8

Planning for education and other social services

1 Social planning in general

As I have already said in chapter 7, section 4, the planning of the so-called social sectors occurs as soon as planning is begun in the industrial sectors. All the same, it is well worth while to consider separately what in fact takes place in these social sectors if the method described in the previous chapter is followed. This may be called the method of complementarity, that is, the method which assumes that the activity of a number of social sectors is bound to expand in proportion to the expansion of production in general or of particular forms of production.

The social sectors mentioned so far produce services provided to the economy. These include personal services and government and education services at the national and the regional level, medical, psychological and cultural services of all kinds, services which are educational in the widest sense of the word and the activities of social insurance. They may be both publicly and privately controlled. If the input-output method is applied in its most primitive form, it is assumed that all these activities take place in proportion to the national income or the income of certain sectors or regions. If the subject is approached in a rather more precise way, there is no need to assume that the social activities take place in proportion to income, but that the increases in the social services are proportionate to the increases in income. This means that they are, as far as their absolute volume is concerned, linearly and not proportionately dependent on each other. The statistical data used are taken from international comparisons, in which a certain social activity is always assumed to be dependent on some economic variable. It should also be borne in mind that the tacit assumption is made here that the volume of this activity existing in various countries is also the most correct. This is by no means an established fact in the case of social activities in particular.

The relationship between the income per head of population and a number of indicators of social provisions is illustrated in figures 14 to 19. These have been taken from the Report on the World

Social Situation of 1961 made by the Secretariat of the United Nations. It is clear from these graphs that there is an obvious connection between the two factors in the case of rather larger groups of countries, but it is also clear that this relationship is not in general a linear one. If, however, a relatively small change in incomes is considered, every curve can be approximated by a straight line.

The information provided by these graphs forms a very useful approximate guide to social planning. Quite often, however, many of those responsible for certain aspects of a country's social policy tend to adopt a perfectionist attitude, and this is frequently in conflict with the country's financial resources. One obvious result of this is that, if their personal preferences prevail, or the experts supporting these particular aspects of social planning argue persuasively enough, there will be an incorrect distribution of means over the various social services.

A more responsible approach would be based more directly on the results to be achieved by the different social activities within the aims of the development policy. It may well be, for example, that certain forms of psychological guidance make a far bigger contribution to human happiness than has so far been realised and should therefore be given a more prominent place in social policy. Whether this is true or not can only be established by more detailed research, which has so far only been carried out incidentally and has not yet produced results in a form that is readily available for planning on a national scale. The recently created United Nations Research Institute for Social Development (UNRISD) with its headquarters at Geneva will no doubt have an important part to play in collecting material of this kind.

The method of direct evaluation of results which is advocated here (but which cannot usually be put into practice at present) is in principle identical to the method of project appraisal which will be discussed in chapter 9. This method can be applied to economic objects but is general enough to be applied to other objects too.

I have already indicated that a connection is not always established

Figure 14. *Income per head and consumption of energy per head in six groups of countries.* It is clear that the level of development, as represented by income per head, is correlated with the consumption of energy. This reflects a higher household consumption in rich countries, but above all the use of energy-driven machines in developed economies.

