

# ANALYSES AND PROJECTIONS OF ECONOMIC DEVELOPMENT

## I. An Introduction to the Technique of Programming

*A study prepared by the Economic Commission for Latin America*



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## FOREWORD

During the fifth session of the Economic Commission for Latin America, which was held in Rio de Janeiro, Brazil, in April 1953, the secretariat presented a report entitled *Preliminary Study of the Technique of Programming Economic Development* (document E/CN.12/292). This study was the logical continuation of the analysis of Latin America's economic development problems that had been undertaken in previous publications of the secretariat.<sup>1</sup> It was a preliminary outline of the methodology of analysis and projection to be used in the formulation of programmes, and took into account not only the factors that influence the region's economic development, but also the need to accelerate that development. The Commission expressed its appreciation of the *Preliminary Study* and noted with satisfaction the agreement reached between the secretariat and the Banco do Desenvolvimento of Brazil for the undertaking of a joint study of the factors vital to the drawing up of a programme which would follow the methodological principles set down in the foregoing document. The Commission also recommended that member Governments submit the study in question for the consideration of the competent agencies in each country, and drew their attention to the desirability of employing the technique of projection. Among other recommendations, it was suggested that the secretariat continue its studies on the technique of programming economic development and that it lend its technical collaboration to those Governments requiring assistance in working out development plans.<sup>2</sup>

In accordance with the injunctions of the Commission, after the fifth session the secretariat undertook a revision of the study presented at Rio de Janeiro and, with the approval and widest possible collaboration of the Government of Colombia, initiated in that country a study of economic development aimed at formulating a programme similar in outline to that already undertaken in Brazil.

The present work is a revised version of the document originally submitted at the fifth session. In its new form, the text constitutes a general introduction to the studies of the technique of programming, as applied to specific cases of the Latin American countries. This necessitated

<sup>1</sup>See *The Economic Growth of Latin America and its Principal Problems*, document E/CN.12/89/Rev.1 (United Nations publication, Sales No.: 1950.II.G.2); *Economic Survey of Latin America, 1949*, document E/CN.12/164/Rev.1 (United Nations publication, Sales No.: 1951.II.G.1); *Economic Survey of Latin America, 1951-52*, document E/CN.12/291/Rev.2 (United Nations publication, Sales No.: 1953.II.G.3); *Theoretical and Practical Problems of Economic Growth*, document E/CN.12/221 (United Nations publication, Sales No.: 1952.II.G.1); *Economic Survey of Latin America, 1953*, document E/CN.12/358 (United Nations publication, Sales No. 1954.II.G.1); and *Economic Survey of Latin America, 1954*, document E/CN.12/362 (in press).

<sup>2</sup>See resolution 48 (V) (document E/CN.12/333), adopted during the fifth session of the Commission.

the introduction of certain modifications, for which the following explanations are given.

First, the study is now limited to a consideration of several important problems involved in the technique of programming; to a preliminary examination of certain of these problems as they affect Latin American development; and to a detailed examination of the general concept and more significant aspects of the methodology. The description of the technique as applied to the case of Chile, which appeared in the original document E/CN.12/292, has been suppressed in the present volume since, on the one hand, country studies will be published separately and, on the other, several statistical and other data included in the former report have, in the interim, been subject to some modification. The secretariat is at present engaged in the complete revision of this material.

Secondly, the present version has taken into account the opinions and criticisms of the original work expressed by economists and other authorities both inside and outside the secretariat. One of the most frequent observations was that a more systematic presentation of the proposed method was lacking. In consequence, an attempt has been made at greater clarity in certain sections, and the chapters dealing with technique and methodology have been entirely rewritten.

Several of the comments received by the secretariat refer to more substantive questions, since they are related to theoretical problems involved in economic programming and in general development. In the present work it has not been possible to tackle these problems in all their implications, but the secretariat is now making every endeavour to pursue their investigation. Thus, this Introduction is in the nature of a preliminary work, containing hiatuses and imperfections, some of which are mentioned in the text itself. Any criticisms of the ideas expressed herein, or any studies which individuals or institutions interested in the subject may be led to undertake, will be of inestimable aid in the preparation of subsequent secretariat surveys, and will help economic development—a matter of such urgency—to achieve the necessary progress.

This volume will be speedily followed by the publication of an account of the work carried out in Brazil and Colombia,<sup>3</sup> as well as by the appearance of a revised version of the report on analysis and projection of economic development in Chile. These studies are indispensable for a better understanding of the question, and, together with the general examination presented in the following pages, form integral parts of one whole survey.

<sup>3</sup>See documents E/CN.12/364 and E/CN.12/365 which will be presented in preliminary form during the sixth session (Bogotá, August-September 1955). The final versions will be published in 1956.



## Chapter I

### THE MAIN PROBLEMS OF THE PRELIMINARY TECHNIQUE OF PROGRAMMING

#### 1. DEVELOPMENT PROGRAMMES AND THE REGIMENTATION OF THE ECONOMY

A clear distinction is not always made between the concept of a development programme and that of rigid state control of the economy. Such ambiguity must be dispelled. A programme of economic development is the expression of a simple idea, namely, the desirability of increasing and judiciously regulating capital investment, so that a stronger impetus and greater order may be given to the growth of a country. Undoubtedly, the State may thus encompass a very wide sphere of action and to a great extent supplant the role of private enterprise. But this is by no means inherent in a development programme. In fact, state intervention may even take place without economic development as a definite objective, and there may be no clear direction of investment. Conversely, a programme may be put into effect with the minimum of state intervention. That the sphere of action of private initiative and free enterprise may in reality be very wide does not imply that the State ought necessarily to limit itself to the traditional attitude of *laissez-faire*. On the contrary, a programme calls for the firm application of a development policy. But this is possible without shackling private enterprise which may, in fact, be stimulated into undertaking certain activities, and be offered access to essential resources. The State possesses effective instruments for this purpose, namely, its fiscal and tariff, monetary and credit policies, and domestic and foreign loans, apart from its direct participation in those basic investments which, for one reason or another, cannot be effected by private enterprise. Well handled, these can become the chief instruments of a programme conceived in terms of a development policy.

Here, too, it would be as well to avoid confusion. There are two kinds of state intervention: that which involves the use of such instruments and which creates a favourable environment for the evolution of private enterprise, enhancing its ability to fulfil certain goals or objectives; and that of a regulatory character which tends to prescribe what private initiative may or may not do. The system of exchange permits and price controls is symptomatic of this kind of intervention. A good programme, far from strengthening or insisting upon the necessity of this type of control over the actions of individual entrepreneurs, could, on the contrary, create favourable conditions for its elimination, by means of a more systematic and intensive growth of the economy.

There is no point in repeating here the reasons for advocating the formulation of development programmes in the countries of Latin America which were set forth in an earlier work.<sup>1</sup> The purpose of the present report is to

<sup>1</sup>See chapter IV of *Theoretical and Practical Problems of Economic Growth*, *op. cit.*

tackle more specific problems and to discuss the actual technique of programming. Since this field is so very vast, the study will of necessity be limited to a consideration of the preliminary technique of a programme, that is, the several methods of analysis and projection which permit the definition of the fundamental elements upon which must be based those objectives, plans and measures of economic policy which integrate a programme. This technique embraces a whole series of closely interrelated problems. The present chapter will provide a general commentary on these questions, in order to clear the field for the following chapters.

#### 2. DEVELOPMENT TARGETS AND INVESTMENT

The first problem involved in the technique of formulating a programme consists in determining the possible targets of development in a given economy. Such a problem cannot be resolved without a prior review of past events and present possibilities, and its solution must be the result of painstaking analysis. First, to undertake what might be termed a diagnosis of the national economy, an examination must be made of the way in which a country has evolved in latter years, and of the dynamic factors which have played a part in its growth. Of special importance is the determination of the most recent rate of growth, as well as of the efforts made by the economy to attain it. Secondly, a study must be undertaken of probable future trends, and of the possibilities of change or of persistence in the internal and external factors that have played a role in recent years. An over-all survey of these elements will enable the economy's growth potentialities to be assessed, and the degree of effort required to attain various rates of growth to be defined.

The possible conclusions to be derived from the results of such an analysis are many and varied. It may well be that, on account of favourable circumstances—internal or external in origin—the country has attained what might be considered a satisfactory rate of growth, but that a continuation of these promising trends is unlikely. In that event, the aim of a programme might be to maintain development at the previous rate, which would necessarily imply a greater effort on the part of the economy as a whole. Another possibility is to accelerate the rate of growth, inasmuch as the present rate is considered unsatisfactory, or because it is thought that the economy could either make a greater effort or achieve a better organization and distribution of its resources. These two instances are perhaps the most typical in Latin America.

At all events, it is likely that the study of recent and future trends in a country's development will suggest various alternative patterns of growth, depending upon the degree of effort employed. One of the decisive factors in

the evaluation of these alternatives is the level of investment required to ensure that a given rate may in practice be achieved.

Careful calculation of the total investment required would be a laborious task. But simplified procedures exist which, established upon past experience of a country's economy, make possible such a computation. These methods are based on the relationship between the stock of capital and income over a representative period. This relationship will give an approximation of the volume of new investment required to attain a given increase in income. Thus, taking Latin America as a whole, it can be estimated—according to experience later than that of 1935—that to obtain an increase in income of 1 per cent, about 2.3 per cent of income must be devoted to capital investment, apart from the amount which must be invested to offset the loss or depreciation in the stock of capital.<sup>2</sup>

With the coefficient thus derived it is possible to make a preliminary estimate of the volume of income that would be obtained from year to year according to each rate of growth, as well as of the aggregate investment required to attain it. In this way projections of income and investment are drawn up on the basis of past experience, which by their very nature are general and aggregative. The next step is to establish projections for individual sectors of the economy, with more-detailed estimates of the capital required by each, so that the general projections of investment can be subsequently amended. But this comes at a more advanced stage of programming, and meanwhile work must proceed with aggregate projections.

To return to the previous question—it is in this matter of investment that economists responsible for programming encounter the first limitation to the range of alternatives. To attain a higher rate of growth, the coefficient of investment must be raised. This implies a corresponding increase in saving, which cannot be achieved without a restriction of present consumption. On paper, it is easy to see how the lowering of average *per capita* consumption by the adoption of this or that measure could raise the coefficient of investment, so that, within a very few years, income would increase and consumption return to its former level, subsequently expanding at a higher rate than before. The numerical demonstration of the acceleration of growth is a very simple concept. But in the act of expressing numerical hypotheses in terms of practical reality many stumbling-blocks are encountered.

In the first place, preference for the current pattern of consumption is very strong because the population will not readily accept any modification of its habits of consumption and saving, unless there is an appreciable change in the volume of income or in its distribution among the different social groups. This attitude is all the more understandable in countries such as those of Latin America, where the level of consumption—although it has risen in no small measure—remains very low, notwithstanding the fact that the pattern of income distribution would suggest that the higher income groups are capable of much greater saving than at present.

In the second place, very strong pressure exerted on consumption may lower it to a level below the installed capacity of consumer goods industries, so that the stimulus

provided by this important sector of production would be lost.

These practical difficulties are one of two fundamental reasons for believing that savings must be supplemented with foreign capital to attain a higher rate of growth. The other reason will be examined at a later stage. The additional contribution of foreign capital is usually considered as a transitory expedient which allows of a higher rate of growth without the curtailment of existing consumption. It impermanence rests upon a simple principle. The growth of income must be accelerated with the aid of foreign capital until it reaches a point, beyond which all the investment required for further growth at a higher rate of development can be covered with domestic saving, without resort to additional foreign capital. From this point of view the aim of the foreign capital inflow is to create conditions favourable to an increase in the savings coefficient. In a programme, the time required to raise initial domestic saving to the level necessary to achieve the target rate of growth will be called the period of transition.<sup>3</sup>

In other words, foreign capital must facilitate an increase in the coefficient of domestic savings, without it being necessary to reduce current consumption. Nevertheless, it will be essential to restrict the expansion of consumption as income rises. A larger share than previously of the increment to gross income being obtained from greater investment should be devoted to savings. If this is not accomplished and the savings coefficient remains at the same level, the inflow of foreign capital must continue indefinitely in order to maintain the desired rate of growth. This would be impracticable for a series of reasons. Among them figures the increasing burden of remittances abroad, which could be borne only on the assumption that the foreign capital inflow would continue to increase without interruption, not only to meet the deficit in saving, but also to contribute to the payment of these remittances.

Between the assumption of a continued and indefinite rise in the inflow of foreign capital and the hypothesis that consumption would be restricted in order to accelerate development without resort to foreign investment, there are other intermediate courses. Everything depends upon the share of the increase in income to be set aside for saving during the period of transition. The higher this proportion and the more rapidly a country's domestic saving reaches the savings target for a higher coefficient of investment, the smaller will be the foreign capital required to attain this objective. Here also the question of feasibility must be borne in mind, which, as in the preceding example, is directly affected by political and social, as well as economic, considerations. The programming expert must present the different possibilities as objectively as possible, to facilitate the decisions of the responsible authorities. Not only must this aspect be considered, but also that of import replacement or an increase in exports. Domestic savings alone are not enough; the possibility of transforming them into capital goods imports is indispensable.

<sup>3</sup>This treatment of foreign capital as a transitory phenomenon would be understood as a methodical approach and not as a principle of economic policy. It is quite conceivable that, after the so-called period of transition, the inflow of foreign capital should be continued, to make possible a higher rate of growth and the introduction of new techniques.

<sup>2</sup>For further details, see chapter III.

### 3. THE BASIC NEED TO RAISE THE DOMESTIC SAVINGS COEFFICIENT

It was stated above that domestic saving would have to increase until it could cover the investment needed for an accelerated rate of growth. This is one of the most delicate points in a development policy, in view of the tendency to adhere to a set pattern of saving and consumption. It would not therefore be possible to count too much on a spontaneous rise in saving resulting from the gradual and moderate increase in income achieved by a programme. The lower income-groups will be inclined to use their increased earnings to improve their standard of living, and very little in the way of saving can be expected from them. The higher income-brackets have a greater capacity for saving, but they too will tend to increase consumption in the adoption of new and luxurious ways of life. These obstacles to an improvement in domestic saving have sometimes led to the replacement of voluntary saving by inflationary methods of financing which result in lower real incomes for the poorer and more populous sectors. To judge by the experience of some Latin American countries, the consequences of such a policy were either that saving rose at an extremely high social cost or that dangerous conditions of foreign and domestic instability were created. Both situations retarded development over the long term.

It is thus part of the technique of programming to discuss the means available to a government for modifying saving in terms of the existing data on income distribution. Some examples will serve as a better illustration of these possibilities. It should be recalled that much private financing takes the form of reinvested profits, which firms or enterprises retain in preference to distributing them as dividends. An incentive to this type of saving could be most effective, and doubtless the tax system might play a decisive role by reducing or eliminating taxes on income that is reinvested. This is one of the most important objectives of fiscal policy in a development programme. The fiscal instrument might thus be employed to encourage saving by the entrepreneur before income flows towards consumption. But taxes can also be used directly to discourage consumption, above all in the high income groups, insofar as they have rejected investment. If the coefficient of saving in the high income sector is relatively low, and these means for discouraging consumption cannot increase it, fiscal policy might be of considerable help in achieving this end, if a substantial proportion of the tax on such income were used for purposes of investment. In this way, the State would divert to investment those resources which would otherwise have been used for consumption. Moreover, the investments could also be made through private channels if the resources thus obtained were placed at the disposal of those entrepreneurs who would know how to invest them, instead of resorting to familiar inflationary expedients in the banking system.

Nevertheless, the fiscal instrument may also exert an unfavourable influence on development. Excessive current government expenditure in relation to a country's income can adversely affect the savings of the population and will thus retard the rate of development. It is extremely difficult to demarcate clearly what is and what is not excessive in this field. There is obviously much need for governmental services in Latin America, but equally vital is the necessity to increase the consumption of goods and of cer-

tain private services. A programme must be based on certain assumptions of the relationship between the rate of development of governmental services and the expansion of gross income; should these assumptions cease to be valid, the programme must be revised.

The nature of this relationship is usually determined by motives other than economic development. But the projection of its influence on the rate of development, together with the analysis of growth, may perhaps contribute to the argument that the policy of fiscal expenditure should not be considered independently from the problems of a country's growth.

### 4. LIMITATIONS TO DEVELOPMENT ARISING FROM THE CAPACITY TO IMPORT

Another problem involved in the technique of programming must now be examined. It was explained earlier that one reason for resorting to foreign capital was the practical difficulty of reducing consumption in order to increase saving. If the coefficient of capital goods imports to aggregate investment were equal to the coefficient of consumer goods imports to aggregate consumption, there would be no difficulty in using the increment in saving for the purchase of foreign capital goods. But this does not happen. Even in those Latin American countries where capital goods industries have been vigorously developed, the ratio of capital goods imports to investment is much higher than the ratio of consumer goods imports to consumption. A reduction of consumption in favour of saving does not therefore lower imports as much as the growth of investment increases them. There are two fundamental consequences. First, greater saving, and its transfer abroad, weakens the demand for domestic consumer goods, without being offset by a corresponding increase in the demand for domestic capital goods. Secondly, imports will rise. These are two aspects of the same phenomenon, in which the deficiency in the domestic demand is equivalent to excess demand for imports.

This excess is the important point. The shift of income from consumption to investment implies additional imports. It is conceivable that non-essential imports might be restricted in order to offset this increase. Nevertheless, apart from the fact that such a process does not occur spontaneously but requires selective state intervention, the margin for control is very narrow in countries where severe restrictions upon the expansion of imports are already in force because essential purchases fully absorb the capacity to import. Such is the case in some Latin American countries.

However, this is only one aspect of a more general problem, namely, that of the limitations imposed on economic development by the capacity to import. Even when greater imports of capital goods are offset either by a reduction of imports of other goods or by the use of foreign capital, only a temporary difficulty has been removed. There still remains an obstacle of greater importance to economic development, to which frequent reference has been made in earlier studies of the ECLA secretariat: as *per capita* income expands, imports generally tend to rise more than the capacity to import. This disparity makes the substitution of domestic production for imports inevitable, so that income may continue to grow at a rate which is adequate in relation to the capacity to import.

A development programme calls for an assessment of how much substitution should be effected in order to attain a given rate of growth of income. For this purpose two series of hypothetical calculations must be made. First, the probable expansion of the requirements for imported goods must be determined by means of a series of projections, to which further reference will be made. Secondly, the probable growth of the capacity to import must be estimated in terms of exports and their relative prices, as well as the volume of foreign capital deemed necessary to carry out the programme. In view of the probable increase of these requirements and of the trend of the capacity to import, the difference between these two estimates will give the volume of imports to be replaced by domestic production. Different alternatives will be available in selecting the most suitable substitutions and, in some cases, in deciding whether it is preferable to increase import replacement or encourage exports. Apart from other considerations, the essential criterion should be the increase in income obtained from the different alternatives. The greater the increment obtained by a given addition of capital, the greater will be the volume of goods and services available for the community. Since further reference will be made to this subject at a later stage, it is now sufficient to note that the calculation of import replacement, as of other fundamental estimates in a programme, rests upon a series of hypotheses which must be carefully prepared on the basis of past events and future prospects; but it is not worth while to discuss whether or not they are true in practice. It is therefore necessary to introduce an element of flexibility into a programme, which, while affecting its primary aims as little as possible, will allow it to be adaptable to any changes that may occur.

##### 5. THE PROJECTION OF DEMAND IN TERMS OF THE RATE OF GROWTH

The problem mentioned above forms part of a much greater whole, from which it has been isolated inasmuch as its different characteristics give it special significance. This problem appertains to the assessment of the growth in the demand for available goods and services, in order to calculate investment requirements in the distinct sectors of economic activity and in the different branches of each sector.

The aggregate projections give a first approximation of the volume of capital required to obtain a given rate of growth and its corresponding coefficient of investment. A second approximation must then be made by calculating capital requirements by sectors. Once this is done, either the first calculation or the rate of growth must be adjusted. In this way, the aggregate projections of income and overall capital requirements are transformed into projections by sectors. Only then may more elaborate calculations be made with the assistance of specialists in the different activities. To enable such specialists to work satisfactorily, it is essential to provide them with clear and precise information on what each activity must attain in terms of the probable rise in demand and the capital available to meet this growth.

At this stage the part to be played by the projections may be seen more clearly. It is not possible to project the probable expansion of demand in each sector of economic activity without first having determined the general rate of growth which it is desired to achieve. The target for *per capita* income growth determines the form and inten-

sity with which the sector-by-sector expansion of demand can be forecast. It is thus necessary to pass from the general to the particular, in order to return once more to the aggregate projections and introduce the necessary adjustments there.

If future demand were to expand in the same proportion as total consumption, its calculation would be very simple, since the rate of growth in the aggregate projection could be applied to individual sectors. Obviously this is not the case. With a given increment of income, the expansion of the demand for the different goods and services varies; in some cases demand increases more than incomes, while in others it rises either proportionately to or less than income. The income-elasticity of demand according to the principal groups of goods and services must therefore be calculated; but this is no easy task, given the unreliability of Latin American statistics. The same is true of the estimates of capital needs in the different sectors, although a detailed explanation of this subject would be repetitious at this stage.

This method of summarizing the principal problems of the technique of programming was adopted in the interests of clarity, and does not imply that in practice these problems should be considered in the same order. In reality, once the rate of growth has been determined, they must be analysed according to the relationship imposed by their interdependence. Thus, the assessment of capital needs, to which reference has just been made, cannot be separated from an analysis of the availability and productivity of labour. This is another of the problems to be broached in the present chapter, and its discussion now follows.

##### 6. PRODUCTIVITY AND TRANSFER OF LABOUR

Two main stages distinguish between economic development in under-developed countries and the growth of more highly developed countries. By the very way in which technical progress penetrates the less developed countries, as explained in another ECLA report,<sup>4</sup> Latin America's primary activities, except those producing for export, are generally characterized by a relative abundance of labour, a relative shortage of capital, and low productivity. As a result, a high proportion of the labour force is engaged in these primary activities. As technical progress advances, the proportion gradually falls and the labour force shifts to industry, trade, transport and services. In the latter sectors the intensity of capital per gainfully employed person is usually higher than in primary activities, with a consequent difference in labour productivity. Therefore, as the working population shifts from activities with low productivity to others where it is higher, average productivity throughout the whole economy also rises, although it may not have improved in any individual sector. For this effect to be achieved, it is sufficient for the increment in the population that cannot find employment in agriculture to be absorbed by the other more productive activities. But in reality this process is accompanied by an improvement in the productivity of the different sectors; the shift of the active population from primary production becomes greater as the same productivity can be attained with a smaller labour force. The same is true of the other sectors, although to a varying degree and, as these effects are added to those of the normal displace-

<sup>4</sup>See *Economic Survey of Latin America, 1949, op. cit.*

ment of the labour force, both elements unite to raise productivity.

Given the degree of progress in productive technology, there is a limit to the reduction of the active population engaged in primary activities, which cannot continue to decrease without adversely affecting the relationship existing between production in the different sectors. The complete assimilation of techniques in primary activities will enable such activities to surrender virtually their entire surplus labour, and thus the initial phase of economic development will be accomplished.

During the second stage, there are no great shifts in the labour force. There is a certain technological homogeneity in all activities, compatible with the degree of technical progress in the different branches. Naturally, a certain amount of displacement will occur, owing to the different intensity with which this technical progress is introduced and from the different rates of expansion of demand. Nevertheless, the large and unilateral shifts from primary activities to others will have disappeared. There will be no further outstanding increases in productivity as a result of a mere transfer of man-power, but only through the improvement of skills and of the capital intensity in the individual sectors and their branches.

The Latin American countries are now in the first stage, although some are reaching its conclusion and are ready for gradual entry into the second stage. In other words, they do have the problem of a shift in the labour force from agriculture to industry, trade, transport and services. In general terms, therefore, the labour force is not usually a factor restricting development—at least from the point of view of its size. The limiting factor lies in the capital required to free labour from activities with low productivity and at the same time to raise productivity in the other sectors by increasing the capital intensity.

Herein lies one of the principal motives for drawing up an over-all programme which can co-ordinate partial plans and make them compatible. How, for example, could *per capita* productivity in agriculture be raised, if a simultaneous attempt were not made to reabsorb in other activities the labour force which agriculture, with its own rate of expansion, could no longer retain? From another standpoint, how could industrial development be accelerated if it were not known how much of the labour force could be withdrawn from agriculture, or from personal services?

The essence of the problem is as follows: given the probable greater demand in the various activities, and the higher productivity to be expected from each of them should their capital intensity be increased, how should man-power be distributed among them, what shifts will be necessary, and how and where can the displaced labour force be absorbed?

#### 7. PRODUCTIVITY AND INVESTMENT ALTERNATIVES IN A PROGRAMME

To solve this problem, the concept of productivity and the influence of capital formation upon it needs prior explanation. This is a basic concept in programming development. Once the rate of growth to be reached within a given period has been determined, and a preliminary estimate made of the capital requirements, a criterion for directing the distribution of the capital among the different sectors and branches of each sector must be established. An estimate will be available of the expansion of the re-

quirements for goods and services in the different sectors and branches. To meet these requirements, various alternative courses of action are open, and one of the most important considerations in choosing among them, but not the only one, is productivity.

There are two types of alternative. The first is the satisfaction of requirements by domestic production and imports, although it is known that the present quantum of imports cannot be maintained, since the capacity to import expands more slowly than the demand for imported commodities. Replacement of imports must therefore take place and, once again, various possibilities offer themselves. Should the domestic production of such and such a foodstuff be undertaken or increased instead of this or that raw material or manufactured product? What should be the selective criterion if, given the increment in the available capital and in the labour force, the aim is to achieve a maximum rise in income? These are the first types of alternative which must be examined by the economist in charge of a programme.

The second type of alternative is closely linked with the first, although it does not encompass the whole economy, but is concerned with each of the individual branches. The problem lies in the existence of different solutions for the production of a given commodity or service, each of which involves a differing capital intensity per worker. What criterion should be adopted so that the series of investments will be accompanied by a maximum increment in production?

A discussion of this aspect must include the two principal forms of productivity; namely, product per worker and product per unit of capital. To increase productivity in either of these forms, it is generally necessary to raise the capital intensity per worker. For the economy as a whole, the final objective of technical advance is a progressive increase in the product per worker, that is, a reduction in the amount of labour per unit of production. However, to obtain a given increment in the product per worker may require disproportionate increases in capital. The ideal situation would be for a given increment in the product per worker to be achieved with the minimum increase in capital, which evidently implies a maximum increment in the product-capital ratio. But either because of reasons inherent in the process of introducing improved techniques, or because the latter is aimed mainly at achieving the greatest possible increase in labour productivity, capital increments which do not bring about an increase in the productivity of capital or which even result in a decline in the product-capital ratio are not only conceivable, but are also of great importance in more economically developed countries.

In the United States the product-capital ratio notwithstanding continual fluctuations over short periods, tends rather to remain constant, owing to factors of another order. This would appear to indicate that those effects of an improvement in technique which tend to increase the product-capital ratio have been offset by others having the opposite results.<sup>6</sup>

<sup>6</sup>The following explanation of the same phenomenon would be more in line with traditional theory: since the capital factor has tended to grow with greater rapidity than the labour factor, and in view of the law of diminishing returns, the productivity of capital will tend to decline over the long term. The fact that statistical evidence reveals this productivity as having in practice remained constant can be attributed to technological advances offsetting the drop in the productivity of capital.