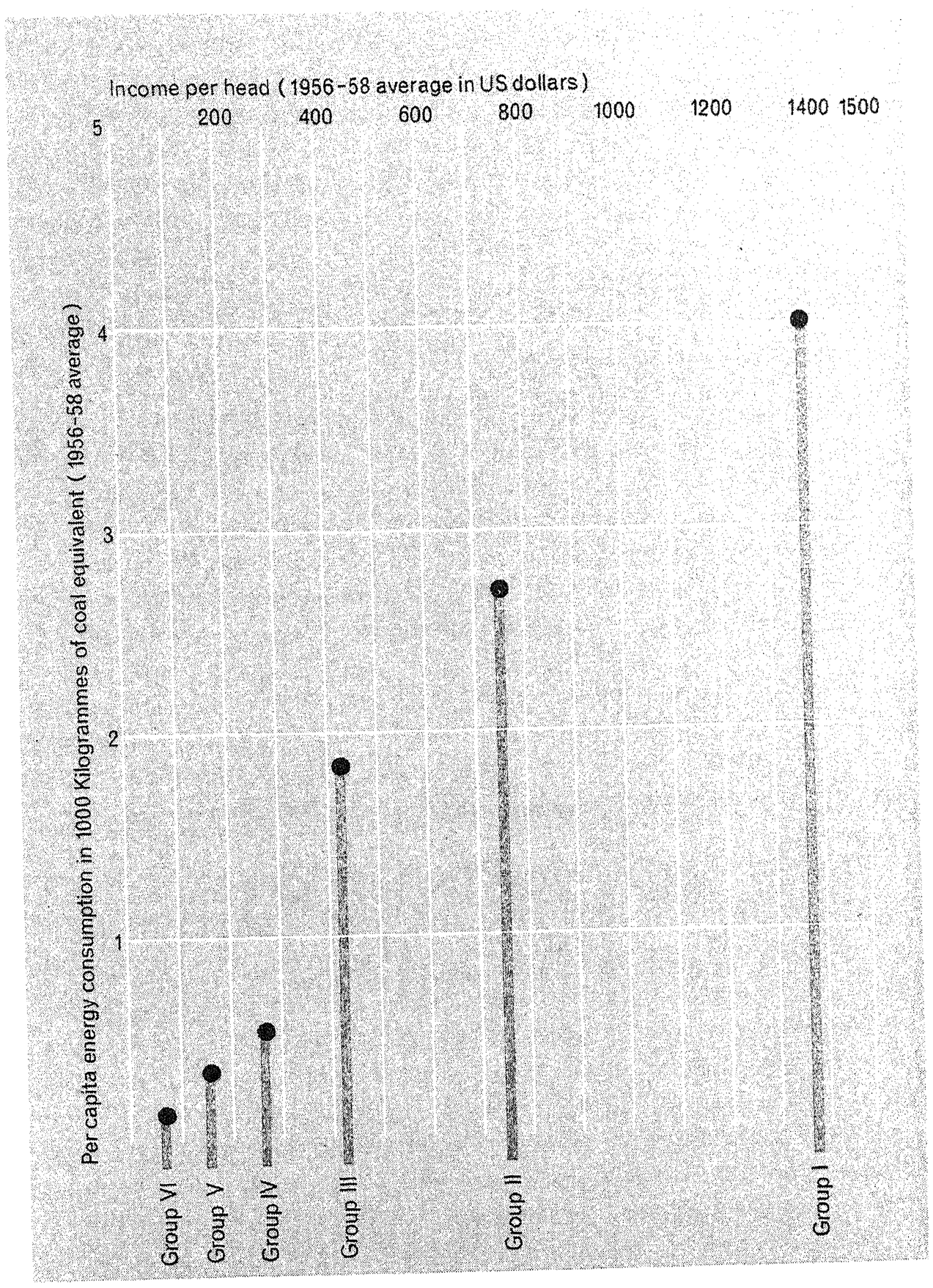


Figure 15. *Income per head, probable expectation of life (black line), and infant mortality rate (brown line), in six groups of countries.* Here we see the correlation between level of income and health conditions. In the poorest group of countries average life expectancy is only forty years, in the wealthiest it is over seventy. This is partly accounted for by the poor countries' much higher infant mortality rate – 18 per cent as against 3 per cent. Bad health is mainly a result of low income, but to some extent also a cause of it.

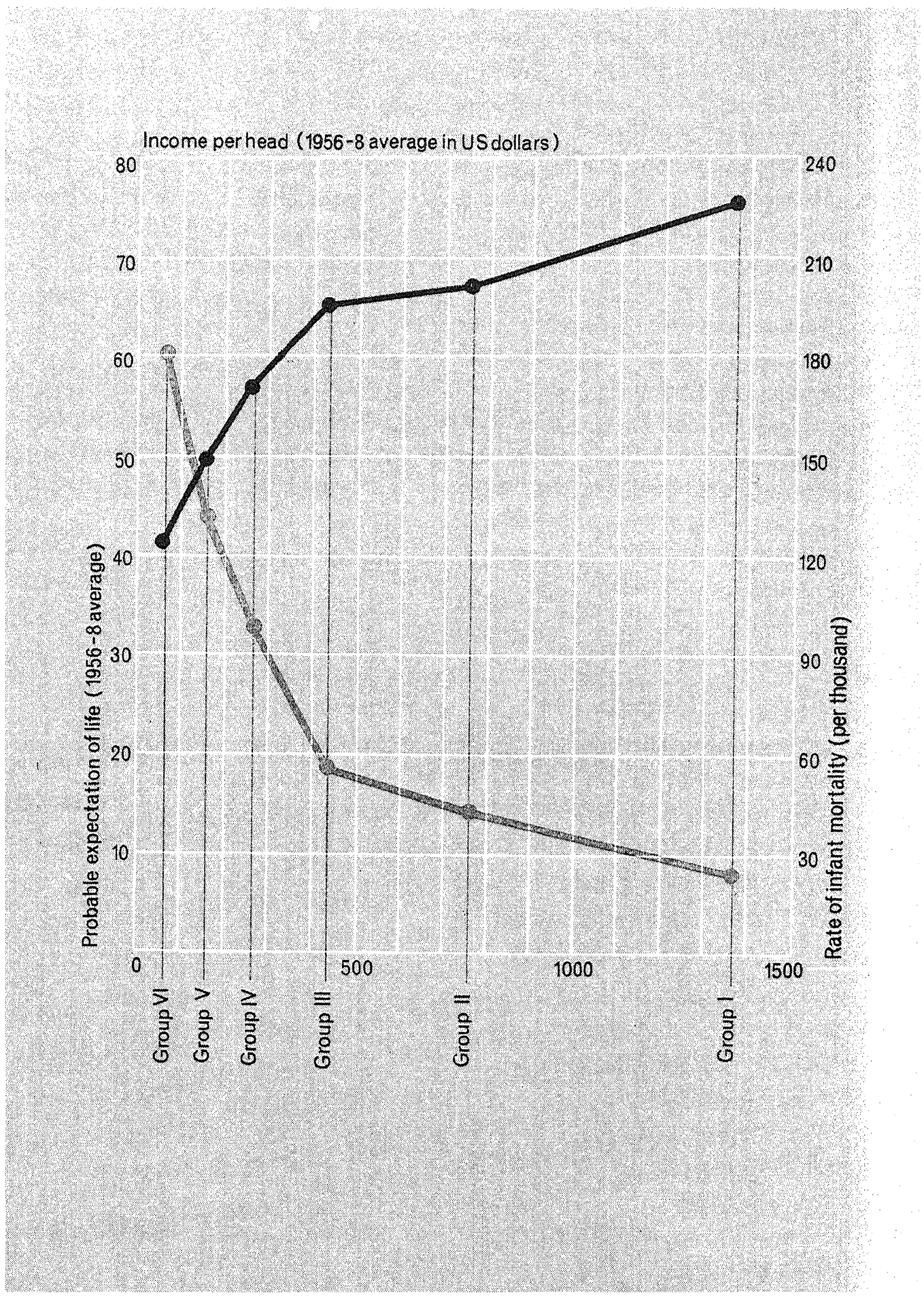


Figure 16. *Income per head and the number of patients per doctor in six groups of countries.* Here we see another aspect of health conditions. In the rich countries there is one doctor for less than 1000 inhabitants, but in the poverty stricken areas of the world some 14,000 people have to be helped by one doctor. In actual fact, in these circumstances help is often simply not available.