This is one of the most interesting aspects of the dynamics of development. If the guiding principle of the capitalist entrepreneur were the choosing of those investments designed to obtain increases in the unit product proportionately greater than the increment in capital, thus obtaining the maximum increase in product for the economy as a whole, he would not resort to investments of another type. However, under the impetus of improved techniques and with a large supply of capital at his disposal, he is not obliged to follow this line of action. If technical progress enables him to raise labour productivity, by reducing costs and increasing profits, he will adopt it without regard to the product-capital ratio. This procedure involves profound dynamic consequences. If labour productivity is increased in this way, wages will tend to rise, so that labour will be drawn away from activities with a lower product per worker, albeit with a higher product-capital ratio. Thus, these activities, in turn, are compelled in many instances to seek methods whereby labour productivity can be increased and competitive wages paid, although this may imply a decline in the product-capital ratio. At an elemental stage of productive technique, in which the capital per worker is scanty—a situation which is prevalent in Latin American subsistence farming and handicrafts—the product-capital ratio is relatively high. As modern technique becomes more wide-spread, this process will be repeated and, in order to expand labour productivity, it will be necessary to lower the product-capital ratio. This takes place, for instance, in the mechanization of agriculture; but such an example is an illustration of the compensatory factors at work, since technical progress in agriculture is continually offering new means of increasing the product per unit of land and of worker with a relatively small amount of capital.

This historical development of technique and its effects on the economic process have taken place gradually in the more highly developed countries, until the present high standards have been reached. But the under-developed countries have no reason to follow the same pattern. Advanced technique is available, and there is no need to pass through all the stages of its development. Such countries lack the necessary capital to assimilate it, and even if the requisite resources were available, technique in all its complexity could not be rapidly absorbed. In 1953, Latin America had an average *per capita* income of 247 dollars at 1950 prices; taking into account changes in purchasing power, it would be necessary to go back as far as 1840 to find a comparable figure in the United States. But during that period *per capita* investment was barely 505 dollars, whereas at the present time it has reached 3,330 dollars (both at 1950 prices). Latin America, in common with other under-developed areas, having an income level equivalent to that of the United States of more than a century ago, is therefore confronted with the results of a technological development which calls for high *per capita* investment.

This demands a very intensive investment effort. But, as will be seen in chapter II, it would not be possible to attain the capital intensity required and the corresponding level of productivity within the short space of a few years. The amount of capital available would fall short of requirements and therefore any examination of the capital increments necessary to obtain an increase in the product per worker touches upon one of the most vital aspects of programming development.

This leads to the question of alternative investments in a given branch of activity, to which reference was made earlier. Investments of varying intensity may be made in the same branch. In some cases the intensity may be very high, accompanied by a high level of productivity per worker, although the product-capital ratio is lower than in other investments or in the rest of economic activity. It is evident that if there were sufficient capital to attain a higher intensity in all activities, the problem would be solved. However, this is not the case; to obtain maximum income in the economy as a whole, in certain sectors it would be necessary to adopt solutions giving a higher product-capital ratio, even at the expense of foregoing increases in the product per worker.

However, as was pointed out in a former report,<sup>6</sup> it is not always possible to find solutions of this nature, since technological research in those countries where capital is relatively abundant is directed more towards labour-saving processes than to capital saving.

At this point it would be useful to digress a little so that the point just made can be placed in the context of technical development. A British transport authority recently showed that if under-developed countries assimilated the road-building techniques of other countries such as the United States, many of them would be unable to meet the resultant cost. Progress in the field of motor transport, together with the abundance of capital in the United States, has given rise to heavier and faster vehicles, which in turn has created new problems in the technique of road-building, with a consequent increase in investment per unit of surface. This is a further manifestation of the remarkable discrepancy between the modest *per capita* income of under-developed countries and the high investment level required by modern productive techniques.

Thus it may be necessary to adopt solutions implying a product-capital ratio which would be much lower than that of other new investments, owing to the lack of alternative courses of action in the same branch of the economy. On the other hand, the techniques involving a high capital intensity, combined with a high product per worker, attract the Latin American entrepreneur in the same way as his counterpart was drawn during the evolution of capitalism. But in the latter case, technical progress took place gradually and in easy stages, whereas the under-developed countries have sought to absorb advanced technique as quickly as possible, in view of the prospect of greater profits. It happens with relative frequency that entrepreneurs, whose own individual resources are adequate, choose the alternatives involving high capital intensity, while the economy as a whole has sufficient capital only to effect investments corresponding to a much lower intensity. Owing to this shortage of capital, the dynamic effect, which the entrepreneur obtained in the highly developed countries by raising the wage level in the rest of the economy, cannot be achieved—or only to a very small extent; moreover, available capital is not distributed in a manner conducive to obtaining the maximum increment in the product.

Undoubtedly, this will not result in the most economical distribution of the small stock of capital. In a programme of development, all possible attention should therefore be devoted to this problem, particularly in those instances where the government effects direct investments or guides

<sup>6</sup>*Theoretical and Practical Problems of Economic Growth, op. cit.*

the investment policy by means of its tariff, fiscal or credit measures.

The other types of alternative are of equal importance, although they are not applicable in a single branch of activity, but among different branches, especially in connexion with import replacement. Here too, of course, the product-capital ratio must be considered, but in the following special way. If, in order to attain a given rate of growth, a certain amount of substitution must be effected, it would be essential, above all, to select those items involving the highest product-capital ratio. Nevertheless, as these substitutions are carried out, the ratio might decline until it was lower than that obtained in the new investments in the rest of domestic activity. The only alternative would then be to export, always provided that a product-capital ratio could be obtained which would be superior to that in the replacement activities. Should this be impossible, the reduction of the product-capital ratio would be vital to the continuation of growth. As long as this phenomenon is accompanied by an increasing labour productivity, there is no cause for alarm. But it is a different matter if the decline in the product-capital ratio coincides with a fall in the product per worker. This is not an arbitrary assumption, but something that might well take place in fact, if substitution is expanded in those countries whose markets are not sufficiently wide to absorb the production deriving from investments of high capital intensity. The smallness of markets is therefore one of the gravest obstacles to developing the economy beyond a certain limit, which in some cases is not a very wide one.

All the foregoing considerations demonstrate that analysis of productivity is of fundamental importance in a development programme. However, there is very little material available in the Latin American countries, upon which such an undertaking could be based. The greatest efforts must be made in preparing an analysis to ensure the better understanding of the problems of economic development.

#### 8. THE NEUTRALITY OF THE PROGRAMMING TECHNIQUE

In the foregoing pages, frequent reference has been made to alternative solutions which the economist charged with the preparation of a programme should submit with all possible objectivity to the authorities responsible for making the final decision. In some cases, the terms of these alternatives are of a strictly economic character; in others,

social and political factors are involved. These decisions are of no concern to the experts, as such, although the technique of programming must provide a sound basis for judgment so that a full knowledge may be had of the extent of the factors at play and of the consequences to be expected from any decision.

The first impartial step of the programming technique is to discuss the possible rates of growth and to decide whether recourse must be had to foreign capital and, if so, to what extent, to attain these rates of growth. As has already been seen, from the economic point of view various solutions exist, and their selection will inevitably depend upon social and political considerations. The role of the expert is to submit the different alternatives with all objectivity, explaining the requirements and probable effects of each one. It must be ascertained, for example, whether current consumption would have to be restricted in order to attain a given rate of growth, if no recourse is to be had to foreign capital; or what amount of foreign capital would be required according to the way in which consumption is permitted to expand in relation to savings, as a result of the additional increase in income. Similarly, with respect to this problem of increasing saving, the programming technique must make an unprejudiced examination of the various possibilities offered by taxation or other expedients, pointing out in each case the probable effects on the distribution of income and consumption in the different social groups.

This attitude of impartiality in the technique of programming is not only laudable in defining functions; it is also commendable inasmuch as it strengthens the moral authority and increases the powers of persuasion of those drawing up the programme. Programming is an extremely complicated procedure, requiring the collaboration of strong social forces. In obtaining this co-operation, it is indispensable to give an unbiased presentation of the possible targets and the different alternatives for attaining them. The final objective of any programme is to obtain a substantial increase in future consumption, and this inevitably requires the raising of the level of investment by restricting the growth of consumption. The support of vast sectors of public opinion for a development programme necessitates a clear understanding of the need to improve the investment coefficient. Without this support, no development programme could be effectively implemented, no matter how rational and well-contrived it might be.

## Chapter II

### SOME GENERAL PROJECTIONS ARISING FROM LATIN AMERICAN EXPERIENCE DURING THE LAST QUARTER OF A CENTURY

#### 1. BASIC PROBLEMS OF THE TECHNIQUE OF PROGRAMMING IN LATIN AMERICA

The preceding chapter referred to the problems which arise in the technique of programming, and gave a preliminary over-all view of the contents of this report. Before entering into a detailed discussion of the methodology for calculating the projections, some of the basic problems of programming economic development in Latin America should be examined. At the present stage, this analysis can be only of a very general and summary nature, but it will serve to provide a broader statement of some of these problems than that obtained from the studies of individual countries. Chapter II therefore examines those over-all aspects of Latin America's economic development which have a bearing on the technique of programming or which are vital for its analysis. Among the many problems, there are some which demand immediate attention. What was, and what will be, Latin America's rate of growth as compared with that of more developed regions? What is, and what will be, the investment effort and how much foreign capital will be required during an initial period of transition to accelerate the rate of growth without lowering current consumption levels? How will the restrictive factor of foreign trade probably present itself now and in the future? What will be the likely trend of the structural changes in the economy that will take place as a result of foreign trade, if a higher rate of growth is to be reached? What increases in labour productivity will be required by the rate of growth, given a certain rise in the active population? What shifts in the labour force from agriculture to other activities must occur as a general result? Finally, what new complications for Latin America will the notorious instability of external factors add to the many difficulties for programming it has already caused?

#### 2. THE RATE OF GROWTH OF INCOME IN LATIN AMERICA, AS COMPARED WITH THAT OF THE UNITED STATES

To the initial problem of deciding whether the rate of growth in Latin America has been satisfactory, must be added another question. What criterion should be used to determine whether it has been satisfactory or not? First of all, the rate of growth must be established. During the period 1935-51, Latin America's gross income expanded at an average annual rate of 5.1 per cent, and since the population rose by 2.2 per cent each year, the annual increment in *per capita* income stood at 2.9 per cent. The increase in gross income was somewhat higher than that of the gross product, because the terms of trade have improved since 1946.<sup>1</sup> The annual average rates of expansion for the gross product were 4.5 per cent in the aggregate and 2.3 per cent on a *per capita* basis. During 1952 and 1953, the situation was different. In those years, both gross

income and gross product were below the average trend for 1935-51. During 1953, gross income rose by only 2.2 per cent and *per capita* income declined by 0.4 per cent, while the gross product expanded by barely 1.8 per cent and on a *per capita* basis decreased by 0.8 per cent. This pause in Latin America's economic growth since 1952 was due to the absence of those favourable conditions which had caused exceptional development in the post-war period, and in which the substantial improvement in the terms of trade had been the major factor, so that, while permitting income to expand more rapidly than the gross product, they also enabled investment and the consumption level to rise simultaneously.<sup>2</sup>

As a result of the decline in the rate of growth in 1952-53, the average expansion of gross income during the period 1935-53 fell to 4.7 per cent and *per capita* income to 2.4 per cent; the growth rate of the gross product declined to 4.2 per cent and the *per capita* product to 2.0 per cent.

Chart I shows the movement of income and the trend calculated on the average basis mentioned above for the years 1935-53. The choice of 1935 as the initial year for the calculations is not arbitrary. The upward movement of gross income shows that the Latin American economy had already recovered from the sharp decline during the world crisis and that a new impetus for growth had begun. The new upswing was influenced by dynamic internal factors whose effects, already apparent before the crisis, subsequently became a decisive force and thus replaced the weakening of the dynamic external factors which had hitherto dominated Latin America's economic development. It may therefore be said that after the world crisis a new phase of growth began.

Chart I also shows that gross income continually fluctuates above and below the average trend, rising and falling in characteristic movements but always tending to return to the average. These movements in the gross income further complicate the task of programming. Once the rate of growth is known, it should be inquired whether this rate is satisfactory or not. When contrasted with the rate of growth in other countries or regions of the world, Latin America's average annual rate of 2.4 per cent *per capita* in 1935-53 may be considered as satisfactory, although by no means exceptional. The following examples may serve as an illustration:

	Annual per capita rate of growth	
	Historical	During peak period
Japan .....	3.26	3.66 (1908-37)
Germany .....	2.11	2.78 (1860-99)
Sweden .....	1.97	2.36 (1881-1920)
Canada .....	1.59	2.32 (1870-1910)
Australia .....	1.21	—
New Zealand .....	0.99	1.81 (1925-50)

<sup>1</sup>See *Economic Survey of Latin America, 1951-52, op. cit.*

<sup>2</sup>See *Economic Survey of Latin America, 1953, op. cit.*

In the case of the United States, the historical rate of growth during the years 1869-1948 was 1.57 per cent, while in the shorter period, 1869-1908, the *per capita* increase corresponded to 2.15 per cent.

Nevertheless, undue emphasis should not be placed upon comparisons of rates of growth. The historical circumstances under which the economy of a country is developing should always be taken into consideration. In the United States, for instance, development is the expression of a gradual process towards technical improvement and capital formation which is typical of capitalist development. In Latin America, as in similar areas elsewhere, development represents essentially a process of assimilation and adaptation to capitalist techniques, which is not obliged to pass through the same stages nor to last so long as the original process. Furthermore, psychological and social factors of decisive importance to Latin America have made it imperative to accelerate the rate of growth.

This process of assimilation and adaptation has two main aspects. First, consumption habits in countries which have attained a high level of income tend to spread rapidly to less developed areas, both in the private sphere and in the governmental field. Secondly, production methods tend to spread relatively slowly, since the process of absorbing technological advances takes a long time and since capital is normally in short supply. In other words, new consumption habits are learnt much more rapidly than new production methods, a fact which causes economic and social tensions that can be eased only by accelerating economic development.

### 3. EFFECTS OF A POSSIBLE ACCELERATION OF ECONOMIC GROWTH

From this aspect, the acceleration of growth means that the income level attained by more developed countries should be approached more rapidly than at present. If the problem of growth is expressed in this way, the question as to whether the rate is satisfactory or not must be answered in terms of the time required to attain that level.

In 1953, average *per capita* income in Latin America stood at 248 dollars (at 1950 prices), or slightly less than one-eighth of that of the United States (2,000 dollars). The targets for a development programme should always be attainable within a reasonable period of time, but it would be expecting too much to suggest that such a high *per capita* figure could be reached over a short period. In order to discover the first unknown quantity, the figure for the United States may be reduced by two-thirds, or to an average *per capita* income of 666 dollars, which is two and a half times the average *per capita* income of 248 dollars in Latin America during 1953. If such income continues to increase at a rate of 2.4 per cent annually, when will the level of 666 dollars be reached? The answer, forty-two years, provides the information for judging whether or not this rate of growth is satisfactory. But the problem does not end here.

Gross income in the United States has not attained a stationary level. The Paley Report<sup>3</sup> based its calculation of the probable income of that country in 1975 upon the assumption that the *per capita* rate of growth would then be 2.0 per cent annually. If this hypothesis is used as a

<sup>3</sup>Paley, William S. (Chairman), *Resources for Freedom. A Report to the President by the President's Materials Policy Commission.* (The Paley Report) (Washington, D.C.), June 1952.

basis, it is possible to make another illustrative calculation. How long would it take Latin America's *per capita* income to reach one-third of the United States figure, assuming an annual rate of growth of 2.4 per cent in the former and 2.0 per cent in the latter? Given the relatively small difference between the two rates, the period would be extremely long and devoid of all practical significance. In fact, 252 years would be required. Naturally, such an illustration can merely serve to show that a progressive reduction in the very wide margin of *per capita* income at present existing between the United States and the Latin American countries is impossible, unless the latter make a decisive effort to accelerate their rates of development. In other words, there would be no point in making extrapolations of such long duration since, apart from other factors, a slight change in the rate of population growth would entirely alter the results.

These considerations are sufficient to emphasize the magnitude of Latin America's problem. If the substantial difference in the standard of living between Latin America and the United States is to be narrowed progressively, the rate of economic development must be accelerated. For this purpose, it is necessary to raise the investment coefficient, which averaged 15.6 per cent of gross income during 1946-53. As a hypothesis, let it be assumed that greater foreign investment could rapidly raise the coefficient to 20 per cent.<sup>4</sup> This assumption provides very interesting results. An analysis is made later, first, of the effect upon the rate of growth and the time needed to attain the *per capita* income of the United States and, secondly, of the volume of foreign capital required, according to the rate at which consumption should be increased.

With an investment coefficient of 20 per cent, the average annual rate of expansion in *per capita* income would rise from 2.4 to 4.0 per cent and, instead of forty-two years, a period of only twenty-five years would be necessary for Latin America to reach one-third of the *per capita* income in the United States. The shorter time lapse would also narrow the difference between the income levels. Indeed, if Latin America's *per capita* income could continue to expand after these twenty-five years at the rate of 4.0 per cent annually for a further quarter of a century it would reach 1,830 dollars. This figure would be equivalent to one-third of *per capita* income in the United States at that date, provided that the annual rate of expansion of 2.0 per cent in that country continued. The target would therefore cease to be unattainable in theory, although it might be rash to draw conclusions about its practical application. A *per capita* rate of growth of 4.0 per cent is extremely high and in practice would encounter obstacles of another nature, some of which are mentioned later in this chapter. In the meanwhile, the second half of the question must be considered, namely the volume of foreign capital required to attain this rate of growth.

### 4. THE SUPPLEMENTARY VOLUME OF FOREIGN CAPITAL

How much foreign capital, in absolute terms, would be necessary? No reply can be given without first defining a point of vital importance which was stressed in chapter I.

<sup>4</sup>The investment coefficient of 15.6 per cent has been calculated on the basis that 6.0 per cent is for depreciation of capital, which gives a net rate of 9.6 per cent. To reach the rate of 20 per cent, a rise of 4.4 per cent would be required. These calculations exclude the increase in inventories, owing to lack of information, but this factor should not be omitted from future estimates.

The coefficient of saving must rise in proportion to the increase in income, to avoid the need for new net increments of foreign capital over a reasonable lapse of time which was called the period of transition. The problem consists of estimating the aggregate requirements for foreign capital according to the speed with which the coefficient of saving rises during the period of transition. As domestic saving increases, so the share of new foreign investments will decrease, until the latter cover only amortization at the end of the period of transition. From that time forward the volume of foreign capital will remain constant in the projections.

At the beginning of the period, the foreign capital inflow must raise the coefficient of investment from the basic 15.6 per cent to 20 per cent. Assuming that 1956 is the initial year, two hypotheses may be formulated. The first assumes that domestic saving would begin to rise in 1957, reaching 20 per cent in 1963, when any further net investment from abroad would cease. In the second case, the transitional period would be double that of the first hypothesis and the coefficient of saving would become adequate to cover all investment requirements in 1970 only. The result of calculations (at 1950 prices) on the basis of these two hypotheses are as follows. In the first instance, additional foreign capital of 16,300 million dollars would be required, that is, an average of 2,300 million dollars annually for the seven years of the period envisaged. In the second case, when the coefficient of domestic saving grows more slowly, a total of 44,200 million dollars would be needed, that is, 3,200 million dollars *per annum* over the fourteen-year period.<sup>5</sup> Naturally, the degree of internal effort represented by the marginal rate of investment is greater in the first case (0.28) than in the second hypothesis (0.23).

These figures do not attempt to suggest a definite policy for foreign investment in Latin America. The aim of this study, as noted earlier, is merely to give an idea of the extent of a problem that has hitherto been very little examined.

The significance of the calculations should now be analysed and for this purpose tables 1 and 2 have been used to compare the data of the first hypothesis, in which the period of transition lasts for seven years, with the second, where its duration is fourteen.

Table 1. Projections of *per capita* income, *per capita* consumption and the domestic savings coefficient (Dollars)\*

Years	Income	Consumption		Domestic savings coefficient	
		First hypothesis	Second hypothesis	First hypothesis	Second hypothesis
1956	256	225	225	15.6	15.6
1963	350	280	288	20.0	17.8
1970	461	369	369	20.0	20.0

Source: Economic Commission for Latin America.

\*At 1950 prices.

<sup>5</sup>In both hypotheses, the resources required to cover capital depreciation and remittances of profits and interest have been included in the figures representing the additional foreign investment.

Table 2. Average annual *per capita* rates of growth of income and consumption

Periods	Income	Consumption	
		First hypothesis	Second hypothesis
1956-63	4.0	3.6	3.6
1963-70	4.0	4.0	3.6
After 1970	4.0	4.0	4.0

Source: Economic Commission for Latin America.

In both cases the rate of growth of gross income is equal, since they fulfil the purpose of expanding it at an aggregate rate of 6.2 per cent and a *per capita* rate of 4.0 per cent. But the behaviour of consumption is different. According to the first hypothesis, where the savings coefficient reaches its target in 1963, the expansion of consumption is naturally much slower, but investment using domestic saving grows much more rapidly. Conversely, in the second case, consumption grows faster, at the expense of investment using domestic saving, and hence the need for more foreign capital. Nevertheless, it should be noted that the slower expansion of consumption, when the period of transition lasts for only seven years, is fully compensated by the fact that, after 1963, its rate of growth is equivalent to that of income, whereas in the second case, a further seven years must pass before consumption attains the average annual rate of growth for income, namely, 4.0 per cent. This is tangible evidence of the benefits of greater domestic saving.

But it cannot be said of the first hypothesis that the increase in consumption is weak. On the contrary, the average annual rate of growth would be 3.2 per cent until 1963, which is much higher than the 2.0 per cent recorded for the period 1945-53, when external factors were exceptionally favourable. Consequently, the first hypothesis by no means implies austerity, and still less does the second, where the average rate of growth for consumption would be 3.6 per cent until 1963.

It would be entirely feasible to decrease foreign capital requirements by reducing the rate of growth of consumption. But if the objectives of development are to be achieved, the practical difficulties of implementing such a plan become more serious if an attempt is made to hasten the raising of domestic savings to the level ultimately required. This is not only because there will be a growing resistance to any change in saving and consumption habits, but also because of the time required to replace imports until the balance-of-payments situation can bear the consequences of ending the foreign capital inflow.

At this point it would be advisable to make a brief digression. A certain risk exists in these projections, that of considering the results as final data from which definite conclusions may be drawn. They should in fact be regarded as instruments of analysis and as a basis for preparing hypotheses, so that a preliminary approximation of the nature and extent of the problem can be obtained.

In this particular case it should be recalled that all the estimates are based on the assumption that the product-capital ratio will remain constant. But as regards this specific problem, there is no justification for departing from this assumption, nor is it necessary to do so in this preliminary over-all survey. Development, however, does not only depend upon the labour force and the capital

density, but also upon a combination of other factors, among which natural resources are of fundamental importance. Over a relatively short period, this factor may be considered as constant, but it does not apply to the very long periods used in some of the estimates given earlier. Although a comparison with the United States provides a good illustration, it is clear that the intensity of growth in that country largely arises from the very favourable combination of resources and the manifest readiness of the population for economic development. To whatever extent Latin America in time reaches a capital intensity comparable to that of the United States, its gross income could not reach a corresponding level because the product-capital ratio would have declined either because of limited natural resources or because of inadequate determination to use them. In this connexion, very differing situations exist within Latin America itself and would be disclosed by an individual study of each country, if such were pertinent at this stage.

#### 5. FOREIGN CAPITAL AND ITS EFFECT ON THE CAPACITY FOR EXTERNAL PAYMENT

The problem of foreign capital includes another aspect of fundamental importance, namely, the manner in which remittances of profits and interest are related to Latin America's capacity for external payment. During 1946-53 these remittances accounted for 9.0 per cent of that capacity. What proportion would be absorbed in the two cases outlined above, that is, an investment of 16,300 million dollars in seven years or one of 44,200 in fourteen years, in order to attain an annual *per capita* rate of growth of 4.0 per cent?

To answer this question the rate of yield from foreign capital must first be established. During 1946-52, this rate stood at 7.5 per cent for Latin America as a whole. If it continued until 1963—the end of the period of transition in the first hypothesis—remittances would absorb 19.9 per cent of the total capacity for external payment,<sup>6</sup> as compared with a share of 9.0 per cent in 1946-53. This proportion is very high in the projections, but it need not be so in fact. Indeed, the estimate was based on an average yield of 7.5 per cent, which is substantially affected by the profits on private foreign capital. The interest on public loans is of course appreciably lower and has fluctuated during the past few years between 3 and 4 per cent for the operations of the International Bank for Reconstruction and Development and those of the Export-Import Bank. If these sources became the principal channel for the foreign capital inflow and the average rate of yield therefore dropped to 5.5 per cent,<sup>7</sup> the share of remittances in relation to the capacity for external payment would decline to 14.5 per cent. This figure is more reasonable and would have to be handled properly by an acceleration of the process of import replacement to which reference is made below.<sup>8</sup> After 1963 there would be no further net increments of foreign capital for Latin America, since it is assumed that any new foreign investment would merely suffice to offset amortization. Thus the share of 14.5 per

cent would be gradually reduced in proportion as the absolute, although not the relative, capacity for external payment increased. This would help the process of import replacement after the period of transition. At all events, this high proportion would seem to indicate that Latin America will be unable to absorb very much more foreign capital. In the second hypothesis, the 44,200 million dollars needed to extend the period to fourteen years would require that, in 1970, 29 per cent of the capacity for external payment be devoted to remittances of profits and interest, with a yield of 7.5 per cent, and 21 per cent with a yield of 5.5 per cent. These proportions would be highly detrimental to the capacity to import.

#### 6. THE CAPACITY TO IMPORT AND THE REPLACEMENT OF IMPORTS

It should also be recalled that another factor restrictive to development exists, the effects of which were very apparent during the period following the world crisis and will certainly continue to be evident in the future. This element represents the disparity between the rate of growth of income and that of the capacity to import, to which reference was made in Chapter I.

The fact that exports increase at a slower rate than income, means that the effort towards import replacement, other conditions being equal, must expand in proportion to the rate of growth. As has already been shown, to reach one-third of the current level of *per capita* income in the United States within twenty-five years, Latin America's economy must develop at an annual *per capita* rate of 4.0 per cent, instead of at the 2.4 per cent rate obtaining over the period 1935-53. Consequently, the effort to replace imports by domestic production must be greater, with the complication that the more advanced countries of Latin America have already achieved the easier substitutions. Before this other aspect of development is explored with the assistance of the various projections, an attempt should be made to clarify past experience on this subject.

During the last quarter of a century the evolution of the capacity for external payment in Latin America has by no means run parallel to the movement of income. In 1946-53, the capacity for external payment had risen by only 62.2 per cent from the 1925-29 level, whereas gross income had increased by 121.8 per cent. It must be emphasized that this weaker movement of the capacity for external payment occurred, notwithstanding the fact that the terms of trade were strongly in its favour. Thus, the coefficient of external payment, that is, the ratio between the latter and gross income, dropped from 26.3 per cent in 1925-29 to 19.0 per cent in 1946-53. The capacity to import is obtained by subtracting remittances on foreign capital and other liabilities in the balance of payments from the capacity for external payment. The capacity to import decreased from 21.2 per cent of gross income during the earlier period to 15.6 per cent thereof during 1946-53. This decline is somewhat less than that of the capacity for external payment inasmuch as the proportion of remittances to gross income also decreased. (See charts II and III.)

The sharp fall in the capacity to import, the explanation for which has been given elsewhere,<sup>9</sup> has led to a considerable change in the composition of imports, a change closely linked with the structural transformation

<sup>6</sup>According to a hypothesis presented later, whereby the capacity for external payment increases at an annual rate of 2.2 per cent.

<sup>7</sup>This was reached by assuming that new capital would yield an average of 4.0 per cent, while capital already invested would continue to yield 7.5 per cent.

<sup>8</sup>See section 6 of this chapter.

<sup>9</sup>See *Economic Survey of Latin America, 1949*, and *Theoretical and Practical Problems of Economic Growth*, both previously cited.

in Latin America's economy. The share of final consumer goods in total imports has decreased remarkably, being supplanted by imports of capital goods, raw materials and fuels. (See table 3 and charts IV and V.)

Table 3. Average share of imports of consumer goods, capital goods, raw materials and fuels in total imports (Percentages)

Periods	Consumer goods	Capital goods	Raw materials	Fuels
1925-29 .....	47.5	33.1	13.1	6.3
1946-53 .....	32.1	39.4	19.4	9.1

Source: Economic Commission for Latin America.

These changes in composition have been irregular and there have been sharp fluctuations owing to variations in the capacity to import. Thus, when capacity to import has narrowed, or access to foreign goods has been difficult, the share of raw materials has increased noticeably while that of capital goods has declined, and *vice versa*. This is logical since it enables the impact of external fluctuations on the domestic economy to be weakened, at the expense of violent fluctuations in investment.

An examination should now be made of the way in which changes are related to the growth of available goods and services and of their distribution in consumption and investment. The share of final goods in over-all consumption dropped to a coefficient of scarcely 5.7 per cent in 1946-53, clearly reflecting the effects of import replacement. The same effects may also be observed for capital goods, although the coefficient in relation to total investment still continues to be relatively high, or 37.6 per cent during the same period. (See table 4.)

Table 4. Coefficient of imports in relation to disposable income

Periods	Consumer goods in relation to consumption	Capital goods in relation to investment	Raw materials in relation to consumption	Fuels in relation to consumption
1925-29 .....	12.5	57.0	3.4	1.6
1946-53 .....	5.7	37.6	3.4	1.6

Source: Economic Commission for Latin America.

While the coefficients of finished consumer goods and capital goods imports declined, raw material and fuel imports closely followed the growth of consumption. Consequently, it is in these last two groups of goods that import replacement in Latin America seems to have encountered the most serious difficulty. But the coefficient of raw material imports is not high in relation to aggregate consumption, since it averaged only 3.4 per cent during the period 1946-53. The coefficient of fuel imports was even lower, reaching barely 1.6 per cent during recent years. Nevertheless, these two groups constituted more than one-quarter of total imports in 1946-53. But if the rate of economic development since 1935 continues, these two groups will necessarily absorb a much higher share of total imports, unless the prevailing trends change fundamentally. This probable evolution would be even more intensified, if the rate of growth were accelerated in the manner described elsewhere in this report.

Herein lies one of the major problems confronting economic development. If the expansion of raw material and

fuel imports represents an ever-increasing share of total imports, to what relative extent can imports of final consumer goods and capital goods be restricted? Similarly, how far can the process of import replacement, already introduced, be continued? The margin of replacement appears to be greater for imports of capital goods, which in 1946-53 accounted for 39.4 per cent of total imports and 37.6 per cent of investment. In contrast, imports of final consumer goods, represented only 5.7 per cent of consumption but accounted for 32.1 per cent of total imports. As regards imports, these are the terms in which the problem of future growth must be assessed. But the possibilities should not be ignored of expanding petroleum production and using hydro-electric resources more efficiently, thereby modifying the prevailing trend in fuel imports for some countries. The same is true of some raw material imports. Whatever the progress made in that direction, active substitution of domestic products for imports of final consumer goods and capital goods must continue, according to the resources and rate of growth of individual countries.

#### 7. A HYPOTHETICAL PROJECTION OF THE COEFFICIENT OF LATIN AMERICAN IMPORTS

The extent to which import replacement affects final consumer goods and capital goods depends not only on how far imports of raw materials and fuels can be reduced, but also on the future evolution of the capacity to import. No projection can yet be made of the possible trend in Latin American exports without an individual analysis of the different products, an undertaking which is still in its infant stage. Nevertheless, some recent calculations of the capacity to absorb imports in the United States may serve at least to reach this negative conclusion: there is little prospect of a fundamental change in the tendency of Latin American exports to expand less rapidly than income.

A recent official publication in the United States<sup>10</sup> estimated that for every 1 per cent of expansion in domestic industrial production, there was an increase of only 0.66 per cent in imports and that a change in this trend was improbable. An earlier estimate by the ECLA secretariat—based on projections of raw material imports from Latin America published in the Paley Report and very general estimates for other commodities—showed a similar coefficient of the elasticity of demand for Latin American imports in the United States.

During the last quarter of a century, the elasticity of the demand for imports of Latin American commodities was higher in the United States than in Europe. Consequently, the calculations of the secretariat cannot be reckoned as over-pessimistic if they assume that aggregate Latin American exports to the whole world will under optimum conditions develop in the same way as those shipped to the United States alone. On this basis it may be stated that aggregate Latin American exports will not tend to rise at more than an annual rate of 2.2 per cent.<sup>11</sup> This is not to be considered as a forecast, but merely as a working hypothesis to obtain a first rough approximation of the size of this serious obstacle to Latin America's growth.

The consequences of this possible export trend upon the alternative projections of growth formulated earlier should

<sup>10</sup>See Chart 32 of *The Economic Report of the President*, Washington, D.C., January 1953.

<sup>11</sup>See *The Long-Term Prospects of Latin American Exports to the United States*, Pan-American Union, Washington, D.C., 1953, pp. 28 and 34.

now be examined. For the sake of brevity and to avoid complicating the estimates by varying this element, attention will be focused on 1980. This is the end of the 25-year period required for Latin America's income to attain one-third of the present level in the United States, given an annual *per capita* rate of growth of 4.0 per cent in the region's income. In this case, if exports grow at 2.2 per cent annually and the terms of trade remain constant at the 1953 level, the coefficient of imports in relation to Latin America's income must be condensed to 6.8 per cent by 1980. To appreciate the size of this decline, it is sufficient to recall that imports comprised 20.6 per cent of gross income in 1925-29 and 16.4 per cent in 1946-53. Such a low import coefficient in Latin America would obviously call for a herculean effort in import replacement. How far could such a policy be carried out without detriment to the product-capital ratio? It might be argued that the coefficient is similar to that of the United States during the twenties. But the opportunities which existed in that country for reducing imports are very different from those in Latin America. This refers not only to the development conditions noted earlier, but also to an institutional factor of great importance. The United States was able to make such a striking reduction in its foreign trade because its vast resources could be freely used over the whole of an extensive territory. Economic development was, in fact, accompanied by a strong process of integration.

There is no need to emphasize the vital importance of this difference between the United States and Latin America, where economic development is proceeding in water-tight compartments and where some countries may be approaching a stage when the reduced size of their markets seriously hinders an intensification of economic growth.

### 8. PROJECTIONS OF SHIFTS IN THE ACTIVE POPULATION, OF HIGHER PRODUCTION AND OF PRODUCTIVITY

The above paragraphs outlined one of the most serious obstacles to an annual *per capita* increase of 4.0 per cent in Latin America's income, but this is not, of course, the only hindrance. When contrasted with industry, agricultural production has expanded relatively slowly during the last quarter of a century. It is difficult to say how far this is the result of the elasticity of demand for agricultural products or of difficulties in raising production. But it is certain that, by increasing the rate of *per capita* growth in gross income from 2.4 to 4.0 per cent annually until 1980, the pressure of demand for agricultural production will rise appreciably. Without a detailed analysis for each country, it is impossible to know how agricultural production in Latin America as a whole would respond to this incentive. Meanwhile, any conjecture lacks substance.

Projections of the demand can be made, but more in the nature of illustrations alone. Coefficients of the income-elasticity of demand for foodstuffs and projections of the demand for raw materials must be used, both of which would be around 0.6, to judge from the partial data available. An increase in *per capita* income and variations in income distribution would probably lower the coefficient for foodstuffs and maintain or even raise that for raw materials. To avoid exaggerating the force of this pressure of demand, it is preferable to err by understatement rather than overstatement and to assume that the total coefficient would remain constant as a result of these opposing trends. Given a *per capita* rate of growth of 4.0 per cent in total income, the annual average increase of the demand for

agricultural products would be almost 2.4 per cent on a *per capita* basis, while the aggregate rate would increase by an annual average of 4.6 per cent, since the annual average rise in population stands at 2.2 per cent.

Although this rate is substantially lower than that of the *per capita* expansion of gross income, it would involve trebling agricultural production. At the same time aggregate production of goods and services would rise by slightly more than four-and-a-half times during the next 25 years, in accordance with the given increase of 4.0 per cent in *per capita* income, equivalent to an annual aggregate expansion of 6.2 per cent.

Could agricultural production develop during the next quarter of a century at an aggregate annual rate of 4.6 per cent (which corresponds to trebling the volume), when the annual aggregate rate of expansion during 1945-53 scarcely reached 2.2 per cent? The basic problem is not one of man-power, but rather of enlarging the cultivated area and raising yields. From the standpoint of man-power, the increase in the capital density would allow the reduction in the agricultural labour force to continue. Given the increment in demand, the essential requirement is an increase in productivity per worker.

It is known that the product per worker employed in Latin America's agriculture averages some 357 dollars (at 1950 prices), as compared with 1,113 dollars in other activities. The tendency for the difference to become progressively smaller is a characteristic of economic development, but to achieve this end, the product per worker must rise more rapidly in agriculture than in other activities. It may be assumed that the product per worker in agriculture would rise by an average of 4.3 per cent annually and in other activities by a *per capita* average of 2.8 per cent annually. These rates, duly combined, provide the 4.0 per cent annual average increase in *per capita* income.

In accordance with these figures, the active population in agriculture would increase from 30.5 to 31.9 millions between 1955 and 1980 and from 29.0 to 50.4 millions respectively in other activities. The man-power employed in agriculture would thus decline from 51 to 39 per cent of the total labour force.

If productivity rose by less than 4.3 per cent in agriculture, this sector would obviously need a higher proportion of the labour force and productivity in other activities would have to increase by more than 2.8 per cent annually to reach the target for *per capita* income. On the other hand, if greater technical progress allowed productivity per worker in agriculture to rise, other activities would absorb a larger share of the agricultural labour force and would require a smaller increase in productivity, unless more capital were available to attain a higher rate of growth. This, however, would strengthen the pressure of demand on agriculture.

From the foregoing statements, it may be understood that such data are merely an illustration of this aspect of economic development, given a certain rate of growth. But no information is yet available in Latin America on which to base estimates of this nature with any reasonable degree of accuracy.

### 9. INSTABILITY OF THE ECONOMY AND THE EXECUTION OF A PROGRAMME

The use of projections to explain some of the more important consequences of growth and to forecast the prob-

able magnitude of the results, is one of the first steps in the analysis which programming entails. But, in addition to acting as analytical instruments, the projections are also a means for the approximate calculation of the volume and distribution of the investment required to reach a given rate of growth in income. The projections thus serve to establish from year to year the volume of investment and the income generated in the different economic sectors. The income thus assigned to a given year is the result of investment realized previously according to a coefficient, the size of which was in fact determined by the income level sought.

On examining these calculations, queries arise which should be settled at once. In practice, can this regular and systematic growth be achieved year by year, even assuming great perseverance and steadfastness of purpose on the part of the authorities responsible for the programme? Can the mere will of these officials attain the required coefficients of investment and the desired level in the product-capital ratio?

Doubts are thus cast on the whole question of implementing a programme, particularly in countries which are subject to constant economic instability, as is the case in Latin America. This instability naturally precludes any programme of a rigid nature; there must be elements of flexibility which will keep pace with the constantly changing circumstances without losing sight of the fundamental objectives. How far can this be achieved in practice? Before this question is answered, the principal factors of economic instability in Latin America and their repercussions on growth must be examined.

The main factors of instability are of external origin and exert direct or indirect pressure. In the first place, they cause the income available in relation to the production of goods and services to vary. If the terms of trade were not to fluctuate, and if the components of the balance of payments were such that exports of goods and services were always equivalent to imports, available income and production would always be equal. But this does not occur in reality and the disparity between available income and production is usually of sizeable proportions. Indirect influences are also of considerable importance. They are apparent in investment and in the degree of utilization of the capital stock.

A start may be made with investment. Other secretariat studies<sup>12</sup> have often demonstrated the close relationship between investment and the capacity for external payment. The influence of the terms of trade upon this phenomenon has also been emphasized. Analysis over a longer period of time confirms the dominating effect of the terms of trade, and the close link between the capacity for external payment and investment no longer exists. While the coefficient of the capacity for external payment declined, the coefficient of investment rose. Nevertheless the close relationship between the fluctuations of these two coefficients over the short term is maintained, largely owing to the influence of the terms of trade. However, during the past few years the effects of the terms of trade scarcely reattained the level they had reached immediately after the world crisis, while the coefficient of investment is now substantially greater than before. External and internal factors account for this situation. Among the external factors, the most

important is the decline in the proportion (in relation to gross income) of the remittances of profits and interest on foreign capital invested in Latin America. This contributed to the expansion of domestic saving and thereby to a greater coefficient of investment. It is not surprising, therefore, that if to the coefficient of investment is added the coefficient of remittances in relation to gross income, the resulting curve closely resembles the terms of trade effect, as may be seen by comparing the two curves in chart VI.

Whatever the reasons, there does exist much instability in the coefficient of investment, and the influence exercised by the fluctuating movements of the terms of trade is clearly apparent.

This is one of the indirect ways in which external factors affect the stability of Latin America's production. How do such factors influence the degree of utilization of capital? Elsewhere reference was made to the implications of fluctuations in the product-capital ratio. But, in considering these fluctuations, the relatively slow movement caused during growth by changes in the composition and density of capital was alone included. The fluctuations in the product-capital ratio here are of another nature. They are short-term movements arising not from structural factors, but from a greater or lesser degree of utilization of the capital stock. They respond to changes in demand and variations in the level of investment.

Without of course excluding the importance of internal forces, external factors also play a large part in the changes in demand. In Latin America, the product per unit of capital fell sharply during the world crisis and rose again during the subsequent recovery. The slight decline in economic activity immediately before the Second World War similarly impaired the product-capital ratio. However, the shortage of capital goods during the war, the sharp increase in demand resulting from inflationary pressures, and the need to substitute domestic production for imports, all necessitated a more intensive utilization of the capital stock. As a result, the product-capital ratio regained, and even exceeded, the pre-crisis level. (See chart VII.) Since 1945, there has been another decline, but the degree to which changes in the composition of capital influenced this tendency cannot be established. As outlined in another secretariat study,<sup>13</sup> there can be no doubt that the sharp rise in investment since 1945 weakened the wartime pressure and created a broad margin of idle capacity, held in reserve for a future expansion of demand, but in general detrimental to the product per unit of capital.

Returning to the main theme of discussion, the question has not been raised as to whether, in view of the economic instability, it would be possible to carry out a development programme however well planned it might be. The proper way to state the problem is not to ask whether or not a programme is possible, but rather to inquire what type of programme would meet the characteristics of Latin America's economy. The type of programme is imposed by circumstances and therefore it should be closely associated with measures to alleviate as far as possible the consequences of external instability. A programme should aim not only at the general target of achieving the highest practicable rate of growth, but also at regular and ordered development with a minimum of fluctuation.

The consequence of external instability upon internal demand, and therefore upon the degree of capital utiliza-

<sup>12</sup>See particularly the *Economic Survey of Latin America, 1951-52* and the *Economic Survey of Latin America, 1953*, both previously cited.

<sup>13</sup>See the *Economic Survey of Latin America, 1951-52, op. cit.*

tion, may be largely offset by a compensatory fiscal policy in which investment must play a very active role. But how can investment be used for this purpose when the decline of internal demand is itself a reflection of phenomena which also adversely influence investment? A carefully planned programme must foresee the means of solving this problem. As the capacity for external payment contracts, it is certain that investments with a relatively high import coefficient must be reduced. At the same time, investments with a low import coefficient could be increased. This, for instance, is the case of building in many Latin American countries, where the government and the mortgage institutions could act most effectively.

From another angle, the reduction of investments with a high import coefficient would affect mainly imports of equipment for the direct productive process. But it has already been seen that intensive capital utilization would, if the stimulus of demand does not weaken, permit the growth of the economy to continue.

Once the adverse phase of the external factors has passed, in the typical fluctuations to which the Latin American economy is subject, a period of relative ease will return when those investments with a high import coefficient can be made. This is the exact moment when the projections in a programme, regularly adjusted to the changing conditions, may be of great value, since the fluctuations often cause the general guidance of the economy to be lost; short-term requirements, the special nature of the difficulties and their subsequent problems, all usually obscure the over-all picture of development and investment needs. If emphasis had to be laid on certain types of investment during a period of depression, it at least provides an accurate idea of the investment which has been postponed. These deferred investments can then be accelerated in such a way that, when a new period of depression occurs, economic development may continue by means of the compensatory policy. It suffices to recall the serious transport and energy difficulties which some countries have faced

to justify the importance of this point. But this is not all. It is during favourable periods that a country is best equipped to undertake measures that will transform the structure of its economy, thus facilitating future economic growth and the application of an efficient compensatory policy. In this context the reference is specifically to import replacement. That is the time to promote such a policy so that future expansion of gross income will not cause an external disequilibrium and thus necessitate a restriction or contraction of imports, as has occurred so frequently. But it is precisely because of the abundance of external resources which are characteristic of favourable periods that the tensions which are arising in the heart of the economy remain unseen. They appear only when the economic pattern changes and when a relative shortage of foreign exchange finds the country unable to obtain all the imports required to maintain — if not to raise — the level of activity reached during the period of prosperity.

Because Latin America's economy is subject to such instability, a policy with foresight is required to halt the adverse effects. A development programme is the best practical form for evolving such a policy, which must necessarily be based upon analyses of past events and projections for the future. As a consequence, instability represents one of the two main justifications for a programme; the other is the need to accelerate economic growth.

It is clear that international action can greatly facilitate the implementation of a programme, by methods which will either weaken the original fluctuations or counteract their consequences for countries in course of development. Among such methods investment can play a dominant role. Historically, private capital movements have closely followed phases of prosperity and depression, sharpening their effects. A stable growth of the economy requires precisely the opposite procedure, namely, the adoption of an international compensatory policy by which the internal measures taken by countries in process of development may be applied with maximum efficacy.

## Chapter III

### NATURE AND METHODOLOGY OF THE AGGREGATE PROJECTIONS

#### 1. SCOPE OF THE AGGREGATE PROJECTIONS

In the two previous chapters, it was maintained that programming should start from aggregate projections of the economy, proceed with an analysis of the different sectors and, finally, compare the aggregate projections with the results obtained from the individual study of the different branches, so that any necessary corrections and adjustments can be made. The adoption of the aggregate projections as a starting point constitutes a fundamental aspect of the technique which is being examined here, since it would also be possible to begin the preparation of a programme by studying the various sectors, and to combine the individual projections by branches in an aggregate programme at a later stage. Consequently, the time has come to explain the reasons for preferring the first method.

The preparation of a general development programme means that basic data must be available in anticipation. In the first place, the rate of growth which the economy must reach during the period in which the programme is in force, as well as the volume of investment necessary to achieve that rate, must be determined beforehand. Only by starting from this basic data will it be possible to follow the subsequent stages of the programming. Thus, the initial object of a programme is to establish the investment which must be made in each sector of the economy and to fix the order of priority for the different investments. This requires a prior estimate both of the future demand for exports and of the internal demand for consumer, intermediate, and capital goods. But this estimate—particularly as regards the internal demand—must be based on the probable growth of income and on its distribution, for which it is necessary to have previous knowledge of the rate of growth of the economy. A programme also has to establish what share of the demand will be supplied with imported goods and what share with domestic commodities. From another angle, a programme must determine the investment required to produce both commodities for export and those for the domestic market. This will also need previous knowledge of the total volume of investment on the one hand and, on the other, of export prospects and the capacity to import. In calculating investments, it will be necessary in addition to know how these will be financed, that is, to what extent domestic saving can supply the capital required to attain the desired level and, if necessary, what would be the share of foreign capital. To reach a solution—starting from the probable increase in income—the trends of domestic consumption and saving, as well as the anticipated role of foreign capital, must be estimated.

Each of these aspects provides different possibilities. The rate of development may be more or less rapid, according to foreign trade prospects or to the degree of domestic

effort represented by the level of saving. Production may advance with greater or lesser intensity towards the realization of a programme of import replacement, according to the hypotheses on foreign trade. The contribution of foreign capital may vary in magnitude, given the estimate made for the rate of growth and for the possibility of curtailing the future expansion of consumption.

These various possibilities also presuppose different ways in which economic policy is used. A slow rate of development or a large inflow of foreign capital will require measures which differ from those applied to an accelerated growth or a high rate of saving. The decision as to the objectives of the programme, and its more detailed application to the various sectors of the economy, will depend on a study of the different alternatives.

The aggregate projections are calculated with the basic data previously mentioned. With this information, it is possible to proceed, in the first place, with an evaluation of the different alternatives which arise from the initial stages of programming an economy and the degree of effort required by each alternative. Once the objective has been established, it can be used as the basis for drawing up the partial programmes, which in conjunction will permit the accomplishment of the over-all programme.

The procedure of starting from plans or programmes for the various sectors and then combining them in a general plan, which is sometimes adopted because sufficient information is lacking, differs substantially from the method used for aggregate projections. In that case, the targets for each sector would not be fixed as a result of the estimate forecast for the probable gross income and for the distribution of expenditure, but a series of heterogeneous criteria would be applied to establish an estimate of the needs or possible growth of each sector. Neither would capital requirements be the result of the distribution of a volume of investment which had been previously established in terms of a rate of growth, in accordance with an order of priority applied to the economy as a whole; rather, the required investment would be fixed in each isolated case and the total capital to be invested would represent an aggregate of the individual investments, which would certainly have to be adjusted later if the available capital proved insufficient to cover the estimated total. Lastly, in the aggregate projection method, the rate of growth is the fundamental criterion upon which is based the volume of investment and the required levels of domestic saving or of foreign capital. In contrast, under the system of individual programming, the future rate of growth is unknown beforehand and can be assessed only after the individual sector programmes have been established; as a consequence it is very probable that the result will not coincide with the highest rate of growth which the country might reach.

## 2. THE ANALYSIS OF THE PROCESS OF DEVELOPMENT

The drawing up of the aggregate projections must be based upon as complete an examination as possible of the economic situation of the country and of the evolution of its economic development, over a sufficiently long period of time, to enable its main characteristics and the determining influences of the process to be appreciated. This analysis of historical trends is indispensable if both the projections and the possible subsequent decisions derived from them are to be founded upon reality and are to reveal the strategic points upon which economic policy should be brought to bear, if the desired results are to be obtained from programming.

This analysis should, above all, clearly reveal the rate of growth experienced by the economy concerned during the immediate past. It might happen that there was no growth, or that the expansion hardly existed, in other words, that a state of economic stagnation had been reached, the causes of which it would be necessary to determine; but, in the event that the economy had experienced a period of satisfactory development, it would have to be established how and to what extent development had affected the different branches of production of goods and services, the occupational distribution of the population and the income from the various productive factors.

The evolution of production and gross income is influenced by both internal and external factors. The action of each of these agents should be studied with the greatest care.

Among the external factors, the volume of foreign trade, the terms of trade and the inflow and outflow of capital are of particular interest. The importance in the over-all economy of foreign trade—the export and import of goods and services—will indicate the degree to which the national economy is integrated with world trade in marketing production and in the domestic availability of goods and services, as well as recent movements in the principal sectors of this trade. The terms of trade will measure the way in which the prices of products sold in foreign markets and the prices of those purchased abroad for domestic consumption and investment have evolved; they will also show the influence of price variations on the volume of gross income. The movement of capital and the capital services account will indicate the magnitude of the contribution of foreign capital to investment and development, and the resources which the country must remit for interest and profits on such capital, or for its amortization.

A study of the internal factors in the development process covers a wide variety of aspects. Particularly important are the evaluation and evolution of the country's resources: the active population and the labour force by sectors; productive capacity or installed capital; natural resources of which use is or could be made; and productivity per worker and per unit of capital in the different activities. Data are likewise needed on the share of each social group in the gross product and on the distribution of income and expenditure, so that the proportion of income used for consumption, and its movements, the percentage that has been saved and the distribution of investment may all be established. The ratio, by factors of production, between the income received and the proportion saved, is of vital importance if the share of each in capital formation is to be assessed.

The manifold part played by the public sector in the process of growth deserves special mention. As the recipient of taxes and the source of public services, the State simultaneously acts as a producer receiving a remuneration, as a purchaser of goods and services in competition with the private sector and as an agent for the redistribution of the population's aggregate income. In its character as the executor of all kinds of public works the State is an investor contributing to capital formation. The extent to which the State participates in creating income, the use and influence of its redistributive function in the development process, the volume of public investment and the form it assumes, are all indispensable data for a study of a national economy and an evaluation of its tendencies.

The purpose of the analysis made on the basis of this information is intended to give an idea of the forms and characteristics of the development of the economy concerned, identifying its dynamic centres and strategic points and assessing the evolution of all these factors in the final period. An effort can thus be made to prepare what might be termed the diagnosis of the economy, on the basis of which the aggregate projections can later be established.

This list of essential data by no means covers all the information required. It has been used merely to attempt an outline of those facts which are indispensable for one part of the task of programming, and even so it must be considered as deficient. The lack of statistics and basic economic data represents one of the most serious problems which under-developed countries must face in carrying out an effective economic policy. One of the first positive results of a policy aimed at programming would in fact be to encourage an improvement in the data which might be available. A first step would be to prepare what is nowadays called "a system of national accounts". The United Nations has been carrying out a campaign in favour of the application of universal standards in such matters<sup>1</sup> and it is to be hoped that these under-developed countries which have not already done so will make a serious effort to apply these standards in practice as soon as possible. But this is not all. The task of programming in addition calls for other data and analyses which will be described in the course of this report, especially as regards consumption statistics and inter-industrial relations.

In the specific applications of the technique of programming which the secretariat has already commenced in the cases of Brazil, Chile and Colombia, and which form part of this series, the use of statistics and economic information for accomplishing the analysis of growth, can be illustrated in practice. The material and methods are similar in these studies, varying, of course, according to the amount of data available and to the differences in the examples analysed. They demonstrate better than any formal description the methodology of this sector of the technique of programming.

<sup>1</sup>See United Nations, *A System of National Accounts and Supporting Tables* (Studies in Methods, No. 2; ST/STAT/SER.F/2). United Nations publication, Sales No.: 1952.XVII.4; *Concepts and Definitions of Capital Formation* (Statistical Papers; ST/STAT/SER.F/3), United Nations publication, Sales No.: 1953.XVII.6.

### 3. THE ANALYTICAL INSTRUMENTS FOR THE CALCULATION OF THE AGGREGATE PROJECTIONS

The technique of programming which is presented here—and in consequence the calculation of the aggregate projections—is based on the supposition that the economic development of a community can be measured by the increase in *per capita* income and production. This simplification does not overlook the other economic and sociological elements which characterize the process—the population structure, the distribution of property and income, utilization of technology, social mobility, spirit of enterprise, etc.—but tends to seek, within these heterogeneous elements, a quantitative instrument which would make it possible to decide, in a preliminary analysis, whether there was a case for development, and, if so, to determine its extent. The increase in *per capita* income and product is a prerequisite of development. However, it is not in itself sufficient, since such expansion can occur without other conditions being present that assure the economy as a whole greater welfare, or which allow the process to continue satisfactorily. Thus, during the course of the present study the premise which rests on the growth of *per capita* income will be used as a starting-point but an attempt will also be made to take into account the other elements which integrate the phenomenon of development. It must be acknowledged that this is an aspect which has hitherto been somewhat neglected, and which will call for further attention in the preliminary technique of programming.

The first step in the analysis consists in defining the factors that determine the growth of income and product. It is known that the fundamental elements of this process are capital formation or investment rate, and the average productivity of capital, also known as the product-capital ratio.<sup>2</sup>

Thus, if it is assumed that, in a given period, a community had attained a net rate of capital formation—after depreciation is deducted—equivalent to 15 per cent of income, and that the product-capital ratio was 0.4, net income would increase by 6 per cent. If, during the same period, the population had increased by 2 per cent, *per capita* income would have grown by approximately 4 per cent.

This equation also involves a high degree of simplification. In the first place, the analysis of the production process has been focused upon one single factor—that of capital—and no specific mention is made of other elements, of which the most important are natural resources and labour productivity. A more careful examination reveals that these factors have, in fact, been taken into consideration. Natural resources influence the increment of income through the product-capital ratio. Thus, the same investment, when applied to very rich natural resources, will yield more than when applied to poorer ones. In the first case the product-capital ratio will be high and in the second, the effect will be the opposite. Something similar occurs with the labour factor. Technical skills and human productive capacity usually mean a greater invest-

ment yield, or—what amounts to the same thing—an increase in the average productivity of capital.<sup>3</sup>

These facts are of great importance, and it will be possible to appreciate their practical application both in the present work and in the specific studies on Brazil and Colombia. On the other hand, the formula given undoubtedly represents a most valuable instrument for the analysis and programming of development. For this reason, more attention should be paid to its parameters, namely, the investment rate and the product-capital ratio.