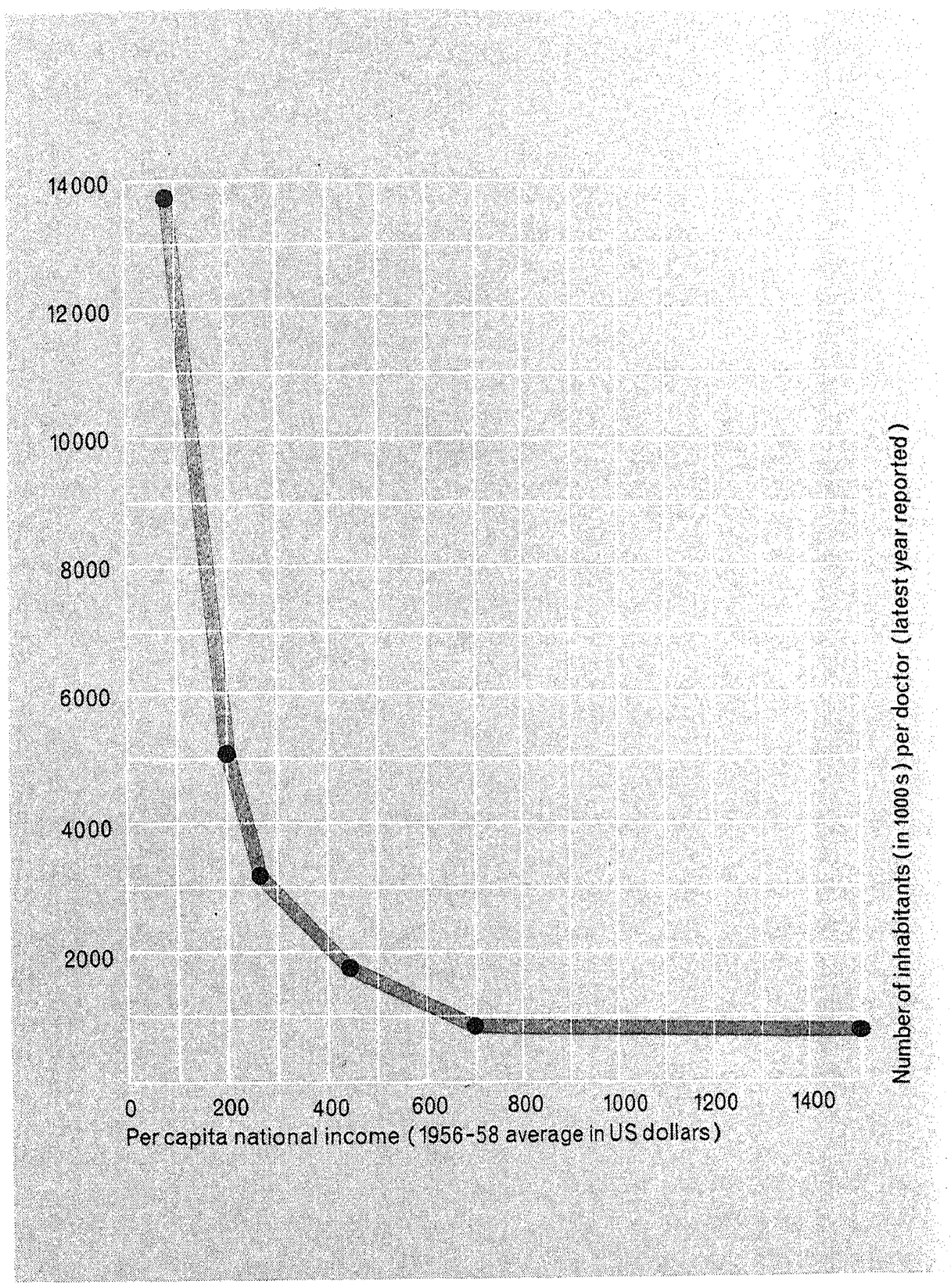


Figure 17. *Income per head, literacy (black line), and school attendance (brown line), in six groups of countries.* In the highest income countries both literacy and school attendance are above the 90 per cent level, in the lowest income group below 40 per cent. As in figure 15, this is to some extent a two-way relationship. Parents with low incomes cannot give full schooling to their children; but lack of education makes for low productivity.