### 4. THE INVESTMENT RATE

No attempt is being made here to formulate a theoretical analysis of capital formation, which would be outside the scope of this study. It is merely proposed to examine certain aspects of the methodology in so far as they are related to the preliminary technique of programming. For this purpose, capital is defined as those goods resulting from economic activity which are used for the future production of other goods. In the first place, this concept is expressed in real terms as opposed to the monetary concept—even though monetary units are employed to measure it—and in the second, it is of a limited nature. Thus, durable consumer goods, which are sometimes included in capital, are excluded. Also discounted are mined precious metals, as well as those natural resources, such as land, which do not result from economic activity, although any improvements which man may make to the latter for productive ends are considered to be included. In turn, investment would consist of all additions to capital of goods of the same kind, or, in other words, the process whereby part of the goods available to a community in a given period is withdrawn from final consumption and incorporated into the productive capacity. The investment may be considered in relation to the stock of capital or to income. Thus, if at a given moment a country's capital amounts to 100, and the investment or accumulation of new capital stands at 10, it may be said that the capital or productive capacity has increased by 10 per cent. Or, again, if out of an income of 10,000 million dollars, 1,300 millions is invested, then the investment rate, in relation to income, will be 13 per cent.

In considering the investment rate, it should be taken into account that part of it does not consist in additions, strictly speaking, to the stock of capital, but rather serves to replace that capital which, for one reason or another, has been depleted, or has been consumed in the process of production.

This leads to the concept of depreciation, which has been defined as the difference between the value of productive equipment at the end of a period, and the value which had been assigned to it at the outset. From the point of view of economics—as opposed to that of accounting, in which somewhat rough methods of approximation are permissible—capital depreciation is one of the most difficult estimates to compute, on account of the varying duration of its different components. If the criterion of depreciation is applied, net capital or the stock of capital might be defined as the depreciated replacement value of reproducible, tangible and durable capital goods, and

<sup>2</sup>Use is also made of the reciprocal of the product-capital ratio—the capital-product ratio, known as the capital coefficient. For recent works on this subject, see, *inter alia*, R. Harrod: *Towards a Dynamic Economics*, Macmillan, London, 1949; E. D. Domar: "Expansion and Employment", *The American Economic Review*, 1947; "The Problem of Capital Accumulation", *The American Economic Review*, 1949; "Economic Growth: An Econometric Approach", *The American Economic Review*, May 1952.

<sup>3</sup>When labour productivity, instead of capital productivity, is used as a measure the other factors will have to be taken into consideration through their effect on the yield of the labour factor.

the net investment as equivalent to the gross investment less depreciation.

To apply the equation given in the foregoing section, use must be made of net investment, that is, total investment less depreciation. The net rate of investment would be the ratio between net investment and national income.

It has already been pointed out that the inadequacy of Latin American statistics constitutes a serious obstacle hampering the application, to specific cases, of the analyses and methods necessary to the study of economic development and programming. However, the Economic Commission for Latin America has made every effort to utilize the unreliable material available, improving it wherever possible, and always endeavouring, in each case, to reach useful, common-sense conclusions. For this reason the fact must be acknowledged that the calculations, rather than leading to exact and definite conclusions, give only a preliminary understanding of the phenomena, and an idea of their extent. Apart from the contribution it may make to improving statistics, the use of present material is considered as representing an advance on vague generalizations, or merely qualitative concepts as to economic development. However, it should be observed that in some Latin American countries considerable progress has already been made, and valuable, though generally incomplete, information is available; moreover, everywhere in the region there is a growing interest in perfecting economic statistics. It would now be as well to give an idea of the scope and sources of the figures on Latin American capital and investment which are utilized by ECLA. The figures on the stock of capital which appear in the Commission's studies, include reproducible, tangible and durable capital goods, and exclude land, durable consumer goods, minted precious metals and, in most cases, inventories. The reason for excluding the last-named item is the lack of data as to their volume and fluctuations. For estimating purposes, complete or partial inventories of the stock of capital have been used, as well as chronological series for the formation of gross and net capital. As has already been stated in another document,<sup>4</sup> it should be noted that the character, quality and amplitude of available data vary from one country to another, and have presented problems of interpretation and adjustment. In the absence of complete data for a precise calculation of depreciation, a useful life for capital goods, longer than that in the United States, has been used as a working hypothesis, taking into consideration the dissimilar capital structure, disparity in the economic nature of obsolescence, owing to the difference between the relative costs of labour and capital, and the influence of the rate of growth on the rate of depreciation. The figures on investment have been based, as a rule, on series formulated in the countries themselves, with some adjustments and corrections wherever necessary; they include the import value of imported capital goods, plus a provision corresponding to the cost of installation, the valuation of public and private construction at market prices, the cost of the domestic production of unexported capital goods, and estimates of the increment of livestock inventories, and agricultural improvements.

In the countries where studies have been made for the application of the preliminary technique of programming, available statistics were better than the average. In the

studies on Brazil and Colombia reference has been made to the sources used for drawing up the series, and it can be stated that in these cases there is a greater degree of accuracy in the estimates and corresponding conclusions. As will be appreciated in these studies, the investment rate has varied for clearly defined reasons. In Brazil the net investment rate—which was 8.0 per cent at the beginning of the Second World War—began to decrease, until in 1945 it dropped suddenly to 4.8 per cent, owing chiefly to the difficulty in importing equipment. It recovered during the post-war period, and in 1952 reached 13.6 per cent of net income, but in 1953 and 1954 declined again to 10.4 and 9.4 per cent respectively.

In Colombia—which had a high investment rate during the period 1925-30 (an annual average of 12.5 per cent)—the depression of the thirties and the Second World War provoked a decline, the average for the whole period being 6.3 per cent. In 1945-54 investment recovered again and the annual average reached 11.4 per cent.

##### 5. THE PRODUCT-CAPITAL RATIO

The term "product-capital ratio" is comparatively new in economic science. However, its meaning is closely related to the classic concepts of "organic structure of capital", "turn-over of capital", "average cycle of production", which refer to the connexion existing between the volume of productive equipment and the other factors, or the real production of goods and services, and show that the more a country increases its capital, the longer the production process takes to mature. The re-emergence, during recent years, of the concept and of interest in problems of this kind is the result of the renewed importance which macro-economic studies in the scientific field have achieved, thanks to the impact of cyclical phenomena and expansion in the under-developed countries.

The product-capital ratio, or the productivity of capital, is the relation which exists over a given period between the net national product, or national income, and the capital which has participated in production. Naturally, a distinction must be made between the average and the marginal product-capital ratio. The average ratio is that of product to capital employed; by marginal is understood the relation between net investment in a given period, and increase of net product during a succeeding period.

In the latter case, some authorities advocate a longer period—two to three years—for the evaluation of the direct and indirect results of the investment, which generally become effective only after such a lapse.

It is easy to understand that the factors which have an effect on capital and on the product have a more marked incidence on the marginal than on the average ratio. Consequently the latter usually has a certain amount of stability, while the former is subject to continual fluctuation. Therefore, to calculate it correctly, an average of marginal product-capital ratios must be examined over a long period, for example, ten years. If a sufficiently lengthy period is taken it is inevitable that this average of marginal ratios would differ but slightly from the average ratio.

Apart from the terms of trade, the principal factors which influence the product-capital ratio are inventories, the degree of capital utilization, capital structure and the time the investments take to mature.

<sup>4</sup>See *Economic Study of Latin America, 1951-52, op. cit.*, p. 34.

If inventories have been included in the calculation of the stock of capital or their variations taken into account when net investment is computed, any fluctuations they may register will augment this term of the ratio, and consequently an increase in inventories will tend to reduce the product-capital ratio, and vice versa.

The degree of capital utilization is another variable. If, during a given period, inadequate demand, or other elements, diminish the intensity with which productive capacity is utilized, the product-capital ratio will clearly be lower. Conversely, the ratio rises in those periods when there are difficulties in the supply of capital goods and when equipment is used to full capacity.

Lastly, capital structure and the time taken by investments to mature are other important elements. If the stock of capital consists mainly of items of lesser productivity, such as agricultural investment and buildings, the ratio will be lower than when the larger volume is represented by highly productive investments, such as industrial equipment. Similarly, a lapse of time must obviously occur between the initiation of the investment and the moment when its product reaches the market. The length of this period is dependent upon the nature of the investment, but as a rule it amounts to several years in the case of large-scale investments in electricity, transport and other services, as well as big irrigation projects. In calculating the product-capital ratio, those investments still in process of maturing are included. Furthermore, a proportion of the new production results from investments made wholly or in part during previous years. It is evident that in periods of greater investment—or when investment is of such a nature that it takes a long time to mature or has great capital intensity—the ratio will be lower than in periods in which investment has fully matured, especially if at such times it is not adequately balanced by new investments of the same type.

So far, reference has been made to the over-all product-capital ratio, that is, as applied to the economy as a whole. This over-all ratio is evidently the result of individual and different relationships between investment and product, which exist in the diverse sectors of the economy and in the very varied and numerous enterprises within each sector. The question now arises as to whether the over-all ratio has any significance, and what is its use in economic analysis and the technique of programming.

Its value lies primarily in the fact that it is an element in estimating the social productivity of capital. Only by comparing the product generated in the economy as a whole with the investment made can an approximate idea be obtained of the effects deriving from that investment. Apart from its intrinsic theoretical interest, it is of practical importance in that it provides grounds for allotting priority to investments. The product-capital ratio by sectors or by enterprises could not be used for this purpose, since its productivity is strongly affected by relative domestic prices, and by the possible effect of new investment in production in other sectors. Low relative prices in the public services may mean that industrial activity is subsidized. In consequence, the average productivity of an investment in electricity or transport could not be measured merely by the product of the respective sector, for its effect on other sectors would have to be taken into account; and the opposite would occur in the case of enterprises and branches of production which benefit from the

low relative prices. On the other hand, it may happen that new investment puts other enterprises out of the market, and, in this case, in measuring its social productivity, the reduced production caused in other sectors would have to be taken into consideration.

The other point of interest in using the over-all product-capital ratio is more closely allied to the calculation of the aggregate projections. Its use enables a preliminary estimate to be made of the investment required to obtain a given income, indispensable if some notion is to be formed of the possibilities of putting the various alternatives into practice. When one of these has been decided upon, the anticipated volume of investment will be the starting point for a preliminary estimate of the respective contributions of domestic savings, and supplementary foreign capital. It is true that these calculations are merely preliminary approximations, and that in those referring to projections by sectors or to specific projects, the individual capital coefficients concerned must of course be utilized. These individual projections will then serve to correct and adjust the preliminary figures deriving from the aggregate projections. But this does not deprive the product-capital ratio of its fundamental role in the first stage of programming as a basic means of judging the feasibility of a programme and its consequences.

The ECLA secretariat has calculated the average product-capital ratios for a group of countries, which represent more than 90 per cent of the stock of capital in the region. The statistics used for the calculation are those of the gross product; the estimates used were, in the majority of cases, those computed by the countries themselves, and in other instances, those prepared by the secretariat. These estimates differ in their degree of accuracy, but no greater precision could be obtained with the statistical material available. In the figures for capital, inventories and durable consumer goods are excluded, contrary to common practice in United States calculations.<sup>5</sup>

The result has been a product-capital ratio which varies from 0.43 to 0.46, for the period 1945-54. The difference between this and the figure of 0.30 for the United States, given by the studies mentioned in footnote 5, is partly attributable to the statistical methods used. If inventories and durable consumer goods had been added to capital in the ratio found for Latin America—which would mean an increase of perhaps 20 per cent—and if depreciation had been deducted from production, the average value would have been about 0.35. It should be observed that the most conservative calculation used by Goldsmith, gives a ratio of 0.40 for the United States.

In the application of the method to Brazil, a product-capital ratio for that country has been calculated. The estimate of the stock of capital was based on the figures of the Industrial Census of 1940, and on data on net investment over the period 1939-53. The figures for the product are those of the Instituto Brasileiro de Economia,

<sup>5</sup>See William J. Fellner, "Long-Term Projections of Private Capital Formation: The Rate of Growth and Capital Coefficients", National Bureau of Economic Research, *Conference on Research in Income and Wealth*, May 1951; and Raymond Goldsmith, "The Growth of Reproducible Wealth of the United States from 1805 to 1950", International Association for Research in Income and Wealth, *Income and Wealth Series*, Vol. II. In the latter work, however, Goldsmith calculates two series of product-capital ratios, in one of which buildings and installations are not taken into account, a procedure more in line with that of ECLA.

Fundação Getúlio Vargas (Brazilian Institute of Economy of the Getúlio Vargas Foundation). The average ratio of the over-all period 1939-53 stands at 0.52, having risen from 0.49 in 1939 to 0.57 in 1947 and 1948, and reaching 0.53 in 1953. The marginal ratio has been calculated for the years 1947-53. The two extremes are 0.73 in 1950 and 0.34 in 1952, while the average is 0.514.

The preliminary research carried out by ECLA in the study on economic development and programming in Colombia has revealed some unusual facts. One of the most significant aspects of this country's economic development, has been the continuous long-term increase of the product-capital ratio since 1925. In this year the average ratio of 0.22 was the outcome of an economic structure characterized by an accumulation of capital employed principally in agriculture and building, and by a low technical level. As a result of changes in capital structure—in the direction of greater investment in industry and in transport and electricity—and in consequence of the over-all process of development of the national economy, the ratio rose until it reached 0.31 in 1938, 0.32 in 1945, and 0.40 in 1954.

The product-capital ratio for Latin America might appear very high. Apart from the differences from calculations made in other countries with respect to the elements included in the terms of the ratio, the inadequacy of the statistics themselves undoubtedly may give rise to a certain margin of error. However, it is not beyond the bounds of possibility that the figure arrived at—in the more approximate calculations for the majority of the countries, as well as in the more precise ones for Brazil and Colombia—is very near to the truth. It must be taken into account that, during the period analysed, exceptionally favourable factors have been present in Latin America and have made possible a more efficient utilization of capital, labour, and natural resources.

Studies of capital productivity in the under-developed countries, and its evolution as investment progresses, are still in their initial phase. The results of research carried out in the most highly developed areas have hitherto shed little light on the case of the under-developed countries. One of the most interesting aspects of the studies made in the United States is the absence of any indication that the average product-capital ratio shows a marked tendency to fluctuate. In fact it seems characterized by a certain stability.<sup>6</sup>

Some economists hold that the accumulation of capital tends to provoke a decrease in the ratio over a certain period, and that this is due to many causes. Among these may be mentioned the need for basic installations of relatively low productivity, the costs which arise from import replacement, and losses and difficulties caused by inexperience. Another very important factor is the need to maintain heavy stocks both of materials required for the production process proper, and of consumer goods to satisfy a growing demand generated by investments which have not yet matured.

No premature conclusions should be drawn on this topic, but its theoretical and practical importance is obvious. It is therefore indispensable that the studies begun should be followed up with greater thoroughness, particularly in regard to their application to Latin America. At all events, the results obtained demonstrate the importance

of this theoretical instrument in the technique of programming.

## 6. FOREIGN AND DOMESTIC DEMAND

Once the analytical instruments have been agreed upon, the method of calculation of the aggregate projections can be described. One indispensable element in the preparation of the projections is the estimate of future demand for goods and services both for export and for domestic consumption. There is some variation in the methodology applicable to each of these sectors. The preparation of the aggregate projections calls for as full as possible a calculation of the demand for exports, so that the probable extent of the effect of external factors on production and income can be assessed. In contrast, only aggregate figures indicating the probable volume of domestic demand are needed, since the detailed analysis of its composition will be made when the time comes to undertake the calculation of the projections by sectors.

There is another difference which must be taken into account. Exports depend on external economic conditions on which the domestic economy can exert only slight or limited influence. Conversely, internal demand results from the process of national development, and from decisions taken in connexion with its intensity and character.

The estimate of demand for exports is based on the probable trends of factors affecting the goods and services which the country exports, or could export. These factors are the future income level in the export markets, the income-elasticity of demand for such goods and services, their probable price trends, and the situation regarding competitive commodities whether these are identical or potential substitutes. A similar analysis must be made for each separate product, taking into consideration all the peculiarities of its market. Projections of the demand for exports should also take into account, in appropriate circumstances, the country's possible ability to influence foreign markets by measures of trade or exchange policy. This will depend on the country's relative position in regard to the world supply of the commodity concerned. For example, it might happen that, in the event of a price-elasticity of demand exceeding unity, it was considered possible and advisable to increase exports through price reduction, so as to augment the supply of foreign exchange. Such cases may affect the projections of future production for export which would have to be appraised in the light of other alternatives, in terms of their effect on the economy as a whole.

The degree of accuracy in the calculations of the demand for exports is limited on account of the unreliability of the statistics used. Generally speaking, price data and forecasts are the least exact. There is a greater probability of accuracy in short-term estimates of income trends in foreign markets. In contrast, this probability diminishes in long-term forecasts, and it is precisely these which are the most important for programming. For this reason, projections of the demand for exports—more than any others—indicate merely reasonable hypotheses, and must be revised and adjusted periodically so as to embrace any possible market variations.

It is more difficult to anticipate the evolution of the terms of trade. If information as to prices is the weakest part of export analysis, the difficulties will be multiplied when an attempt is made to forecast import prices. A solu-

<sup>6</sup>See Goldsmith, *op. cit.*

tion might be found by studying the historical trend of trade factors and by establishing one or more hypotheses based on this trend, on the understanding that any variation in the terms of trade, by affecting the volume of gross income, will modify the basic data of the programme and necessitate its revision and adjustment.

Over-all domestic demand is calculated as a function of income, after domestic saving has been deducted. It is advisable to examine each of these factors. Income depends on domestic production and the terms of trade. One or more hypotheses on the latter having been established, income will be determined by the rate of growth of the gross product. Here a crucial point is reached in the technique of programming. Defining the desired rate of growth means fixing a target for the programme and at the same time establishing a constant, on which all the other variables of the problem will depend. On the other hand, this rate is subject to the economy's capacity to achieve it—in particular to the degree of effort signified by domestic saving—and to supplementary foreign investment. Analysis of past records and of the probable future trend of those factors which have influenced the rate of growth will serve as a basis for judging future possibilities. But other circumstances will have to be taken into account. For example, it might be that the previous rate of growth was very low, and an accelerated rate of development is desired; or, as has happened in the study of Brazil, that it may be considered unlikely that a set of favourable conditions, which gave rise to a rapid growth in the past years, would persist in the future. In the preliminary technique, the starting point was the selection of various rates of growth which, although hypothetical, were based as far as possible on reality and on the future possibilities of the economy. The selection of several alternative rates of growth is designed to reduce to the minimum the arbitrary element which undoubtedly exists in this part of the technique. The methodology used in the study of programming in Brazil contains some variants which will be dealt with later.<sup>7</sup> An effort has been made to eliminate this arbitrary element by different means.

Once a given hypothesis as to growth of income has been adopted, the distribution of this income between consumption and saving will have to be estimated. Here judgment must be primarily based on past experience. Studies made in various countries seem to indicate that the population tends to earmark a fairly stable percentage of its income for consumption, or, from another standpoint, the rate of saving is usually confined within certain limits. Kuznets has found a gross rate of capital formation in the United States which varies from an average of 22.8 per cent for the period 1869-98, to 22.0 per cent for 1894-1923, and 18.2 per cent in 1919-48. The net rate would have a more marked downward trend, averages of 15.2, 13.2 and 6.8 per cent being recorded for the above periods.<sup>8</sup> In Canada, the gross rate of capital formation, excluding foreign investment, has fluctuated during the last fifty years between 15.3 per cent (1931-40) and 19.3 per cent (1926-30), reaching 18.7 per cent over the period 1941-50; the net rate which during the period that began with the world depression (1931-40) was 5.9 per cent,

rose again to 11.9 per cent in the ten succeeding years, a figure more in line with the recorded trend. In Sweden the gross average rate over the years 1891-1930 was 18.0 per cent, and the net 11.1. The statistics mentioned and studies carried out in other countries seem to indicate that the gross savings of any capitalist economy tend to be around 20 per cent of the income, and the net savings to attain a figure that seldom exceeds 10 or 12 per cent. This of course does not mean that these averages may not vary, as a reflection of community effort to accelerate investment.

In the study of economic development in Brazil, it has been estimated that the net rate of saving has varied in the last sixteen years from 6.8 per cent in 1940 to 13.1 per cent in 1950, the highest frequencies being between 8 and 9 per cent, which occurred in five separate years, mainly in the period prior to 1948, and between 10 and 11 per cent, also occurring on five occasions. With the exception of 1952, the savings rate remains above 10 per cent from 1948 onwards.

The study of the historical rate of saving indicates the limits within which economic effort tends to be exerted. An analysis of the circumstances which may have determined the rise or fall of the rate, and an estimate of the behaviour of the factors affecting it, will provide grounds for a short-term projection. It might be considered that future saving should be increased to achieve a higher degree of investment, within reasonable limits that will not endanger the process of development. Here also there are possible alternatives. The increase in the savings rate should be considered in relation to its effect on the required level of consumption, and to the possibility of restricting the latter's expansion; and a study must be made of those measures of economic policy which would have to be adopted to attain this end. An example of such an analysis may be seen in the study of programming in Brazil. The technique of programming will have to present anew, if necessary, the alternatives which may be required to furnish more complete information as to the effect on the economy of different saving and consumption levels.

The difference between the income arrived at by a given rate of growth—plus the effects of the terms of trade—and the volume of savings, gives the volume of domestic demand for consumer goods and services. No mention has hitherto been made of demand for capital goods. In principle, the volume of domestic saving is equivalent to the demand for producer goods and services on the part of domestic investors. However, this domestic saving may represent only a part of the capital formation. It is not yet known whether the estimated saving is adequate to meet the anticipated rate of growth, and if so, in consequence, how large an inflow of foreign capital, if any, may be necessary. Therefore the demand for producer goods and services can be assessed only when the over-all investment necessary to attain the established target has been calculated. This topic is discussed in the following section.

## 7. THE PROJECTION OF INVESTMENT

An outline has been given of the methodology of estimating a rate, or alternative rates, of growth of income which is expected to bring about a programme, and the probable or desirable volume of domestic saving corresponding to those income levels. On these bases, and with

<sup>7</sup>See the appendix at the end of this chapter.

<sup>8</sup>See S. Kuznets, "Long-Term Changes in the National Income of the United States of America since 1870", in *Income and Wealth of the United States*, International Association for Research in Income and Wealth, *Income and Wealth Series*, Vol. II.

the help of the product-capital ratio, it will now be possible to calculate two fundamental elements, namely, the investment required to attain the income envisaged and the proportion of such investment to be contributed by foreign capital.

The calculation of over-all investment is a simple operation. For each volume of income the capital required will equal the income divided by the product-capital ratio. On the assumption that in the current year the income is 100, the stock of capital 200, and the product-capital ratio 0.50, to secure a 5.0 per cent expansion of income in the following period, new investment will have to amount to 10 per cent. If the population has increased 2.0 per cent in the same period, the *per capita* rise in income will have been 3.0 per cent. If such a calculation is made year by year during the course of the programme, it will be possible to assess the amount of capital required.

It seems unnecessary to stress the nature and limitations of so simple a calculation. Its usefulness lies in its provision of a rough, over-all conception of the volume of investment necessary to achieve a given rate of growth, and in the fact that it thus furnishes a basic criterion as to the applicability of a programme. As has often been stated, when the projections by sectors are calculated, more exact methods will be used, and later compared with the preliminary result obtained in the aggregate projections, so that the latter can be adjusted.

When the estimate of investment has been made, it must be compared with the domestic saving forecast. The difference between investment and domestic saving will give the amount of foreign capital required, year by year, and in its entirety.

The apparent simplicity of this procedure conceals a series of decisions, in which an essential part is played by economic and political considerations. The variables of the functions used should be taken into consideration, namely, rate of growth, product-capital ratio, rate of domestic saving, foreign investment. Developments in any one of these have an immediate effect on the over-all system. If it is assumed that, as is probable, the domestic saving is not capable of attaining the required volume of investment, and that foreign capital must be called upon, several different situations must be considered. For example, is it likely that the foreign capital inflow will continue indefinitely, and will be large enough to cover requirements? And if the answer is negative, will it be preferable to maintain a more moderate rate of savings and extend the period of foreign investment, or is it worth while to make a greater effort to increase the rate of savings in the initial years, and thus curtail the term or volume of the foreign capital inflow? What will consumer levels be in either case over the total period? What measures of policy will be necessary to attract this capital, or to attain a given rate of savings, and how will these measures react on the over-all economy? And if it is unlikely that foreign capital and domestic savings will be available in the required amount, or that the measures of policy which would make them possible will be accepted, then should not the original target be reduced and a less ambitious programme formulated?

All these considerations must be taken into account in preparing the aggregate projections. It is now easier to assess the presentation of various alternatives, a theme on which so much stress has already been laid. The economist

who prepares a programme on the basis of the aggregate projections, can make a forecast of the results of given hypotheses of growth, and carry out a preliminary selection of those which are feasible. Or, if he so prefers, he can point out, wherever possible, the effects of these alternatives on the economy, and the measures of policy which each situation may dictate.

### 8. THE CAPACITY TO IMPORT AND THE REPLACEMENT OF IMPORTS

The next step in the formulation of the aggregate projections is the calculation of the capacity to import, and of the imports which will have to be replaced if this capacity is to be utilized to the maximum advantage of economic development.

The imports which a country can make in a given period depend on two factors: the exports of goods and services, and the balance of the flow of capital. When the projections of the demand for exports were discussed, reference was made to the method used in calculating its volume and the terms of trade. The hypotheses established in this connexion constitute the basic factor in the calculation of the capacity to import.

In computing the flow of capital, the most important components are the external public debt, the servicing of the past and future inflow of capital, the volume of fresh investment, and the flow of short-term capital. Obligations arising from the public debt are generally easy to estimate, and all countries have information on this subject. The servicing of foreign capital—that is the remittance abroad of profits and interest, whether for loans or returns on direct investment—create greater difficulties. Apart from the complete information which has to be collected on this subject, the future movement of such servicing may be affected by the exchange situation, and by future investments and their behaviour as regards interest rates, amortization terms, etc. Despite this it is possible to make a relatively accurate forecast of the item. Fresh foreign investment would be calculated in accordance with the projections for investment previously examined.<sup>9</sup> The flow of short-term capital is a more difficult element to assess, but also of lesser importance to programming. It may even cause disturbances, by provoking temporary trends and alterations in international transactions which do not correspond to the economy's normal evolution. This factor may be ignored in most cases, on the assumption that the application of a programme implies the establishment of a policy to avert the undesirable consequences of the short-term flow of capital, or in general to tackle unstable external factors.

The algebraic sum of exports and of the probable balance of the capital account during operation of the programme will give an estimate of the capacity to import.

And now another aspect of the problem must be examined, namely, the projection of imports. Here, the distinction must be made between the import of consumer goods, intermediate goods (including fuels) and capital goods.

It has already been pointed out in previous chapters, that these categories of goods are likely to follow dissimilar trends, as development progresses. Even should the import of consumer goods diminish, over-all imports do not tend to decrease because the import coefficient in

<sup>9</sup>See section 7 of this chapter.

investment is higher than the import coefficient in consumption. On the other hand, in the process of expansion which has taken place in Latin America so far, the import coefficient of raw materials has shown a tendency to remain stable, and that of fuels to increase.

For the projection of imports and their replacement, in this initial stage, a provisional hypothesis may serve as a point of departure. For this purpose, it may be assumed that the coefficient of imports will not vary in any of the categories of goods, or, in other words, that imports will continue to maintain their present share in consumption and investment.

From the calculations of consumption and investment already made, it will be possible to formulate a projection of the future imports of these goods. The computation is more complicated in the case of intermediate commodities and fuels, since for a fairly accurate calculation, information on their share in the production process would be required. However, as a preliminary approximation, current import coefficients for these goods in relation to consumption could be applied. To the results thus obtained will have to be added an estimate of the services paid for abroad, for which it may be assumed—provisionally—they will maintain their present proportion in regard to income.<sup>10</sup>

The comparison of the projections of the capacity to import with those of imports will reveal a difference, except when export prospects are highly favourable, or, to be more exact, when the rate of increase in the capacity to import is at least equal to the rate of increase in the demand for imports.

If this is not so, the disparity between the capacity to import and the volume of imports will denote the extent to which domestic production must replace imports if the programme is to be implemented. As has often happened in Latin America, since imports have tended to increase more rapidly than the capacity to import, the problem of substitution is one of the most important in programming.

## 9. THE RESULTS OF THE AGGREGATE PROJECTIONS

A summary can now be made of the results obtained from the calculation of the aggregate projections, and the projections themselves allotted their proper context in the formulation of a programme.

In the first place, the probable targets of economic growth have been established, and the future trend of production calculated, as well as the income corresponding to each of the rates of growth selected. Secondly, targets have been fixed in regard to future distribution of income in consumer goods and savings, and therefore with respect to the community's degree of effort to achieve greater investment. The amount of investment necessary to implement each hypothesis has been calculated, and, through a comparison of the volume of this investment with that of domestic saving, the foreign capital inflow has been estimated. Similarly, the growth of the capacity to import has been postulated, and, by a comparison of this latter with the probable demand for imports, the amount of substitution required to carry out the programme has been established.

<sup>10</sup>Or as regards foreign trade, in the case of services connected with it.

Hitherto, over-all figures have been employed. In the final issue the object of a programme is to establish the distribution of future investment, so as to attain the targets envisaged. This means that from the over-all analysis, it is necessary to pass to the analysis of each sector of the economy. It must first be determined how future demand will be distributed among the different consumer goods, and what effect will this structure of consumption produce on the demand for intermediate and capital goods. Once the future requirements in goods and services are known in detail, a study must be made as to what part of these requirements will have to be covered by imports, and where replacement is most feasible. The volume of demand in each sector, less the part satisfied by imports, will give the production targets which will have to be attained in each branch of domestic activity. To this must be added the targets set for export activities. The first step will be to determine the measures which must be applied if these targets are to be reached. This will require a detailed analysis of the situation in each sector, with the object of achieving the greatest possible utilization of existing resources, as well as of establishing the extent and nature of the investments required. Among existing resources, labour is specially important. The raising of *per capita* productivity is one of the essential objectives of a programme. A study of each sector must indicate the level of the productivity of labour, and what are the possibilities of improving it. Coupled with this problem is the necessity of shifting the labour force from less productive to more productive sectors of the economy, thus modifying the occupational structure of the population.

Thus, the projections by sectors constitute the second phase of the programming technique. Once the results have been obtained, their comparison with the aggregate projections is the final step in the elaboration of this phase of programming, but not in the formulation of a programme. When the given objectives have been set, on the basis of the projections, two extensive fields still remain to be covered: the establishment of an economic policy, and a suitable administrative organization for the execution of the programme. The present work does not cover these latter aspects, but rather stops at the level of the projections.

## Appendix

### NOTE ON THE METHODOLOGY USED IN THE STUDY ON BRAZIL

In the application of the technique of programming to Brazil, the methodology employed is substantially that outlined in the various sections of chapter III. However, the characteristics of economic development of the country, emphasized by an analysis covering the last fifteen years, have introduced certain variations in the manner of presenting the aggregate projections.

A study of the fundamental variables in the rate of development has been utilized primarily to formulate a hypothesis as to the probable evolution of the country's process of growth over the next few years. The following parameters have been used: (a) the product-capital ratio, which, it has been assumed, would be maintained at the average level of 0.52 prevailing during the period 1939-53; (b) the terms of trade on which three hypotheses have been

formulated, according to whether the terms of trade maintain the level reached in 1954, or return to that of 1952, or to that prevailing before the end of 1949. As a preliminary approximation, the assumption that they return to the level of 1952 was adopted; (c) the rate of domestic savings, which was taken as being 10.9 per cent, the average for 1949-53; (d) the balance of the flow of foreign capital, which, if it registered the same trend as over the period 1949-54, would be negative, and would annually absorb, on an average, 4.8 per cent of the difference between the domestic product and consumption.

On the basis of these hypotheses, the probable annual rate of growth of the *per capita* gross product would be 1.7 per cent, as opposed to 3.1 per cent over the period 1949-53; that of gross income, 1.5 per cent as compared with 4.1 during 1949-53, and that of consumption, 1.2 and 3.8 per cent, respectively.

A second assumption, based on the deterioration of the terms of trade to the level prevailing before the end of 1949 would show even lower annual *per capita* rates of growth: 1.6 for the product, 0.9 for income, and 0.8 for consumption.

When these hypotheses had been formulated, and the assumption adopted that the economy needs to attain a higher rate of growth and that this is the sole object of the programming, a study was made of the possibilities of influencing the factors that determine the rate of development.

The study of the Brazilian economy has made it clear that a greater yield can be obtained from the stock of capital, principally through improvements in methods of agricultural production, and by means of concerted action at certain strategic points which are at present hampering the production process, namely, transport, storage, and energy. It would consequently be possible to aim at raising the product-capital ratio from 0.52 to 0.57, which was the level attained in 1947 and 1948.

The rate of savings reached 13.1 per cent in 1952. Since one of the objectives in programming is to increase, within reasonable limits, the coefficient of domestic saving, an improvement might be envisaged in the rate of 10.9 per cent which was used in the preliminary hypothesis. From

a brief study of the domestic situation, it can be seen that specific internal measures—in particular as regards the distribution of public expenditure—might raise the savings rate to a level of 13.0 per cent, instead of the 10.9 per cent used in the initial hypothesis.

The inflow of foreign resources might be increased by means of loans obtained from international credit institutions, and by the re-investment of the income accruing from these loans. The assumption established was that loans could be obtained up to an aggregate sum of 500 million dollars during a period of five years.

On the basis of these considerations, five possibilities of growth have been established, according to whether the programme is directed towards one or other of the factors studied, or towards several of them. The first hypothesis consists in assuming that foreign credit is obtained under the conditions described, and would permit an increase of 1.9 per cent in the annual *per capita* product, of 1.8 per cent in income, and of 1.6 per cent in consumption. The second is based on a rise of the rate of savings to 13.0 per cent, with the probable resultant increment of 2.0 per cent in product and income, and 1.6 per cent in consumption. The third assumption—that of the raising of the product-capital ratio to 0.57—would give annual rates of growth of 3.1, 2.8, and 2.8 per cent, respectively. The fourth possibility would consist in jointly raising both the savings rate and the product-capital ratio to the levels previously fixed, and the resultant rates of growth would be 3.9, 3.6, and 3.2 per cent, respectively. Finally, in a fifth hypothesis, the combination of the fourth possibility with the utilization of foreign loans, would produce rates of 4.0, 3.8, and 3.4 per cent. Each of the situations involved would call for measures of policy which are sketched in very broad outline in this study, as the examination of the different hypotheses proceeds.

The study contains aggregate projections for each of these hypotheses, but for the development of the projections by sectors, the minimum hypothesis is selected. This would aim at the achievement of an annual rate of growth of 2.0 per cent for the *per capita* product, corresponding to the second of the hypotheses enumerated in the preceding paragraph.

## PROJECTIONS BY SECTORS

### 1. INTRODUCTION

It was explained in earlier chapters that, once the aggregate projections for a particular economy, under differing hypotheses of growth, have been prepared, attention must next be turned to projections and studies covering the several sectors of that economy. The purpose of these is to ascertain the rate and type of development to be pursued by each sector, and to determine what investments and other measures will be required in order to attain the objectives set for the individual activities.

The basic element in calculating sectorial projections is an estimate of the community's future demand for goods and services. The over-all demand has already been estimated during the preparation of aggregate projections, but this global figure must now be broken down in such a way that a forecast can be made of its distribution among all goods and services.

The first group to be considered is that of goods and services intended for final consumption, be these durable or non-durable. In a strictly controlled community it may be that the economic authorities will influence consumers, by means of coercive or indirect measures designed to produce a preconceived demand structure. This would apply, for instance, to an economy in war-time or in particular politico-social situations. In a society where freedom of the consumer is presumed to exist—and such is the case considered in the preliminary technique of programming outlined in the present study—the demand structure will depend on an infinite number of individual decisions concerning the distribution of expenditure. But in practice, even in economies based on free enterprise, the authorities, for manifold economic and social reasons, usually intervene in the structure of demand, by means of fiscal policy, prices and other measures. A method must therefore be found of formulating reasonable hypotheses concerning the future structure of demand, based on the free choice of the consumer within the limits described.

When the composition of the demand for final goods and services has been estimated, it will be necessary to assess the demand for intermediate products. The latter is the direct outcome of the former, since the commodities concerned are those needed for the production of consumer goods. *Inter-industrial relations must therefore be studied, in order to determine the intermediate products required in the production of final goods and services. Somewhat similar observations apply to capital goods. The composition of investment will, broadly speaking, be a consequence of the demand for consumer goods, although there are other elements to be considered, which will be examined later.*

Knowledge of the probable demand during the operation of the programme leads directly to a study of the manner in which that demand will have to be satisfied, or, in other

words, to an estimate of the supply. The latter may consist of imported goods and of domestically produced commodities. Since the capacity to import has been calculated when drawing up the aggregate projections, the first step will consist in distributing the predicted foreign exchange resources among such goods as are not produced within the country. The procedure adopted was, first, to study possibilities of import replacement in a particular sector of consumption, so as to reduce imports in that sector to a minimum; and, secondly, to make a similar study in regard to intermediate goods. In this way, the replacement of capital goods is left to the last, the maximum possible foreign exchange resources being set aside for the purchase of such goods, on the principle that this is the sector where a major increase in the need for imported goods will result from the elaboration of a programme, and where at the same time substitution will be more difficult to effect.<sup>1</sup>

The demand in each sector, less that part which must be met by imports, will give the domestic production to be achieved. The next step in the technique of programming will be to ascertain what action is necessary to attain the targets thus set up for the different branches of the economy: in other words, to establish sectorial programmes. This implies a detailed technico-economic study of each activity. The existing situation in the sector under consideration must be examined from widely varying angles. Attention must be given to the natural resources in use and available, to the degree and efficiency of their utilization, to investments and the productivity of capital, to the productivity of labour and the possibilities of increasing it, and, in short, to every aspect which will enable a rational programme to be prepared with a view to attaining the desired objectives through the most effective use of the factors of production. A basic conclusion to be drawn from these studies will be the determination of the required investments and of the channels into which they may best be directed; and a further result will be an opinion on what measures of an economic or other character are necessary to the attainment of the targets set. Sectorial projections will be the preliminary step towards the preparation of specific projects for enterprises or works, which constitute the final stage in the elaboration of a programme.

### 2. PROJECTIONS OF DEMAND

Both in economic theory and in applied statistics, consumer demand has now been studied for a long time past. But only in the most recent decades have these studies been broadened and deepened to such an extent that they have come to constitute one of the themes on which the

<sup>1</sup>The criterion referred to does not rule out the possibility that it may be more desirable, in certain circumstances, to find substitutes for specific capital goods rather than for certain consumer goods.

literature of economics is most abundant and valuable.<sup>2</sup> In the technique of programming it is possible to use some of the results of this research, with a view to estimating the future composition of the demand for final products.

#### (a) Factors determining demand

The first point of interest is to determine the main factors which influence changes in the demand structure. It is well known that the demand for the different groups of goods does not grow at the same rate as income. Economic analysis enables correlations to be made between income increments and the consumption of different categories of goods. Such correlations are known as income-elasticity coefficients of demand for these goods. Thus in Latin America as a whole preliminary research has made it possible to fix over-all coefficients of income-elasticity of 0.5 to 0.6 for non-processed foodstuffs, of 0.8 to 1.2 for processed foodstuffs and of 1.2 to 1.5 for manufactured articles. An approximate initial estimate of future demand would consist in calculating, for a given period, the income-elasticity coefficients of products or categories of products, and in applying these coefficients to the income available for the consumption forecast in the aggregate projections. There are times when the statistical standards permit of nothing more than this type of calculation, but it should be pointed out that such a procedure presupposes certain oversimplifications which can be avoided with the help of improved data.

In the first place, the method described takes no account of changes in income distribution and in demographic structure. In addition, since it refers to changes in the course of time, it is affected by variations in preferences, technique, etc. The income-elasticity of demand for the various categories of goods and services is not the same for the different income groups. In the lower income brackets the income-elasticity of demand for foodstuffs is greater than in the middle and upper groups, and among the last-named differences also exist. On the other hand, goods and services, the demand for which has a low income-elasticity in the least-favoured sections of the population, have a high income-elasticity among the more privileged groups. Something similar occurs as regards urban and rural communities. At the same income level the structure of demand is different as between town and country. The application to future gross income of simple income-elasticity coefficients for the different categories of products implies the assumption that there is no shift of population and no change in the distribution of income—which is not true of a developing economy.

The method known as "family expenditure surveys" enables these defects to be partly overcome. By means of research into the expenditure of carefully selected families, at different income-levels and in urban centres and rural

communities, tables may be drawn up, with a fair degree of accuracy, giving the breakdown of demand and showing that each income group and each type of town and country family has its own demand structure. On the basis of these data the elasticities of the demand for the different categories of products, at various income-levels and in different population centres—whether urban or rural—may also be calculated. For this it is not necessary that the inquiry should refer to expenditure incurred over several years; all that is needed is an initial assumption that differences obtained in the structure of demand on account of income may be applicable as time goes by to the changing situation of the components of the present groups. In this way an estimate can be made of the evolution of demand in relation to income changes over a not-too-lengthy period, for example, five to eight years. Over a longer term, estimates would be less valuable, on account of possible changes in consumers' tastes and of transformations undergone by certain consumer goods and services, which might give rise to structural modifications in demand. Consequently, any projection of the structure of future demand would consist in applying group-elasticities to a given future composition of the population, in accordance with both the degree of urbanization and income distribution.

The future distribution of the population between town and country may be estimated, as a preliminary approximation, on the basis of censuses and population statistics. These data will show the general trends followed by the growth of towns in the recent past. However, the extrapolation of such trends cannot be regarded as an accurate yardstick for the future. The implementation of a programme will in all probability alter their course. Since it is impossible at this stage of the work to forecast the exact nature of such alterations, it will be necessary, when the programme has been completely prepared, to adjust the estimates of the future population breakdown, in the interests of greater precision.

It is a more complex process to project the future distribution of income. Like those mentioned in the previous paragraph, population shifts imply a certain change in such distribution, since town and country wages generally differ. A projection of the population by occupations might serve to improve the estimates. Reservations already made, in connexion with the urban/rural division, with regard to alterations of past trends in consequence of the implementation of a programme, apply still more strongly, however, to a breakdown of the population by occupations, and subsequent adjustments and revisions may appreciably modify the initial estimates. But the greatest difficulties impeding the projection of future income distribution arise when the attempt is made to assess changes in the share of the various factors in gross income. A good system of national accounts will provide information on the remuneration of these factors at any given moment. But projection of the relative levels of such remuneration in a free enterprise economy—where price and wage movements, profits and other income are influenced by numerous elements of an economic and social nature—demands previous knowledge of the income distribution policy that is to be adopted.<sup>3</sup>

<sup>2</sup>A full list of the most important contributions to this subject in recent years would be extremely long. Apart from the already classic works by R. G. D. Allen and A. L. Bowley (*Family Expenditure*, London, Macmillan, 1935) and H. Schultz (*The Theory and Measurement of Demand*, Chicago, University Press, 1938), students may obtain an idea of the latest research and of the relevant methodology in the article by Ruth P. Mack entitled "Economics of Consumption", published in *A Survey of Contemporary Economics*, Vol. II; in Vol. XV of the *Studies in Income and Wealth* (National Bureau of Economic Research, 1952), in Herman Wold's work *Demand Analysis* (New York, John Wiley and Sons, 1953) and in the series entitled *Studies in the National Income and Expenditure of the United Kingdom*, published under the auspices of the National Institute of Economic and Social Research and the University of Cambridge (Cambridge University Press, 1954).

<sup>3</sup>When estimating future demand, useful comparisons may be drawn with countries at development stages and income levels similar to those reached by the economy under consideration, either at present or during the execution of the programme. Such comparisons must, however, take account of differences arising from climate, traditional consumption habits and other elements peculiar to the various countries.

So far, attention has been concentrated on the influence of income level and changes in location of population on the structure of demand. Another factor, no less important, must now be considered, namely, the level of relative prices. The theory of demand has long emphasized the many complex relations between the prices of goods and services and their consumption. It would be very difficult, if not impossible, when preparing a programme for an economy based on freedom of the consumer, to give due consideration to the effects on future demand of the various price-elasticities, of relationships with complementary and substitute products, and of the reciprocal elasticities brought about by changes in the prices of the different goods. On the other hand, it is readily conceivable that these factors could be studied within groups or categories of products, since it is safe to assume that the effects of price changes on the distribution of expenditure are of lesser relative importance with reference to groups such as foodstuffs, clothing, housing, entertainment, etc. However, for some products of particular significance to the economy, special studies may be needed to estimate the incidence on demand of changes in relative prices. Such changes may result from the influence on the market of purely short-term factors—transient modifications of demand, a temporary shortage of supplies, the action of natural factors, etc.—or from structural causes such as a change in tastes or a variation in production costs. A programme may be designed, *inter alia*, to lower the relative costs and prices of certain goods and services. While it is difficult to forecast changes due to fortuitous causes, it may be both possible and necessary, when making projections of demand by sectors, to estimate the effects of variations originating in structural modifications upon the relative prices of specific goods and services.

In the studies applying preliminary programming technique to particular countries, analyses and projections of demand were made in each case in accordance with available statistics and information. As regards Chile and Brazil, existing material permitted only the use of historical income-elasticity coefficients. It was therefore assumed from the outset that there were no variations in prevailing trends of geographical distribution of population, income distribution and relative price levels. For Colombia, however, better data were available. In addition to a reasonably full report on consumption patterns and elasticities over the whole country, a survey of family expenditure in the towns enabled a direct calculation to be made of the structure of demand and of the elasticities for income-groups in the urban and, residually, the rural sectors. Relative prices were as a general rule assumed to be stable, except in isolated cases where allowance was made for a few possible changes. This particular subject has as yet received little attention in the secretariat's preliminary studies on the technique of programming, and is one of the aspects calling for more careful analysis.

#### (b) Demand for agricultural products

Projection of the demand for agricultural products presents special characteristics of some interest. Broadly speaking, this demand embraces three large categories of goods: products for export, industrial raw materials, and foodstuffs. Projection of the demand for agricultural exports is included in the analysis of foreign trade referred to in chapter III. The demand for industrial raw materials

will be studied later.<sup>4</sup> Thus discussion may for the present be limited to foodstuffs.

The main feature of the demand for foodstuffs is the tendency of its income-elasticity coefficient to decline as *per capita* income increases. It is almost a truism that the proportion of income spent on food tends to be smaller in the higher than in the lower income-groups. Nevertheless, this statement appears to call for some qualification.

First, the elasticity of demand in the lowest income-groups may be very high, as research in many countries has shown. Therefore, an income rise which is reflected in a higher level of remuneration for the least-favoured sectors of the population will mean a much greater increase in the demand for foodstuffs than if corresponding benefits are conferred upon the sectors with a higher standard of living. This confirms previous comment on the limitations of the application of over-all income-elasticity to the projection of demand, and the need to use more sensitive instruments of calculation which take account of income distribution.

Secondly, the downward movement of the income-elasticity for foodstuffs is not the same for raw as for processed foods. The latter usually have a higher coefficient. Expenditure on raw foodstuffs—excluding wheat imports—increased in Brazil at an annual rate of 3.3 per cent (0.9 *per capita*), or with an income-elasticity of 0.5, between 1947 and 1953, while for processed foods the corresponding rate was 7.4 (4.9 *per capita*), with an income-elasticity of 1.2. This difference must be fully taken into account in projections of demand.

The facts described are closely linked with the substitution process operative in the demand for foodstuffs. Once certain levels of *per capita* income have been reached, it is noticeable that demand for particular foods begins to decline as income rises, while for others which are relatively more expensive it increases. The result is that certain foods which are consumed exclusively by the upper and middle income-brackets show high income-elasticities, sometimes well above unity, while products widely consumed by the lower income-groups tend, as development proceeds, towards a negative elasticity. However, the process of replacing lower-quality by higher-grade foodstuffs, in periods when real income is rising, may be completely reversed on account of alterations in relative prices. In Brazil, for example, a 20 per cent fall in *per capita* meat consumption was observed in recent years as compared with the pre-war era, despite the appreciable increase in the *per capita* income disposable for consumption. This reduction was mainly offset by an increase in the consumption of cereals, tubers and sugar. The explanation of this apparent paradox is found in the trend of relative prices. The price of rice declined during the period in question by 21 per cent in relation to that of meat; that of sugar by 24 per cent; that of manioc by 44 and that of bread by 45 per cent.

Thirdly, notwithstanding the trend of income-elasticity, the volume of expenditure on foodstuffs within total consumption and the influence of elements as important as demographic growth and the distribution of income among factors of production, may cause the proportion of expenditure on foodstuffs to total expenditure to rise over short periods, and to fall only very slowly over the medium term. In Brazil, whereas in 1947 the percentage of ex-

<sup>4</sup>See point (d) of this section.

penditure on foodstuffs within the aggregate expenditure on consumption was 40.8, in 1949 and 1950 it stood at 44 and 43 respectively; in 1954 the proportion was 38.2 per cent.

In projecting the demand for foodstuffs it is customary to include both raw and processed products. Admittedly these latter are industrial goods and it is also possible to take the foodstuffs industry as the point of departure and to consider as input the agricultural materials which it uses. But in view of the simple structure usually presented by the foodstuffs industry, and the desirability of paying due regard to the dietetic aspect in projections of the demand for foodstuffs, it is an advantage to consider all foods together, to whatever extent they are processed.

It is important to decide in advance what point in the circulation process will be selected for fixing the demand. In agricultural production there are usually differences in the various stages of the circulation of goods, because some part of these may be used for seed, and another part for animal fodder. Moreover—and this is most important in under-developed countries—losses are normally sustained as a result of the deterioration or decomposition, etc., caused by storage difficulties. In projections it is preferable to determine the demand at the moment when the product is placed at the disposal of the consumer, and only later, when dealing with the projection of supply, to consider adjustments imposed by the circumstances enumerated above.

A problem peculiar to the preparation of projections of demand is that of the appropriate nutritional level of the population. It is well known that—with few exceptions—the diet of the lower income-groups in under-developed countries falls below what dieticians consider to be minimum standards. In 1952 the Food and Agriculture Organization of the United Nations (FAO) carried out experimental research into this subject in five Latin American countries,<sup>5</sup> and found that—except in Argentina and Uruguay—availabilities of foodstuffs are less than minimum requirements. (See table 5.)

Table 5. Foodstuffs availabilities and requirements in several Latin American countries

Country	Recent level	Requirements	Difference
	(Calories)		(Percentage)
Argentina .....	3,190	2,600	22.7
Brazil .....	2,340	2,450	- 4.5
Chile .....	2,360	2,640	-10.6
Mexico .....	2,050	2,490	-17.6
Uruguay .....	2,580	2,570	0.4

Source: Food and Agriculture Organization of the United Nations.

The above data are clearly an approximation, and tend to conceal wide divergencies between one area and another in the same country. They are also an approximation in the sense that they refer to availabilities and not to real consumption of foodstuffs. It should also be stressed that calculations of this kind refer to national averages. If account is taken of unequal income distribution and of the fact that the middle and upper income-groups are not con-

tent merely to satisfy basic necessities, it is clear that covering the deficit alone will not suffice to provide the entire population with the minimum diet. Even in those countries where the food supply greatly exceeds the aggregate needs, a by no means insignificant section is undernourished. A comparison has been made between food consumption (calories *per capita*) and gross product *per capita* in several countries. (See chart VIII.) Certain observations of a general nature may now be made. The first is that most of the Latin American countries are in the categories with the lowest nutritional levels. The second is that the diet in some countries is apparently lower than might be expected in view of their income level. Thirdly, the income-elasticity of demand for foodstuffs differs widely in countries with low, medium and high incomes. (See again chart VIII, curves A, B and C respectively.)

Allowance for dietary levels entails substantial alterations in the projection of the demand for foodstuffs. A projection which takes account only of the present structure of consumption and possible changes in location of the population and income distribution, and which disregards standards of nutrition, is taking it for granted that there will be no changes in the dietary habits of each income-group. But in countries where the poorest strata of the population are known to be inadequately nourished, it is inconceivable that one of the primary aims of economic policy and programming should not be precisely that of raising dietary levels. Fresh problems then arise. What, for instance, is the minimum diet to be aimed at in the period covered by the programme? What chance will there be of ensuring such diet, given the income levels envisaged? What changes will this situation involve in the demand for the different groups of foodstuffs—proteins, carbohydrates and fats—and what are the articles whose production will have to be encouraged, at the expense of which others? The projection of the demand for foodstuffs is thus confronted with new questions to which a reply must be found. Moreover, these problems are intimately connected with others which do not strictly pertain to demand, but which exert an influence upon it. One of them is the question as to whether the country—given its natural and economic resources and its capacity to import—is capable of attaining levels of nutrition that are in varying degrees satisfactory. Another, equally important, concerns the policy that should be followed in order to educate the consumer into improving his diet and to make such improvement possible by means of action to influence prices and supplies.

The study on the economic development of Colombia provides a practical example of how this subject was treated in the technique of programming. On the basis of the present dietary situation, of the income projections, and of what were considered minimum nutritional requirements, the original projections were subjected to modifications designed to improve the food situation by fixing higher demand targets for foodstuffs of superior dietetic value. In addition, measures of economic policy were studied whose adoption would stimulate the demand for such products, encourage production and make prices compatible with the consumers' incomes. In this form, the final projection of the demand for foodstuffs not only anticipates probable changes in the present behaviour of consumers, but also involves the elements of a nutrition policy as an integral part of the over-all development programme.

<sup>5</sup>See the study on "Food and Nutrition" prepared by FAO, which appears as chapter IV of *Preliminary Report on the Social Situation*, document E/CN.5/267/Rev.1 (United Nations publication, Sales No.: 1952.IV.11).

(c) *Demand for manufactured consumer goods*

The dynamics of demand for manufactured products is totally different from that for foodstuffs. In contrast to expenditure on the latter, the consumers' outlay on manufactured products grows more than proportionately to the rise in real income. Available data for Brazil show an income-elasticity coefficient of demand for manufactured consumer goods of 1.2 in 1949-54. In Colombia the historical coefficient for the period 1925-53 was 1.4, while that resulting from family expenditure surveys was far lower. The high historical coefficient was doubtless affected by factors difficult to isolate, such as relative prices, changes in income distribution, the rapid rate of urbanization, and supplies, apart from the growth of *per capita* income. As explained in greater detail in the study dealing with Colombia, the projections of demand for manufactured consumer goods were based on an elasticity of 1.15 as a working figure for the whole. This was closer to the coefficient resulting from the family expenditure survey.

As a result of the high income-elasticity, the share of manufactured products in aggregate expenditure grows with economic development. The ratio of the supply of such products to consumption rose in Brazil from 20.6 per cent in 1939 to 21.5 per cent in 1954; in Colombia the corresponding figures were 22 per cent in 1925 and 30 per cent in 1953.<sup>6</sup> This characteristic feature of the demand for manufactured goods is responsible for the greater dynamic role played by industry in economic development.

The demand for manufactured products cannot be considered as a whole since it reflects widely divergent needs. A mere over-all projection of this demand would thus be of little value. It is necessary to make a sector-by-sector analysis in order to define the demand for different products. The possibility that some manufactured goods will be substituted for others is less than in the case of foodstuffs, especially when sectors or branches of industry, rather than separate products, are being considered. Hence the changes in the relative prices of manufactured articles generally have a less important effect upon the pattern of demand. Nevertheless, in some cases substitution problems are worthy of special attention. One example is the textile industry, where an intensive substitution process has taken place among the different fibres in recent years.

In the study on Brazil an analysis was made of the demand in thirteen industrial groups. In that dealing with Colombia sixteen representative sectors were formed. The income-elasticity of demand in each of these groups is different in both cases, attention being particularly drawn to the higher income-elasticity coefficient for durable consumer goods. In Brazil, for instance, during the period 1937-47, while food, textiles, clothing, footwear and cigarettes showed an income-elasticity not exceeding 1.2, furni-

ture, motor-cars and electrical fittings had an elasticity of 2.0 to 2.5. In Colombia, an income-elasticity of 1.10 was registered for non-durable goods, compared with 1.50 for durable commodities. The case of paper deserves special mention, since in recent years a notable increase in its elasticity has been recorded, the coefficient being between 2 and 2.5 in Brazil, Chile, Colombia, Cuba and Mexico.

In analysing the demand for manufactured consumer products a distinction should be drawn between domestic and imported goods. A division of this kind enables a prior assessment to be made of substitution possibilities and of the limitations which may arise in particular cases. Nevertheless, in many Latin American countries the abnormal behaviour of the demand for durable imported goods is clearly evident. In Brazil, for example, the over-valuation of the currency has given an enormous impulse to the demand for motor-cars, whereas quantitative control of imports has radically restricted the supply in Argentina and Chile. In such cases a special analysis of this sector of the demand is justified.

(d) *Demand for intermediate goods*

In previous sections an examination has been made of the dynamics of the demand for those goods which reach the final consumer. The technique of projecting that demand, as has been seen, is based on the fact that it is proportionate to the real income disposable for consumption. But the productive process utilizes a considerable quantity of goods the demand for which is only indirectly affected by changes in real income. These are the goods absorbed by the intermediate stages of the process.

Some of these intermediate products are very closely linked with the demand for final products. For example, by observing the evolution of real income it is possible to forecast the demand for pulp required in paper manufacture almost as accurately as the demand for paper itself.

Provided no basic technological changes take place which might alter the amount of pulp needed to manufacture a ton of paper, the demand for pulp as an intermediate product is a mere reflex of the demand for the final product. The same is true of cotton, of wool and, to a lesser extent, of leather, rubber and wood.

But the problem is more difficult to solve in connexion with those intermediate products employed in productive activities with multiple purposes. In such cases it is not enough to know how real income will increase in order to make a projection of the future demand for industrial chemical products, for example. Perhaps a forecast of the growth of industrial production as a whole would make a closer approximation possible. But even so no precise estimate would be feasible. Another example is provided by products like caustic soda, which is used in the rayon, paper, textile, cotton, pharmaceutical and building materials industries, as well as in many others. The demand for this commodity is influenced not only by the growth of industrial production, but also by changes in the structure of that production.

Possibly the most complete instance of this type of demand is furnished by metallurgical products. These should be considered in the form in which they emerge from foundries and rolling-mills. The basic demand comes from the building and mechanical industries. The output of the building industries—so far as the construction of

<sup>6</sup>Both figures refer to net production by the manufacturing sector, excluding, that is, agricultural raw materials and services utilized after manufacture. Colin Clark has calculated for a large number of countries the share of manufactured production at factor cost in relation to national income. From the beginning of the century up to the last war that share rose from 16 to 20 per cent in the United States, from 13 to 20 in Canada; from 18 to 22 in Germany; and from 12 to 17 per cent in Australia. These data, however, do not refer solely to the demand for manufactured consumer goods, since they exclude the industrial processing of foodstuffs and include the production of equipment and manufactured goods for export. (See *The Conditions of Economic Progress*, 2nd ed., Macmillan, London, 1951.)

dwelling is concerned—is a final product, since it is designed to provide a direct service to the consumer. But the products of the mechanical industries are sometimes final products—durable consumer goods—and sometimes intermediate products, being intended in the latter case to serve almost all economic activities, including the mechanical industry itself. An analysis of the demand for metallurgical products, for projection purposes, must therefore be based on a study of (a) the demand for final products in which metals are used as the main raw material; (b) the demand for building materials; and (c) the demand for equipment of all types.

For analysing the demand for intermediate products the most appropriate technique is that based on the input-output matrices. These consist of a comprehensive table of all or part of the productive activities of an economy: in one column is given, for each industry or branch of production, the total input together with its proper specification, while the production sold to all other industries and to final consumers is shown horizontally. A complete balance-sheet of the sectors under consideration is thus drawn up, covering both the internal structure of industry and the distribution of its products to the market, and thus facilitating an analysis of the general equilibrium of the system and of the interdependence of its component parts. The unit of measurement adopted is usually the monetary value, and the degree of detail depends on the homogeneity of the elements assembled and, in practice, on the amount of information available.<sup>1</sup> Once the input-output matrix for a given period has been prepared, it is possible to calculate, for each of the activities included, the effects of changes in the final demand for a particular product. Such effects are complex. An increase in the demand for a product will at once cause a rise in its production and, as a logical result, a greater input demand by this sector. In their turn, the industries supplying that input will require products from other sectors, and so on. The case becomes especially complicated in countries where imports make a large contribution to the supply of intermediate products, since part of the input demand will affect the foreign trade sector. It is possible to calculate mathematically, with a reasonable degree of accuracy, the ultimate consequences of these repercussions for the economy in general, and on each industry or group of industries in particular.

The principal objection to the use of input-output matrices for programming purposes is that it pre-supposes that the internal structure of industry will remain unaltered. Data compiled in respect of a particular year are used for future years, without considering that changes in relative prices and technological innovations may cause modifications in the composition of the input of the various industries. Much discussion has been devoted to this subject. Some economists hold the view that changes in the industrial structure are less frequent than might at first sight be supposed, on account of economic and insti-

tutional limitations. It is in any case clear that the data included in the matrices must be periodically reviewed and corrected, either as a whole or in part, according to circumstances.<sup>2</sup>

In the study on development and programming in Columbia the input-output matrix is used for the projection of the demand for intermediate products. On the basis of hitherto unpublished data from the 1953 Industrial Census, and of information specially collected from the industries themselves, a table was drawn up comprising sixty activities, grouped in sixteen categories. Agricultural production is taken as a whole, since in this essay it was intended to study only the industrial sector. Input is classified by domestically produced and imported products. On the basis of the values given in the matrix, the latter was then inverted so as to obtain the coefficients of the various elements of input, and to permit an appraisal of the primary and subsequent effects of changes in demand. By applying the coefficients to the end consumption of manufactured articles (of which the projection was made as explained earlier)<sup>3</sup> it was possible to determine the future demand for intermediate goods and the probable share of imports in supplying them.

#### (e) Demand for services

If the income accruing from industrial and agricultural activities is subtracted from net income, at factor cost, the remainder represents the domestic output of services. The value of this output does not necessarily correspond to the expenditure on services within the country, since in practice every country imports or exports a given net total of services. But the difference lacks significance when the problem is studied as a whole, which is the reason for assuming that the demand for services is equal to their aggregate output.

The share of services in the gross income generally tends to rise with economic growth and an increase in *per capita* real income. But this is a difficult trend to assess, since the volume of services rendered cannot easily be measured in view of the variety and size of the subjective elements in appraising them. The analysis is thus generally based on the over-all expenditure for services which, from the dynamic standpoint, does not correspond to the volume of services rendered.

In comparing the changes which have occurred in expenditure on services with changes in other expenditure, during a given period, it is necessary first of all to study the possible alterations in the relative prices of services. Secondly, an analysis must be made of the possible disparity between the increment in the physical productivity of the labour force employed in services and that of the man-power in the other sectors.

An example of the first of these differences is to be found in the trend of railway rates and housing rentals in certain Latin American countries during the past few years. The prices of these services are arbitrarily maintained below the general price level and there has thus been a decline in their share in gross income. This is a different phenomenon, but its effects resemble those of the relative decline in agricultural prices during a pro-

<sup>1</sup>An exposition of the method and theory of input-output matrices would be out of place here. A sound bibliography exists on the subject; special mention should be made of the works of Professor Leontief, the inventor of the system, and in particular of his *Structure of the American Economy* (New York, Oxford University Press, 1951). A valuable study of the application of the method to economic programming is the work prepared by Hollis B. Chenery, Paul G. Clark and Vera Cao Pinna, entitled *The Structure and Growth of the Italian Economy*, published by the Mutual Security Agency of the United States Government, Rome, 1953.

<sup>2</sup>The United States Government has agreed to revise the input-output matrices every ten years. See Chenery, Clark and Cao Pinna, *op. cit.*, pp. 15 *et seq.*

<sup>3</sup>See (c) of this section.

longed depression and perhaps for even longer periods in certain countries.

A deterioration in the relative prices of one economic sector indicates that the remuneration of all or some of the factors engaged in this sector has decreased in relation to the remuneration of identical factors employed in other sectors. For instance, by preventing transport rates from rising adequately during periods when prices as a whole are on the increase, the real remuneration of the labour and capital engaged in transport undertakings is lowered. In these cases, since it is more difficult to lower the remuneration of the labour factor, the mobility of which is higher, the full impact falls on the remuneration of capital. This explains the need for subsidies and the failure to renew equipment, both of which have often been witnessed in the recent past.

The problem of the disparity in the increment of the physical productivity of labour is different. If this productivity of the labour force rises more rapidly in the sector producing goods than in that producing services, to avoid a relative reduction in the remuneration of labour employed in the latter sector, its share in gross income must be increased,<sup>10</sup> which means that the unit price of services must rise in relation to the unit price of goods. In reality, if one hour of labour today produces twice the volume of goods obtained fifty years ago and only one and a half times as many services, a change may be expected in the relative prices of goods and services in favour of the latter. In this way, if the community's relative consumption of goods and services were still the same today, the proportion spent on services would necessarily have increased.

An analysis of this type was carried out by Colin Clark over a long period and for a good many countries. His study showed that productivity per man-hour has generally risen to a greater extent in manufacturing than in services.<sup>11</sup> This phenomenon partly explains the expansion of the share of services in the gross income as may be seen from the data for several countries. In the United States, for instance, the share of services rose from 57 to 71 per cent between 1870 and 1939-41.<sup>12</sup>

Nevertheless, the available information does not permit any generalization on this subject. It is possible that an economy which is beginning to develop, which has a frontier that is advancing rapidly, and into which there is a substantial inflow of foreign capital, might not adequately use its transport equipment and might have relatively high distribution costs, in view of the low density of population. During the following period of development, characterized by a progressive improvement in the use of the transport system and by lower distribution costs, the productivity of labour engaged in these services may perhaps rise to the same extent or even more than that engaged in the sector producing goods. This may have been

<sup>10</sup>This increase might not occur if the aggregate demand for the service in question were to diminish as a result of its higher price.

<sup>11</sup>*The Conditions of Economic Progress, op. cit.*, p. 320.

<sup>12</sup>A recent study of the changes in efficiency of the United States economy revealed that between 1869 and 1929 the productivity of the economy as a whole expanded at an annual rate of 1.09, while in the sector producing goods the rate stood at 1.23. In the agricultural sector productivity rose at an annual rate of 1.1, which indicates that the aggregate productivity of services not only rose far less than that of industry, but also less than that of agriculture. See Jacob Schmookler, "Changing Efficiency of the American Economy, 1869-1938", *The Review of Economics and Statistics*, August 1952.

the case in Australia, where the share of services in the gross income declined from 70 to 67 per cent between 1913-14 and 1938-39.

These comments referred to services as a whole. However, it is a very general grouping and of little use for projections of demand. The analysis must be broken down further into homogeneous groups where the demand can easily be determined. From the aspect of the behaviour of demand, services can be broken down as follows: (i) services rendered to the final consumer, (ii) intermediate services, and (iii) government services. They will now be considered individually.

(i) *Services rendered to the final consumer.* The demand for such services is similar to that already studied for consumer goods.<sup>13</sup> Personal income, excluding savings, is distributed among purchases of foodstuffs, manufactured goods and services. It is well to recall that services play a far from residual role in consumer preferences, since some of them, such as housing, show a very high priority in consumer expenditure.<sup>14</sup> As in the case of consumer goods, final services vary considerably and often it is difficult to substitute one for another. In studying the elasticity of substitution, goods and services should be considered together since the demand for one service often competes with the demand for goods or for another service. Lastly, it should be recalled that some services play a supplementary part in consumer demand. These are services competing with others which the individual can accomplish on his own and which therefore compete with the preference for leisure.

Although the demand for services does not represent a residual part in consumer preferences, from the moment the demand for foodstuffs and manufactures is projected and the probable volume of domestic savings estimated, an evaluation has necessarily been made of the future aggregate demand for final services. In fact, consumer expenditure on services has been assessed in residual form when the composition of the consumption of foodstuffs, manufactured goods and services in the base period has been assessed and the aggregate consumption and expenditure on foodstuffs and manufactured goods projected. The coefficient of income-elasticity of the demand for services as a whole can be determined by the same method.

Once the probable total of consumer expenditure on services has been estimated, the approximate composition of such expenditure must then be calculated. The most important items are housing, professional services, entertainment and domestic services. The demand for each presents different problems which require special analysis for their projection.

The demand for housing is a most important aspect of a development programme. In the main cities and centres of activity it tends to increase at an accelerated rate with industrial progress and the growth of towns. In Colombia, for instance, while the annual average percentage of population growth for the whole country was 2.2, in 1938-51, the urban population grew by an average of 4.0 per cent and in the twenty-six chief towns by 5.6 per cent. It is therefore necessary to devote a large part of investment

<sup>13</sup>See point (c) of this section.

<sup>14</sup>In view of the importance of housing expenditure in consumer demand, some economists prefer to treat housing as consumer goods and to calculate its demand directly, thus leaving only the other services as a residual element.

to building. Housing investment has, in recent years, represented about one-sixth of Colombia's total investment, and about 11 per cent of aggregate public investment.

The demand for homes raises special problems for programming and development policy. Investment in housing does not directly increase the productive capacity of the economy, since it is designed to satisfy a consumer need. Consideration of the relation between housing investment and the gross product which it generates shows that the output-capital ratio is low (0.14 to 0.18 in Colombia) which signifies a high cost to the community. In addition, the building industry, and the public services which supplement it, absorb a considerable quantity of labour and materials for which there is a demand in other types of investment. A characteristic feature of the housing industry is that technological innovations in this branch have been fewer than in the remainder of industry.

But, notwithstanding, these disadvantages must be set other elements of equal or even greater weight which militate in favour of investment in housing. Where building does not proceed at the necessary rate, insanitary and overcrowded conditions are created which are gravely detrimental to the physical and mental health of the population. To return to the example of Colombia, despite the relatively high rate of investment, it is estimated that in the twenty-six principal towns, which comprise more than half the country's urban dwellings, the number of persons per dwelling was seven in 1951; 15 per cent of such homes had no water, 16 per cent no sanitation, and 28 per cent no electricity. These percentages are considerably higher if the houses in other towns and in country districts are included. It is an economic necessity to provide homes for the workers required by the new industries, both in the older towns and in new centres; and such homes must be so equipped that they cover those physical and cultural needs the satisfaction of which is the birthright of every human being. Moreover, workers and employees will thus be enabled to maintain and improve their productivity.

In the preparation of a programme the housing problem must be tackled not only from the viewpoint of over-all urban and industrial development but also from the aspect of changes in real income. This second factor is important as regards the financing of investment and the quality of the houses. Furthermore, while the supply of dwellings for the middle income-groups usually requires a development policy, in the high income-brackets sufficient resources exist to cover all necessities. In regard to the demand for low-priced housing, a discrepancy usually exists between the purchasing power of the population and an adequate rent return on the capital required for house construction. The problem of popular housing must chiefly be considered from the standpoint of supply, which is influenced in turn by the volume of capital which the State, the social security institutions and private industrial enterprises decide to invest in such building, with due regard to the social utility of alternative investments. Savings institutions also play an important part in housing programmes. To this end, it is relatively easier to encourage saving by the middle and even the lower income-brackets, provided an adequate organization exists. Apart from creating the habit of saving, such a policy is reflected in a greater supply of capital for other uses or for the building of more new houses.

It is essential that individual housing programmes should conform not only to the present rates of growth of individual urban centres, but also to their future development trends. There are notorious cases of ill-conceived urbanization projects which do not form part of an over-all economic programme, thus giving rise to the obvious danger of too many houses in some areas and too few in others. Therefore, once the future demand for housing has been estimated, on the basis of recent rates of growth and likely modifications, a fresh revision must at all costs be carried out, as a final step in preparing a programme, so as to bring the figures into line with specific projects and their location.

The demand for professional services rendered by doctors, dentists, lawyers, etc., has a high elasticity of demand in the medium and high income-groups. For most of the population, however, consumption of these services is regulated by the conditions of supply. As in the case of housing, the projection of the demand for professional services must be separated into high and medium income-brackets on the one hand and low income-groups on the other.

Entertainment and amusements are another item of growing importance for consumer expenditure. The elasticity of demand is high whatever the level of income. This is because of the progress of urbanization and of the relatively low prices for many public entertainments which are available through modern technology. In contrast to services as a whole, labour productivity in this sector has increased substantially, thus providing relatively low prices. An estimate for Brazil showed an income-elasticity of 4.5 for the demand for amusements among the urban population. This coefficient is more than twice that of the demand for durable goods and more than three times greater than services as a whole.

The volume of domestic services used by the community fundamentally depends upon their supply. Such services compete, to a certain extent, with the services which the individual can carry out himself. As the price rises for one hour's work on domestic services, more individuals tend to increase the number of hours devoted to self service, sometimes sacrificing hours of paid labour and at others surrendering leisure time. On the other hand, the rising price of domestic services causes services rendered individually to be replaced progressively by others given collectively outside the home. This is the case of restaurants, laundries, etc.

Since the provision of domestic services does not require skilled training or equipment, the analysis of its demand is of little interest to programming. But an analysis of such services is an outstanding element in the study of the general utilization of the labour force.

(ii) *Intermediate services.* These services are required by producers of final goods or of end services. The demand for final products in which the value of the services is incorporated. However, since the share of these services in the market value of final products is substantial, and sometimes even the main item, they may become the determining factor in supply. The most important intermediate services from the standpoint of programming are transport and energy.

The preparation of a transport development programme is a very complex task. In making a projection of the demand for transport, there are two aspects to be borne in

mind: the location of economic activities and the physical movement of goods and services throughout the economy.

In already-developed economies, with long-established lines of transport, location of industry presents problems quite different from those arising in countries in process of development, whose transport systems are still evolving. The latter case is the more usual in Latin America. In countries where lines of communication cover the important economic regions, changes of location are of relatively little significance, and an analysis will consist mainly of projecting the probable movement of goods among the different geographical areas and, given their volume, of determining regional transport needs. The opening-up or construction of new routes will thus be a supplementary problem, limited in practice to the incorporation of new regions in the economy.

In contrast, in countries where the level of development is still low and the transport system in process of evolution, the location of economic activities will frequently depend upon decisions governing communications; and, when it is other factors that determine the location, the latter in its turn will serve as a basic criterion for decisions regarding the routes and means of transport to which priority must be allotted. This close interdependence between transport and the location of economic activities demands an analysis which duly takes into account the sites of such activities, present and future, and which estimates in each case the intra-regional movements of merchandise and relates them to different transport alternatives. So far no examination has been made, even superficially, of the changes which economic development occasions in the geographic distribution of production and population. This is another subject calling for serious research, the results of which will be of paramount importance for a more systematic study of transport programming.

Analysis and projection of the physical flow of goods within an economy is the other basic element required for projecting the demand for transport. Here also studies of a general nature are lacking. In a well-developed country, where adequate data exist, the demand could doubtless be estimated on the basis of an input-output matrix, in which the common measurement would be the physical weight of the goods, supplemented by a table giving the average distance to be covered by them. Failing delicate instruments of this kind, recourse would have to be had to rougher means of estimation. In the study on programming in Brazil the method selected was to determine the existing relationship between the volume of transport effected over a comparatively lengthy period and the volume of goods in circulation, including in these both domestic and imported products. In this way was obtained an elasticity of the demand for long-haul freight transport which, applied to the average annual rate of increase of goods in circulation, gave a probable rate of growth of the average annual demand for transport in the next few years.

By way of illustration the numerical results of this calculation may be quoted. The traditional elasticity of the demand for transport proved to be greater than unity for domestically produced goods, and almost equal to unity as regards all goods in circulation. Since the figures used referred to actual transport—load transported, in units of weight—and since the kilometric load—tons/

kilometres—grew faster during the period under consideration, a coefficient of 1.3 was taken as the average elasticity for the goods in circulation. The probable annual growth rate of the domestic production of goods and of imports, obtained from the general projections, was shown to be 4.5. By applying the transport elasticity to this figure, the probable rate of growth of the demand for transport was calculated to be about 6 per cent per annum.

Once the over-all demand and its geographic distribution have been estimated, the problem arises of ascertaining how that demand will be divided among the different means of transport. Theoretically, specific means of transport exist for certain products and particular hauls. Of the majority of goods it is generally true that they may be efficiently transported by more than one means. Distribution of the load thus resolves itself into a problem of costs and freight-rates, an estimate of the probable evolution of which therefore forms part of an analysis of future transport demand and policy.

When the probable load has been distributed among the various means of transport, the next step will be to determine the demand for input, including capital goods, which will be required to set the system in motion and keep it in operation. The data thus obtained will serve to supplement and adjust the estimates made for industry in regard to the demand for intermediate and capital goods.

So far the emphasis has been on transport as a supplier of intermediate services. Consideration must still be given to transport as a final service, i.e., for passenger traffic. In general, projections of the demand for passenger transport may utilize methods similar to those applied to freight traffic. The problem of the demand for transport on the outer fringes of cities is a specific subject which has not yet been considered at the present stage of these studies.

Projection of the demand for energy has many points of resemblance with the process used for transport. Both services represent necessary basic materials for economic development; in both cases, not only final demand but also the demand for intermediate services must be taken into account; in both, analysis by geographic areas are essential to a complete notion of the problem, with the added circumstance that, in the case of energy sources, their location is an even more important factor in determining the sites of other activities; and finally, both sectors call for heavy investment, within which the proportion of imports is usually high in countries which have not yet emerged from the initial stages of development.

In nearly all economies which are in process of growth, the demand for energy exceeds the increase in the capacity to produce it. In Colombia, for example, the consumption of electricity and petroleum has risen by an annual average of 12 per cent since 1945, but even so it has not been possible to satisfy the real demand. A frequent result of limited supply is that many industries find themselves obliged to generate their own energy, with a consequent additional burden on investments and the level of costs.

When estimating future demand for energy the foregoing circumstances must be taken into account. A projection based on past rates of consumption increase will fall short of reality. Corrections or alternative projections must therefore be prepared, giving due consideration to present deficits, the consumption resulting from a rise in *per capita* income and industrial needs by branches. Com-

parisons with other countries of similar structure are often useful for such alternative projections and the data supplied by input-output matrices are of assistance in ascertaining industrial consumption. However, it is interesting to note that the use of these matrices in the case of Colombia gave apparently very low figures for energy consumption: this is explained by the share of handicrafts in industrial activity and by the limitations of the energy supply. Thus the projection of future demand in such cases—which are those most frequently encountered in Latin America—must take account of future structural changes in industry and of the need for expansion of the basic installations.

As in the case of transport, projections of the aggregate demand for energy must be followed by a study of demand by geographic areas and energy sources. A complete survey will need to embrace many other aspects—location of future sources, interconnexions between individual systems, and other technical matters requiring the help of specialists.

(iii) *Governmental services.* It is indeed a complicated task to determine the best level of governmental services required by a given economy at a particular moment, since the solution does not rely upon economic criteria alone. But certain economic aspects of this problem must be taken into account for any development programme.

Between the governmental sector and the other sectors of the economy exists an interplay of forces quite different from the reciprocal action of the remaining sectors. This situation arises from the fact that the price of governmental services is not established through the mechanism of the market. Nevertheless, the factors of production used by a government to obtain these services are generally acquired on the open market in competition with private enterprise. Some of the consequences of this situation should be considered.

If a government decides to raise the wages and salaries of its employees, financing the additional expenditure by higher taxes upon personal income, a volume of income is being transferred from one sector of the population to another. The real total of services rendered by the government will not change, but they will become more expensive for the population and the share of such services in the gross income will rise. Since there is no competition between the public and private sectors, the situation will tend to stabilize itself, provided that the groups adversely affected accept the reduction in their real income.

It may be assumed that a government absorbs a volume of factors of production, but not of income, formerly used by private enterprise. If such factors are employed for greater productivity, the real income of the community will rise. In this event, the governmental share of gross income will also increase, but no reduction in the real remuneration of the factors employed in the private sector will take place.

On the basis of such an analysis, it may be said that, from the economic aspect, the transfer of factors between the public and private sectors is justified, provided that it leads to higher income for the community. But, in practice, this rule cannot be followed. For many governmental activities, such as education and scientific or technological research, it is difficult to estimate the rate of productivity. Perhaps the best way of increasing the future returns of agriculture or industry would consist at the present stage

in diverting income and even factors of production to the subsidizing of research or technical education. But since such measures do not bear immediate fruit, the apparent short-term effect of the diversion would be a relative increase in the charges for services rendered by the government.

However, from the aspect of preparing a development programme, it is less important to define the boundary between the public and private sectors, than to project the demand for services provided by the State. That demand is generally expressed in decisions by political bodies, but it is largely influenced by community needs, to which consideration may be given in an economic analysis. Such is the case with the need for urban improvements, education, public health, etc. In a development programme various hypotheses may be formulated as regards the probable absorption of resources by these and other State activities.

### 3. THE REPLACEMENT OF IMPORTS

Demand for a product or group of products having been projected, the next stage consists in determining how such a demand can be satisfied. Whenever demand for a product is partially or entirely met by foreign trade, the question of imports enters into the relation between projections of demand and estimates of output. The problem of foreign trade therefore appears to be an integral part of the sector-by-sector analysis. Its basic elements are the following: (a) the capacity to import is determined by a series of factors, the most important of which cannot be controlled from within the economy; (b) substitution of domestic production for a considerable share of primary commodity imports either is impossible or can only be effected with difficulty, for reasons of climate, lack of adequate natural resources, etc.; and (c) owing to fixed items in the balance of payments, a further substantial share of the capacity to import is usually committed over a long period.

A hypothesis for the capacity to import and another for the expansion of income having been formulated, one of the more important tasks in drafting a programme consists in determining the necessary adjustments to be introduced into the different sectors of the economy, so that these two hypotheses may be in practice mutually compatible. This is one of the most difficult problems in programming economic development and must be considered in some detail.

#### (a) *Adjustment of the capacity to import to the hypothesis of growth.*

If investment is to be suitably guided, the replacement of imports must be estimated and co-ordinated with other elements in the programme. It is then necessary to determine what criteria should constitute the basis for forecasting substitutions or for guiding a substitution policy. Further, a decision must be taken on whether substitution in the agricultural or in the manufacturing sector, of consumer goods or of capital goods, will be of most value to the economy.

Although this problem requires much more thorough study, a simple procedure was used in this analysis, in order to arrive at a preliminary solution. A hypothetical rate of growth for income and another for the capacity to import having been assumed, an estimate was made of

those imports which probably cannot be replaced, as well as of other fixed items in the balance of payments. In this way, it was possible to determine the capacity to import those goods which might be produced domestically. An estimate was then made of the probable volume of imports in this latter category, on the assumption that they would not be replaced, that is, in the event that imports which might be replaced expanded at the same rate as the demand for them, such demand being projected on the basis of the hypothetical growth of the product. Thus an approximation was obtained of the margin of substitution necessary to ensure compatibility between the hypothesis of the growth of income and that of the capacity to import.

As soon as the magnitude of import replacement was evaluated, the analysis by commodities of a possible process of substitution was begun. It was applied initially to consumer goods, including raw materials and fuels. In this case the element of adjustment must be imports of capital goods or, better still, as explained below, imports of equipment. The logical sequence of the analysis was as follows. Once the possibilities for the replacing of imports by domestic production in the consumer goods and intermediate goods sectors were evaluated, an estimate was made of the remaining imports in this sector. After these imports had been projected, they were subtracted from the capacity to import and the remainder represented the capacity to import capital goods. When this capacity to import was subtracted from the demand for capital goods, it was possible to assess the requirements to be covered by domestic production.

The first stage of the analysis consists, therefore, of a detailed study of the possibilities inherent in each group of industries, or in each sector of agricultural activities, of continuing and intensifying the process of import replacement. An analysis of this type would indicate those branches where the domestic producer is gaining experience or where the country's potential, as regards the abundance of raw materials, the extent of the domestic market, etc., is more clearly defined. To assess recent trends towards import replacement in the manufacturing sector, projects under study or at the initial stage of realization must be borne in mind and use made of available statistical material.

In the second stage of the analysis, an examination must be undertaken of the way in which the capacity to import capital goods should be employed. The element of adjustment in this sector—in the cases where the technique of programming has been applied, that is, those of Brazil, Colombia and Chile—was the equipment-producing industry, since the cement and steelmaking industries have already been installed on a relatively large scale in those countries. This leaves the mechanical industry, the principal branch in the manufacture of capital goods, since the advisability of expanding its production will largely depend on the capacity to import. In adopting this criterion, a number of factors were borne in mind. The mechanical industry is the principal means of incorporating technical progress into the production process. The possibility of obtaining equipment from the most advanced technological centres is one of the means whereby under-developed countries may obtain the benefits of the experience and scientific progress of countries with an industrial tradition. Comments might also be made on the size of the market, the shortage of technicians and skilled labour, etc., which

explain, on the one hand, why the heavy mechanical industries and the precision tools industry have developed slowly in Latin America, and, on the other, why import replacement would probably be more difficult in this sector than elsewhere.

(b) *The general criteria for substitution.*

The solution to the problem of import replacement is fundamentally empirical, but it does not exclude the introduction into the analysis of certain general criteria. Presented in its broadest terms, the problem of substitution is similar to the fundamental question of the criteria to be used in a development programme for directing investment policy. Whereas, however, the channelling of investment can be solved through the principle of marginal social productivity, import replacement is complicated by the difficulty of forecasting trends in foreign demand, a basic factor in the capacity to import. It would be interesting, for instance, to ask which is the more suitable for a country such as Chile: investment in the nitrate industry to raise the capacity to import, or investment in the textile industry, with a view to replacing imports? Similarly it might be inquired whether more capital should be invested in paper mills in order to increase exports, or whether greater meat production should be attempted so as to eliminate imports. Any number of similar alternatives might be advanced and it is likely that few cases could be solved by empirical means alone. Certain general criteria must therefore be adopted, even when, in practice, the inadequacy of available data makes it impossible to adhere to them systematically.

In this study, the criterion was adopted of rendering the capacity to import in terms of the estimates of foreign demand. Different hypotheses of the future behaviour of that demand were formulated. But once one of these is selected, the capacity to import can be considered as an independent variable. It was assumed that if foreign demand prospects are favourable, the investment necessary to increase exports will be available. However, no comparison was drawn between the relative advantages of a unit of investment in each export activity whose expansion is possible and a unit of investment in activities which result in a replacement of imports.

A comparison of this nature would require a study of the advantages of investment in export activities according to different alternative patterns of external demand. Moreover, since such investments are almost always made with a view to long-term amortization, short-term estimates of the advantages would be inadequate, given the greater probability of idle factors in the export sector. If such a comparison is made, it must be limited as follows. Investment of a unit of capital in an export activity would cause the national product to rise by  $X$  units over a given period and on the assumption that foreign demand would follow a given trend. The social productivity of the investment unit, provided that foreign demand reacted favourably, would probably be greater than in the alternative case of investments to replace imports. But the advantage obtained during an initial period might very well be lost altogether in the following stage, through a contraction in foreign demand. Under the circumstances, any comparison of the relative advantages would be hazardous. For the time being, it was thought preferable to work with aggregate data for the capacity to import obtained from hypotheses of the pattern of foreign demand. There is even greater justi-

fication for this decision when export activities are financed mainly by foreign private capital, since in this case it would not be correct to discuss alternative investments.

The above comments refer to the alternative of either increasing exports or replacing imports. As was pointed out, the solution is to estimate the capacity to import, on the basis of an over-all hypothesis of foreign demand, and to calculate the degree of effort needed to replace imports that the hypothetical rate of growth would require.

The second aspect of the substitution problem consists of the alternatives for substitution itself. In this case, the solution can be found by comparing the marginal social productivity of the different alternatives, always provided that the relative prices of imported goods are not modified in the future. If the investment of a unit of capital in the paper industry leads to an increment of  $X$  in the national product, while an identical investment in the rubber industry shows an increment of  $X - 1$ , when domestic production is replacing imports in both cases, then paper represents the more desirable substitution. But this example would no longer hold true if, in the future, the price of imported paper were to rise in relation to that of imports of manufactured rubber goods. Therefore a substitution which is at present effected on the basis of the best economic criterion may perhaps become anti-economic at a later date. But problems such as these are almost inevitable so long as the structure of costs develops individually in different countries.

The adoption of marginal social productivity as a criterion gives rise to a series of practical problems, many of which are caused by the faulty operation of the price mechanism. It is enough to consider the effect of multiple exchange rates and of quantitative import controls upon the relative prices of imported goods in order to realize the difficulties involved in adopting a general criterion of this order. If it were merely a question of comparing domestic production costs with the price of an imported commodity, these difficulties might easily be overcome. But an expedient of this kind would be too simple. What is required is a comparison of the aggregate income generated, directly or indirectly, per unit of investment in the different alternatives.

The empirical criterion of a product-by-product analysis in order to define the current trends in the process of substitution approaches—although very indirectly—the criterion of marginal social productivity. In fact, spontaneous substitution normally takes the line of least resistance, that is, it is chiefly effected in those sectors where there are greater development possibilities for the economy. These possibilities are generally evident in the relative advantage of wages, in the accessibility and abundance of raw materials, in a low product-capital ratio, etc. Industries with these characteristics also show a high marginal social productivity, since, from their inception, they use factors of production that were previously idle, labour that had been under-employed, or sources of raw materials so far untapped.

These facts give an idea of the great difficulties involved in formulating a rational policy of import replacement. The criteria adopted here represent a preliminary attempt to find a practical solution. However, the need for more research into the general basis of the problem, and for practical criteria of wider scope than those used in this study, cannot be overlooked.

#### 4. PROJECTIONS OF DOMESTIC PRODUCTION

Projections of domestic production are directly based on the calculations to which reference has been made in the preceding sections. A breakdown may be made by two large sectors: (a) production for export and (b) production for the domestic market. The projection of exports was made at the beginning of this study, in relation to possible demand.<sup>16</sup> It now remains to analyse the investment and other measures necessary for the satisfaction of the demand forecast. The method proposed is in broad outline identical with that about to be described for dealing with domestic production, according to whether agricultural or industrial commodities are in question; the content of the following paragraphs is therefore applicable to what has gone before. The projection of the product by sectors for the supply of the domestic market results from a combination of the analysis of demand with the outline project for import substitutions. Once the volume of requirements, the proportion to be met from imports and the probable development of production for export have been ascertained, the basic elements for projection of the various branches of the national product are available. Clearly, variations in any one of these basic elements would mean that the projections had to be modified. Thus, for every hypothesis of growth, a whole series of combinations of projections by sectors could be presented. In practice, however, for the sake of simplicity, it may be advisable for estimates to be based only upon a limited selection of the most likely hypotheses. The number of countries to which the preliminary technique has been applied has also been reduced to the minimum, to simplify the explanation of the method used, and to avoid such purposeless multiplication of difficulties as a wider range of hypotheses would necessarily involve. Attention must then be devoted to individual problems arising from the projection of domestic production in the main sectors of the economy.

##### (a) *Agricultural production*

Once it has been ascertained what proportion of the demand for the products of agriculture and stock-breeding will have to be met from domestic production, the objective of the analysis for this sector must be to determine the measures and investments required for the attainment of the target proposed.

The point of departure for such an analysis must be a detailed study of the agricultural situation. In this sector the structure of farm ownership and the systems of land tenure may constitute serious obstacles to any increase in over-all production and in productivity per rural worker. The same is true of methods of cultivation and land utilization. Improvements achieved by means of better adaptation of the distribution of crops to natural conditions and improved land use, as well as by the use of suitable strains of seed, fertilizers and more up-to-date agricultural techniques, may represent a saving for the economy of large sums of capital, especially where the reclamation of new areas is concerned. On the other hand, it is sometimes indispensable for certain basic works to be carried out, especially in the sphere of irrigation, if the productivity of the land is to be increased. As can be seen, the preparation of an agricultural programme demands a detailed survey of the main commodities it is desired to produce, and, at the same time, an analysis by agricultural areas, besides

<sup>16</sup>See chapter III, section 6.

general studies of an economic and social character. One of the vital aspects which an agricultural programme must embrace is that of labour productivity. It has already been stated that a widespread feature of agriculture in Latin America is the low productivity of human labour, together with disguised unemployment.

Again, as the implementation of a programme progresses, the development of the industrial sectors and services will gradually require more and more labour, which will have to be contributed by the agricultural sectors. A development programme must include among its principal aims the raising of labour productivity in rural areas; and this will at the same time enable an approximate estimate to be made of the amount of labour which would be set free to be absorbed by the other sectors. Unless these ends were achieved, the *per capita* product would remain below the levels which it would be both desirable and possible to attain, and development would consequently be retarded. Moreover, capital requirements in the non-agricultural sectors would be larger, because of the impossibility of resorting to such techniques as, by using more man-power, effect a saving in the factor of which there is the greatest shortage, namely, capital.

It is clear from the foregoing remarks that an estimate of the investment required for the implementation of an agricultural programme must be based upon special calculations that take into account the institutional factors enumerated above. It would be meaningless to apply capital coefficient to agricultural activities, without having first determined the structural conditions under which such activities will be carried on, and assessed the progress which can be expected to result from improvements in the systems of land tenure and in the methods of cultivation employed. Furthermore, in the necessary capital must be included not only investment in the farms themselves, but also the costs of permanent works, such as irrigation systems, storage facilities, deforestation and land rehabilitation equipment, research, extension and development services, and so forth, if an approximate estimate of the capital needed for the agricultural programme is to be made.

The converse of what may occur in the industrial sector is very likely to take place here; a detailed calculation of investment in the agricultural sector may well differ substantially from the results obtained in over-all projections. The degree to which this is so will be in direct ratio to the structural transformation in agriculture which the execution of the programme is expected to bring about, as the capital coefficients—and the units of capital *per capita* and per unit of cultivated ground—will not be the same in a country where the agricultural system is more up to date as in one where it is still primitive. Clearly, the difference between capital coefficients in the past and in the future will be smaller in the case of an economy where agriculture has already reached a certain level of development, where permanent soil improvements are considerable and where the structural transformations arising from the application of the programme are not so marked. It must once again be repeated that the statistics for investment obtained in the course of the separate study of the sector will serve to adjust and correct the figures initially used for a first approach to the problem.

In view of the scope of this problem, and the short time available, it was impossible to work out over-all projections for agricultural production in the study on Brazil. To remedy this deficiency in part, a chapter on the wheat

situation was included as an example of what it is felt should be done for the rest of the sector. In the study on Colombia, on the other hand, an attempt was made to envisage agricultural programming as a whole, although it must be made clear that many of the subjects dealt with require more thorough treatment, which it was impossible to accord them, partly for want of statistics and partly for lack of time.

#### (b) *Manufactured consumer goods and intermediate products*

The production of the sector manufacturing consumer goods and industrial intermediate products—those of agricultural origin having been included in the foregoing paragraphs—presents a relatively easier problem. The proportion of the demand for the principal commodities that must be satisfied from domestic production having been determined, the most important task is that of calculating the investment required in each branch of industry. The internal structural transformations which a programme may bring about in the industrial sector are not of such far-reaching importance as in agriculture. Probably the most important will be the conversion of branches of handicraft production, where productivity is low and mechanical and energy resources are scanty, to the industrial sector proper; and the concentration of production in units of larger size. But even in these cases, once it has been established in which groups evolution of this kind will have to take place, it will be easy to assess the structural elements of the new form of production, either by using the input-output matrices, or by means of an analytical comparison with similar industries in the same country or in others at a parallel stage of economic development.

For the calculation of investment by branches of industry, the most suitable method has seemed to be the use of partial capital coefficients, or, in other words, the amount of capital required to obtain a given product. These partial capital coefficients may be arrived at in two different ways. The first would consist in adjusting the historic coefficient for the sector to the data obtained on the degree of utilization of installed capital in the industry concerned. For the second, use would be made of the capital coefficients for other countries whose economies were reasonably similar, or of the theoretical coefficients or those resulting from known projects in the case of well-defined industries. Capital coefficients may be affected by relative prices, especially as the level of the individual product is approached. Hence the advantages of taking a representative year for both terms of the ratio, as was done in the case of the study on Colombia, for which the year 1953 was chosen.

#### (c) *Services*

The projection of investment and its local distribution with respect to transport and energy was studied in relation to the projection of demand. In connexion with these two sectors a few considerations must be added, which are of considerable importance for the timing of future investments, to which reference will be made later.<sup>16</sup> The projection of residential services has already been examined in broad outline. To project the basic branches of the national product in their entirety, where services are concerned, it would still be necessary to deal with commercial, personal and governmental services.

<sup>16</sup>See section 5 of this chapter.

The role of the first two in development is comparatively passive. Their physical productivity increases more slowly than that of the economy as a whole, for which reason the wage level in these sectors is influenced by the wages paid in the dynamic sectors of the economy, especially in manufacture.

As regards commercial activities, their growth can be estimated by taking as a point of reference the increment in the gross product or in the circulation of goods. As far as can be observed it seems that commercial activities expand more than proportionately as the product increases, by virtue of the growing complexity of the productive process, the stages of which are bound to be multiplied as the economy develops. This circumstance seems to justify the assumption that the rate of growth of these services is slightly higher than that of the gross product.

An examination of the questions raised by the projection of personal services sheds light on some general aspects of the problem of projections by sectors. It is well known that in under-developed economies wages differ widely from one sector to another. These discrepancies are largely due to the existence of surplus labour, which in most countries seems to be accumulated in agriculture, personal services and construction. The extent of this surplus and the rapidity with which it is absorbed are basic elements in the calculation of projections by sectors, as has already been pointed out in the case of agriculture, since they influence capital requirements in the various branches of activity, modifications in the physical productivity of labour, and the evolution of wages in the different sectors. Upon the postulates of investment in the diverse sectors will depend the shift of man-power from one sector to another.

As the personal services sector is largely residual, the amount of man-power remaining in it will necessarily depend upon the rate at which some sectors absorb the labour force, and others, especially agriculture and construction, set it free. But it would be erroneous to expect the volume of services tendered in this sector to increase or decrease in the same proportion as its labour force. What is most likely to occur is that, as the surplus of man-power in personal services is reduced, the incentive to augment the volume of capital per person employed in such services will become stronger. It may therefore be expected that in this sector real production will grow more than proportionately to the increase in the man-power employed. But even if the real volume of personal services that were to be produced could be ascertained, it would still not be possible to estimate the amount of income generated in this sector unless a hypothesis were available as to the relative prices paid to the factors employed therein. It would, in reality, be mistaken to suppose that relative prices will remain stable while a significant change in the structure of the active population is taking place. If the personal services sector loses a considerable proportion of its surplus manpower—and still more if the remaining labour force increases its physical productivity by virtue of fuller use of capital—a relative rise in wages is to be expected and therefore an increase in costs in this sector. Only after ascertaining the influence of these two factors—the increase in the physical productivity of labour and the relative rise in costs—would it be possible to make an accurate projection of the income generated. Nevertheless the residual nature of personal services and the modest volume of capital they absorb justify the establishment of hypotheses with somewhat vague margins or approximation.

Governmental services must be the object of a special study. The sphere of state activity is so vast, and covers sectors of such varying character both in their economic aspects and from other points of view, that a technique rather different from the method used for the other sectors must be applied. A projection of services provided by the public sector must in every case be based on a careful study, not only of the structure of government income and expenditure in every branch of administration, but also of political and administrative philosophy with respect to the field of activity of the public authorities in the country under review.

Services contributed by the public sector in the future will depend upon two principal elements. The first of these is constituted by those requirements which accompany the process of development and which the community has agreed to nationalize—communications, education, public health, technological research, urban improvement, etc.—and the investment which must flow from the same source. The second consists in the capacity and limitations of the public sector as regards the building up of the necessary resources by means of the taxation system and credit. When an analysis of this type is made for the under-developed countries, the conclusion most likely to be drawn is that the fulfilment of the government's mission, where programming exists, demands a fairly far-reaching reform of the administrative and taxation systems. In the case of Colombia, an attempt was made for the first time to examine the role of the Government in the implementation of a development programme, although the only aspects dealt with were the provision of basic services and basic social capital in the economic field, and the collection and channelling of resources for investment purposes. In the study on Brazil, also, a chapter was included on the fiscal activities of the public sector.

#### (d) *Capital goods*

The projection of capital goods requirements and their domestic production has certain special features which will be very briefly reviewed here, since their study in the case of under-developed countries is still in a preliminary phase.

The primary elements for the calculation of the demand for certain capital goods required for a development programme are to be found in the estimates of investment made for each sector. If data are available on depreciation of installed capital and the amount and nature of new investment, it is possible to define the composition of the demand for capital goods for the production of intermediate and final goods. The case becomes more complex when an attempt is made to project investment demand of the capital goods industry itself. In such an instance, the secondary or tertiary effects of final demand would be considered. In this connexion no satisfactory criterion as yet exists, and the study has had to be limited to a more empiric analysis based on an examination of the principal groups of commodities included in this category of goods.

With regard to import replacement,<sup>17</sup> some general criteria on the distribution of demand for these goods between imports and domestic production were expounded. To enlarge on previous statements, it should be borne in mind that capital goods may be classified into the three broad

<sup>17</sup>See section 3 of this chapter.

categories of building materials, metals, and mechanical equipment.

For an under-developed economy, building materials—of which the most important is cement—are obviously the easiest to produce from the point of view both of technology and of the volume of investment required. In fact, the building materials industry constitutes the first stage in the production of capital goods, and many Latin American countries have by now entirely—or almost entirely—replaced this branch of imports by domestically produced equivalents.

Among metals, the most important are iron and steel, apart from the fact that the existence of mineral and energy resources may in some cases offer special advantages for the production of other minerals, such as aluminium, copper, etc. However, at the stage of technology reached at present, iron and steel are far more important than other metals. The demand for iron and steel products in certain industries is easy to calculate. Projections for the building industry, transport and the input of mechanical industries or others using steel products (such as packing industries), as also the needs of agriculture, public works, etc., will supply the necessary data for the assessment of the volume and composition of the probable demand for iron and steel products. The possibility of domestic production is dependent, first, upon the existence of natural resources; secondly, upon the size of the market; and, thirdly, upon the capital available for investment. The presence of these factors—or at least of the first two—would justify the elaboration of specific projects. In countries where an iron and steel industry already exists, the problem is to increase the productivity of capital.

It often happens that the existence of iron and steel production promotes the demand for these goods because of the advantages it creates for the installation of new metallurgical industries. Before 1946, in Brazil, the iron and steel output was virtually limited to building materials. From that date until 1954, while industrial production increased by 64 per cent, consumption of iron and steel products by the mechanical industries was tripled. This was largely because there is a substantial percentage of iron and steel, in the form of intermediate products, in imports of mechanical goods. The calculation made in the relevant study clearly indicates that in 1949 over 23 per cent of the c.i.f. value of imports from mechanical industries—machinery, transport, electrical and other equipment—was composed of intermediate goods. When the market for these products, in the course of economic development, reaches a certain size, a substitution process takes place which results in greater demand for domestic iron and steel. This is of the utmost importance for the projection of demand for iron and steel products, since it opens up the possibility of an estimate of future demand higher than that deriving strictly from calculations based on the demand of industries already installed.

The third component of the demand for capital goods—industrial equipment and machinery in general—is the most heterogeneous, since it ranges from simple implements to the most complicated types of machine tools. An over-all study of this branch of industry is of only limited use for programming in an under-developed country, since in each case every aspect of the industry must be analysed from its technological aspects to the minimum size of installations and the availability of resources. Mention has already been made, in general terms, of the advantages of indus-

trial machinery imports whereby the technical progress achieved in the great centres of production may be incorporated into a national economy. But, on the other hand, in some lines of industry it is possible and desirable, under specific conditions, to develop domestic production of certain simple equipment. As has already been pointed out, this means that individual studies of the branches of production in question must be made.

Here it is worth while pausing to consider the domestic production of capital goods. The level of development attained by this activity in Latin American countries, and the form it has taken, has not yet raised in practice the important programming problem represented by the creation of a capital goods industry, either for the manufacture of machinery for consumer goods industries or for that of machine tools. Except in the countries of larger geographic and economic proportions—and even in these—the stage reached by Latin America's industry is at most the production of primary capital goods, that is, cement, iron and steel. But there is no doubt that the region is now on the threshold of a new phase, at least in some of the national economies, and it is possible that a serious stumbling-block to the crossing of this frontier of industrialization may be the restricted size of domestic markets at present income levels. Under these circumstances, and for certain activities, programming should not be confined within the framework of national units, but should confront the problems of regional co-operation. This is an aspect that has not been studied as yet, but which may within the next few years become a matter of urgent concern.

##### 5. PHASES OF A DEVELOPMENT PROGRAMME

A scrutiny of the present situation of many of the Latin American economies reveals the vital fact that a cumulative deficit of productivity capacity exists in certain basic sectors, particularly in those of transport and energy. For economic growth to be intensified, it is indispensable that in the earliest stage these basic sectors should grow relatively more than the economy as a whole. This is because the expansion of most other activities depends upon the existence of a certain flexibility in the basic sectors, since transport and energy cannot always increase gradually alongside the rising demand for such services. With respect to these basic sectors, therefore, it is a usual occurrence in economies in process of development for situations of over-capacity to alternate with deficits.

For this reason, at the outset of work on preparation of a programme, careful attention must be devoted to the position of the basic sectors. If they are working at full capacity, there will be good reason to believe that the development of the activities dependent upon them is being hampered. Again, if a deficit is shown to exist in some basic sector of the economy, it will be indispensable, in a development programme, to take into account the time required to expand that sector. Clearly, it is not a question of merely covering the deficit: it is essential for the sector concerned to be given greater flexibility, so that the element which was constituting a hindrance may become a stimulus to the development of dependent activities.

But in a developing economy it is not only transport and energy services that play the role of basic sectors. Capital goods industries are in a very similar position, although in this case recourse may be had to imports to deal with short-term emergencies. If the problem is envisaged within

the scope of a development programme—in which the capacity to import, above all, enacts the role of an independent variable—the capital goods industries in their turn play a part as strategic as that of transport and energy. Since a given capacity to import capital goods is assumed, the possibility of achieving full availability of these goods depends directly on the capacity of domestic industry to produce them. This being so, the acceleration of the rate of growth of consumer goods industries will depend upon a prior expansion of capacity in capital goods industries.

Some consideration should be given to the form this problem assumes within a development programme. Once the capacity to import capital goods for a specific period has been postulated, it is evident that the growth of total productive capacity—that is, the aggregate accumulation of capital in an economy—can be estimated on the basis of the imports forecast and of domestic production of capital goods. On the hypothesis that all capital goods imported and produced during the period under review—after the necessary replacements had been made—were to be used for expanding the capacity of the economy to produce consumer goods, the flow of capital goods in the last year of the period would be the same as in the first.<sup>18</sup> If, in the given hypothesis, the growth of the capacity to import does not play a dynamic role, for the rate of growth of the consumer goods industries to be intensified—that is, for the volume of capital goods incorporated in these industries to be increased—an expansion of the productive capacity of capital goods industries will first be required.

The whole question is of vital importance in a development programme, since it clearly shows the need to begin by broadening the base of the economy, if the rate of growth is to be accelerated. The same problem, envisaged from another point of view, was previously examined<sup>19</sup> when an attempt was made to show what would be the consequences for the economy if the development programme began by accelerating the rate of growth of consumption.

The practical outcome of the foregoing considerations is the advisability of studying, in the course of preparing the projections, the possibility of dividing the programme into two distinct phases. The first of these might be described as the stage of the acceleration of development. Consumption would grow less rapidly than investment, which would indicate that the base of the economy is being broadened. At this stage the fundamental deficiencies of the economy should be eliminated, and a stronger impetus should be given to capital goods industries, so that consumer goods industries could attain a vigorous rate of growth during the second stage. The main characteristic of the stage of acceleration would be a more marked increase in productive capacity in the spheres of transport, energy and capital goods industries. Similarly, a disparity between the volume of investment and that of domestic saving would be very likely to appear, and would imply an inflow of foreign capital. The function of such capital is twofold. On the one hand, it would enable investment to be intensified without exacting from the economy its counterpart in savings. On the other, it would give the economy greater flexibility during this period of adjustment, endowing it

with a higher capacity to import. This first stage is not of arbitrary duration, but its length would be determined by the increment in the rate of economic growth which it was desired to achieve during the subsequent phase, and by the increase in the capacity to import capital goods.

The second stage would be characterized by a rapid but uniform rate of growth, and by identical rates of increase for the product and for consumption, once the desired investment coefficient had been achieved. The usefulness of including this second phase in the programme from the outset—apart from the general advantages for economic development deriving from the establishment of targets and the adaptation of investment to their attainment—lies in the fact that to project the expansion of given basic sectors the widest possible panorama of the future must be commanded. When the programme is being prepared, for the first phase, to increase capacity in transport, energy or the capital goods industry, the outlook cannot be limited to a period of four or five years; demand must be estimated over the longest term that available data and the technique of analysis will allow.

Once the projections for the various sectors of the economy have been estimated, the time has come to check and adjust the results obtained, by comparison with the aggregate projections. Statistical deficiencies, the degree to which aggregate projections are generalizations, and the inaccuracy of the instruments of analysis, make it probable that considerable margins of difference will exist between the two sets of findings. The only way to reconcile them is by successive approximations, adjusting the figures where necessary and revising the calculations derived from these corrected figures. This may be a very laborious process, but it is indispensable if the projections are not to contain internal inconsistencies which would deprive the whole system of much of its value. At the same time, the accomplishment of such a task will show where the weak points of the analysis or the materials utilized lie, and will enable the technique to be established on sounder bases. As this latter approaches nearer to perfection, and the statistical material employed becomes more accurate, the margins of error in the final results will presumably be gradually reduced.

As was indicated at the outset of this report, projections are only the basic elements on which must be founded the objectives, plans and measures of economic policy which make up a programme. In projections, economists present the probable results, the consequences of the various alternatives for development, and state the indispensable requisites for the implementation of each of these alternatives. A programme implies that a decision has already been taken; the competent government or institutional authorities will have adopted one of the proposed alternatives with a view to putting it into effect. Thence forward, the chosen targets become an objective of public activity, and their attainment will require a suitable policy and administrative organization. Although these last aspects are also of special importance for programming, and it would be indispensable to study them if a full grasp of the whole topic is desired, they are outside the scope of the present study, which has at all times endeavoured to keep strictly within the field of projections, the essential subject of the analysis carried out and the basic point of departure for subsequent research.

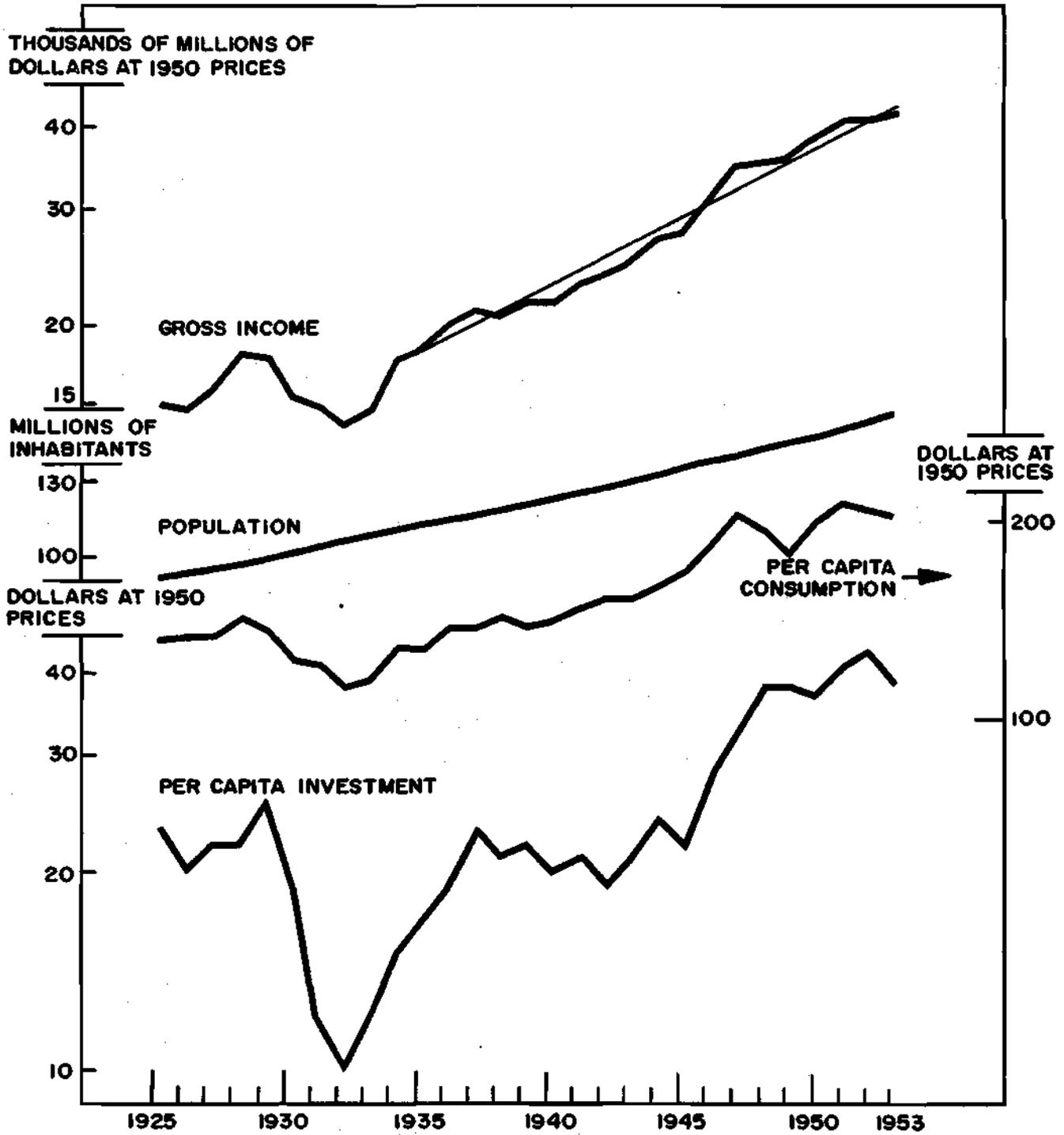
<sup>18</sup>The possible increase in the capacity to import is not taken into account.

<sup>19</sup>See chapter I of the present study.



Chart I

**LATIN AMERICA: RATE OF GROWTH:  
GROSS PRODUCT, POPULATION, CONSUMPTION AND INVESTMENT, 1925-53**  
(Semi-logarithmic scale)



**Chart II**  
**LATIN AMERICA: CAPACITY FOR EXTERNAL PAYMENT AND ITS COMPONENTS,**  
**1925-53**  
*(Thousands of millions of dollars at 1950 prices)*  
*(Natural scale)*

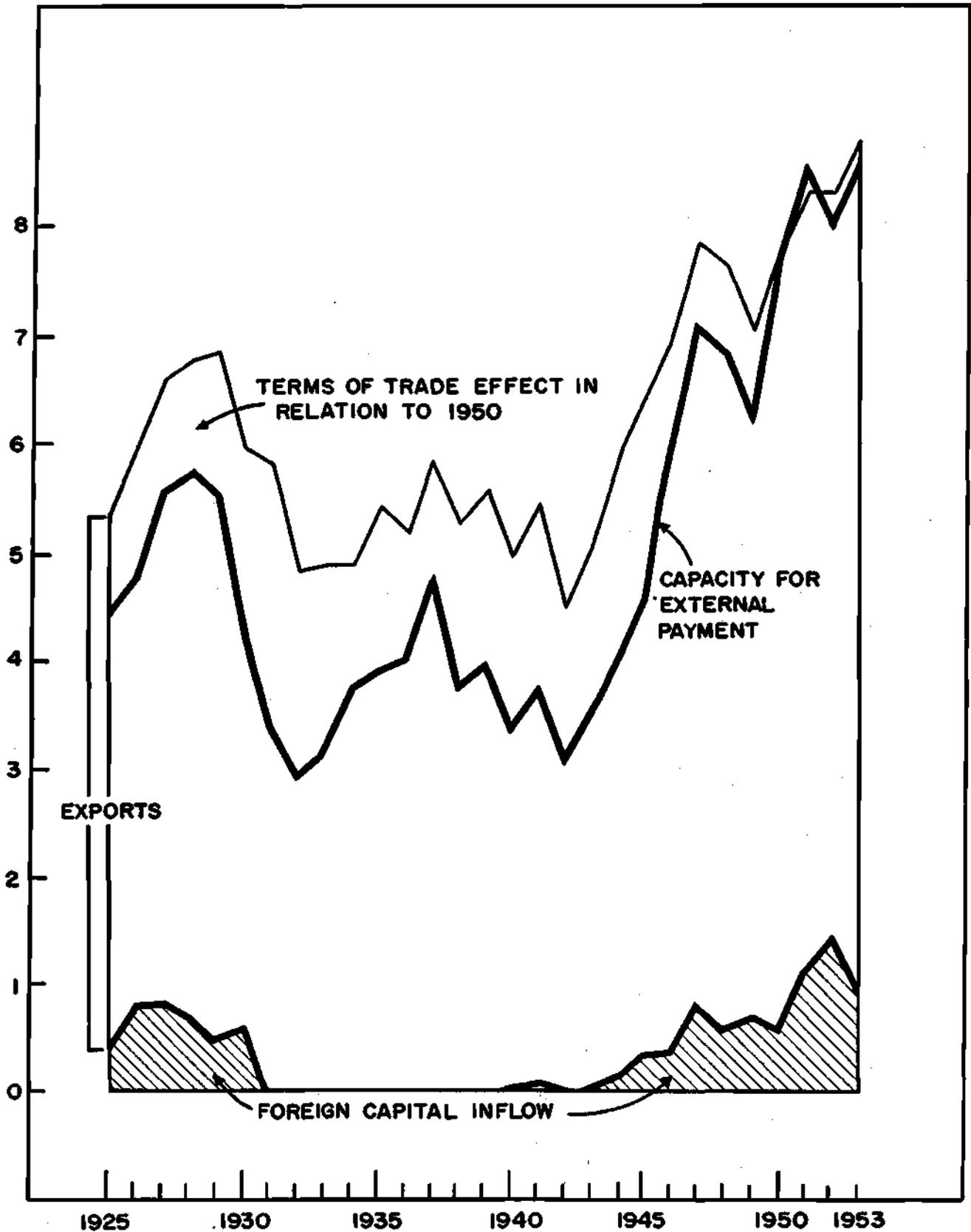
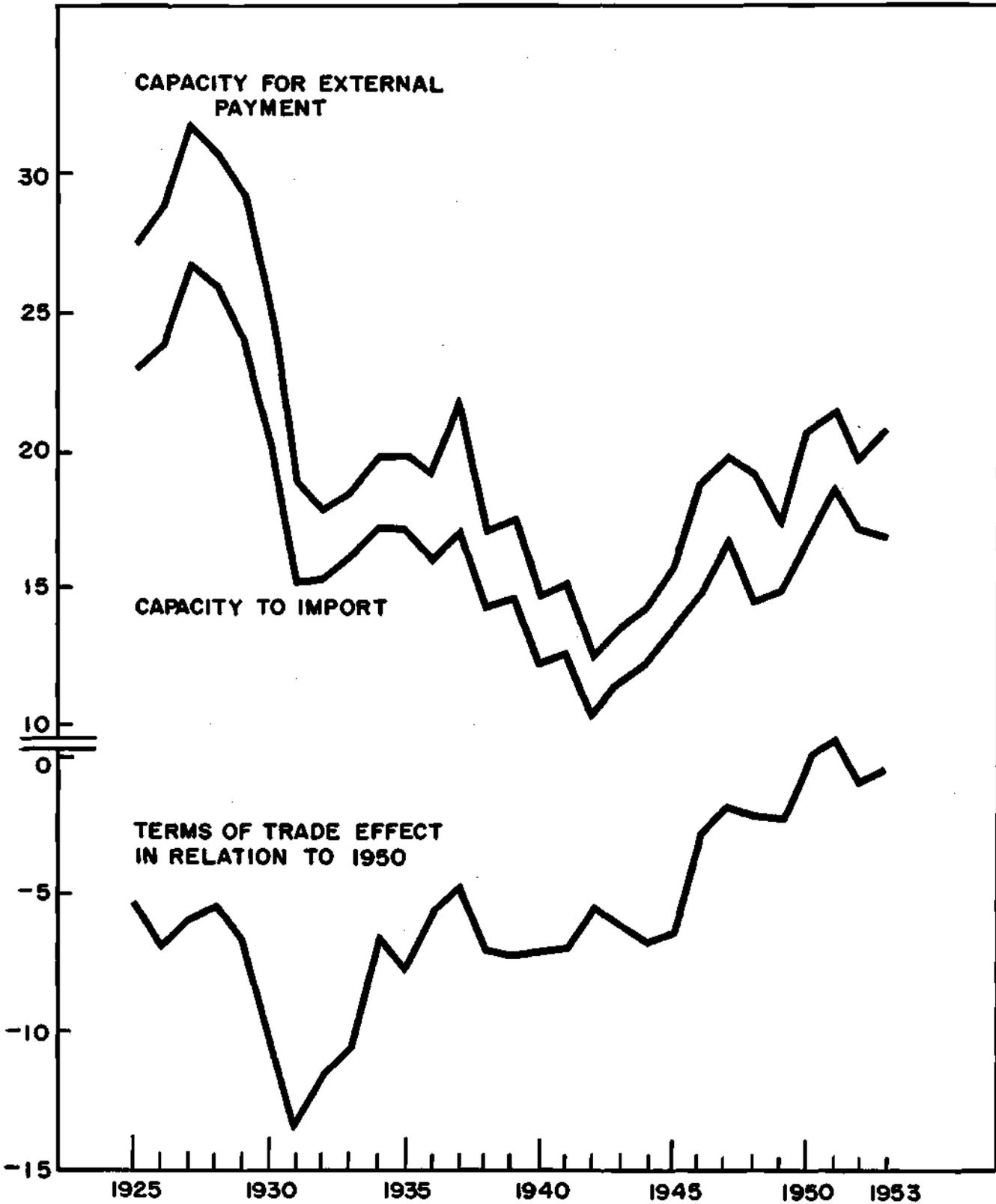


Chart III

**LATIN AMERICA: CAPACITY FOR EXTERNAL PAYMENT, CAPACITY TO IMPORT AND TERMS OF TRADE EFFECT, 1952-53**

*(As a percentage of gross product)*  
 (Natural scale)



**Chart IV**  
**LATIN AMERICA: IMPORTS OF CONSUMER GOODS AND CAPITAL GOODS**  
**(a) AS A PERCENTAGE OF TOTAL IMPORTS AND (b) IN RELATION TO**  
**CONSUMPTION AND INVESTMENT, RESPECTIVELY, 1925-53**  
 (Natural scale)

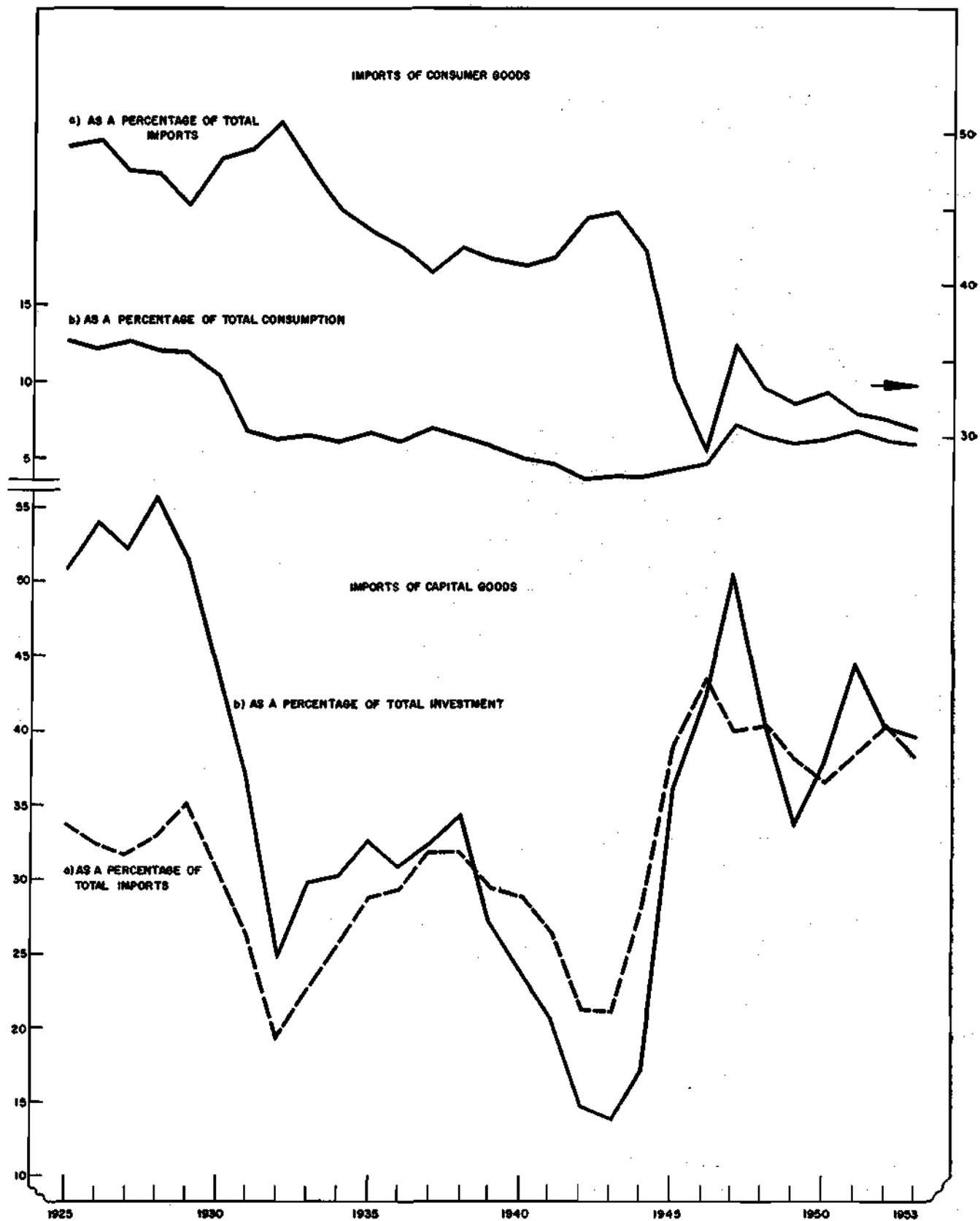
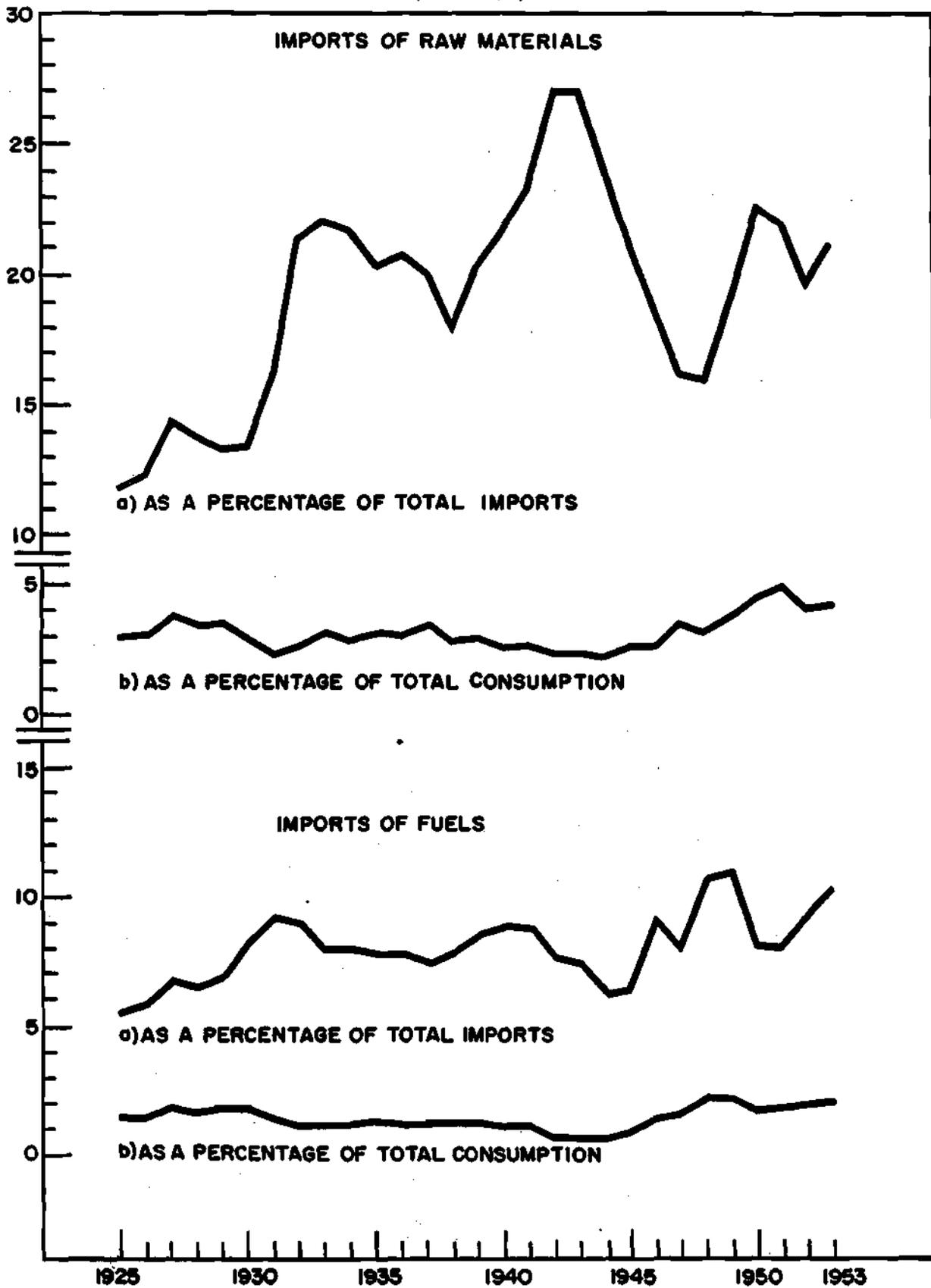


Chart V

**LATIN AMERICA: IMPORTS OF RAW MATERIALS AND FUELS (a) AS A PERCENTAGE OF TOTAL IMPORTS; (b) IN RELATION TO TOTAL EXPENDITURE ON CONSUMPTION, 1925-53**

(Natural scale)



**Chart VI**  
**LATIN AMERICA: FACTORS OF INSTABILITY AND THEIR EFFECT ON**  
**ECONOMIC DEVELOPMENT, 1925-53;**  
**TERMS OF TRADE EFFECT ON GROSS INVESTMENT**  
*(As a percentage of gross income)*  
*(Natural scale)*

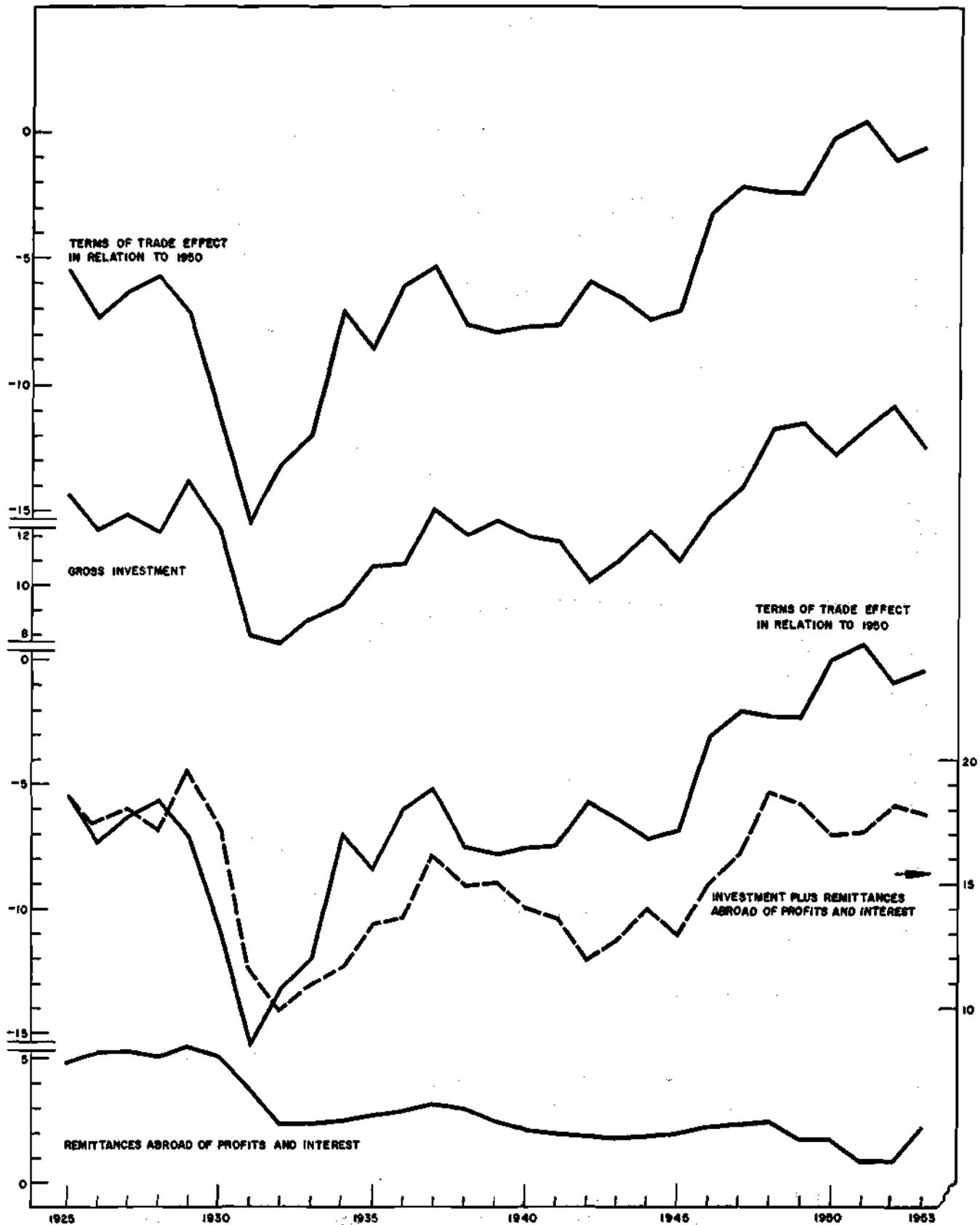


Chart VII

LATIN AMERICA: FACTORS OF INSTABILITY AND THEIR EFFECT ON ECONOMIC DEVELOPMENT, 1925-53; PRODUCTIVITY TRENDS

(Semi-logarithmic scale)

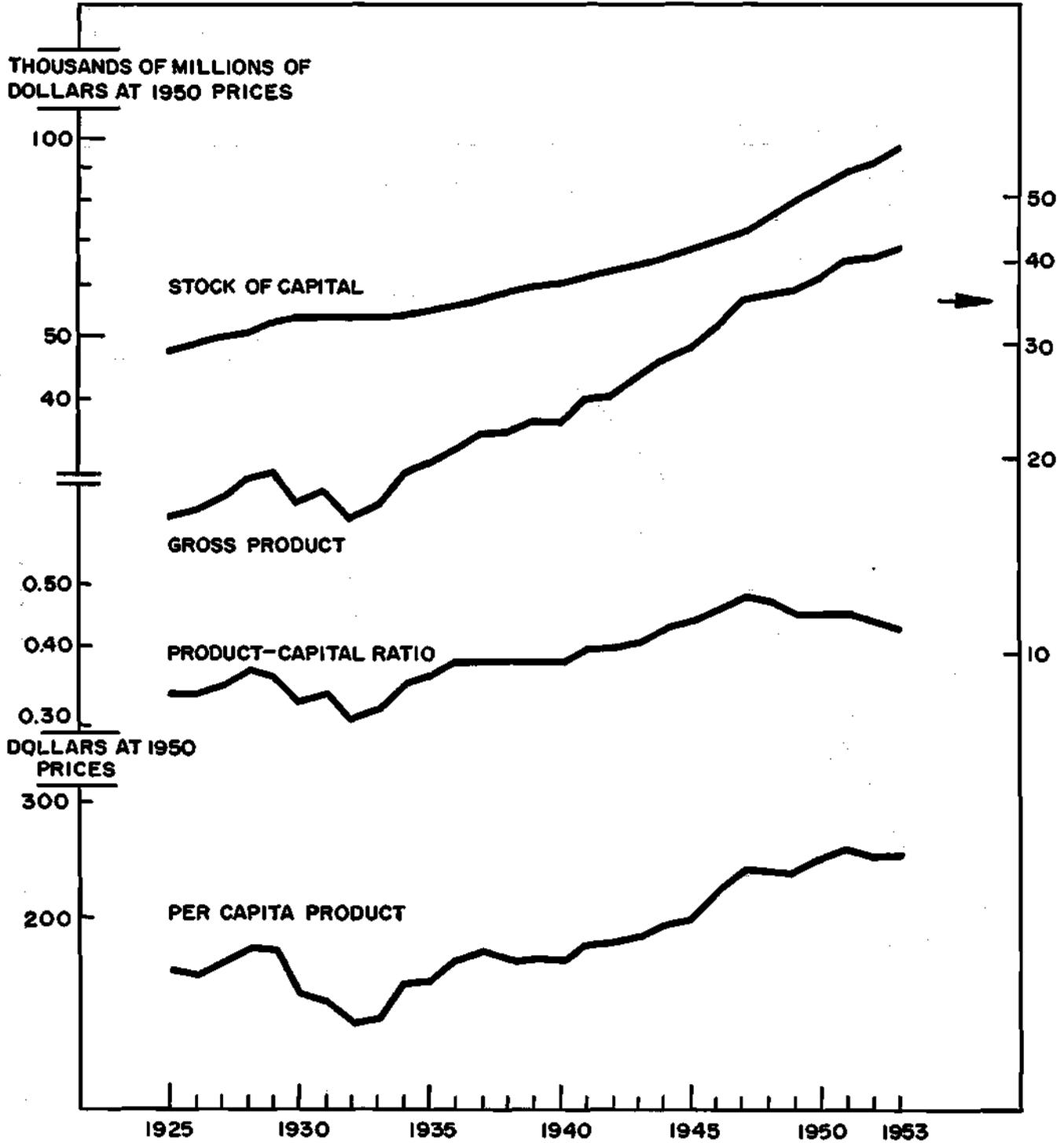


Chart VIII

## RELATIONSHIP BETWEEN GROSS NATIONAL PRODUCT AND FOOD CONSUMPTION

- |                 |                  |                        |
|-----------------|------------------|------------------------|
| 1. Argentina    | 6. Mexico (A)    | 11. Greece             |
| 2. Brazil (A)   | 7. Peru (A)      | 12. Italy              |
| 3. Chile (B)    | 8. Uruguay (B)   | 13. Norway             |
| 4. Colombia (A) | 9. Venezuela (B) | 14. Sweden (C)         |
| 5. Cuba (B)     | 10. France       | 15. United Kingdom (C) |
|                 |                  | 16. United States (C)  |

(Natural scale)