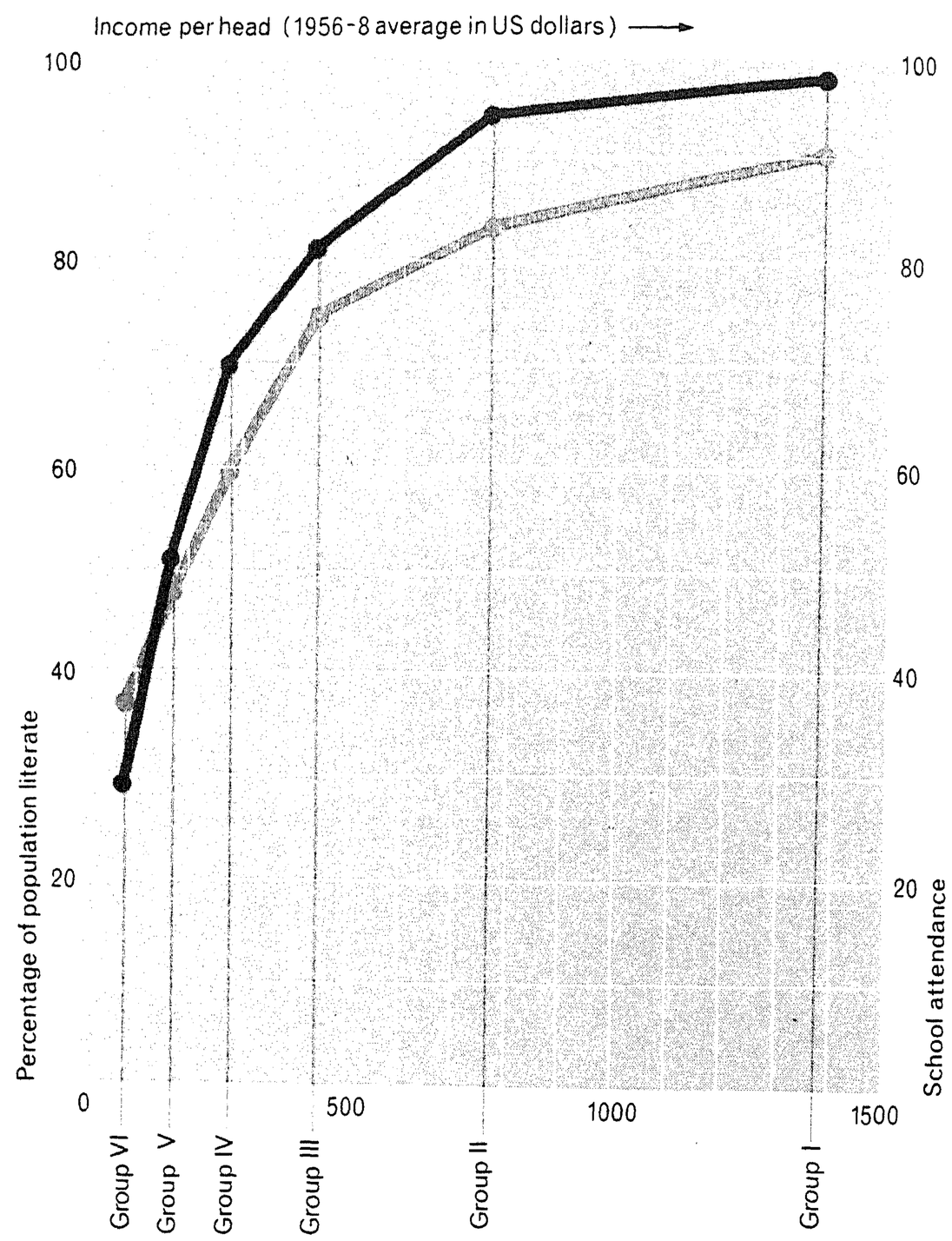


Figure 18. *Income per head, calorie consumption (black line), and carbohydrate content of food (brown line), in six groups of countries.* Poor countries have a lower calorie intake – only 2,000 as against over 3,000 in the most prosperous countries – and a higher starch content in their food, meaning lower quality.

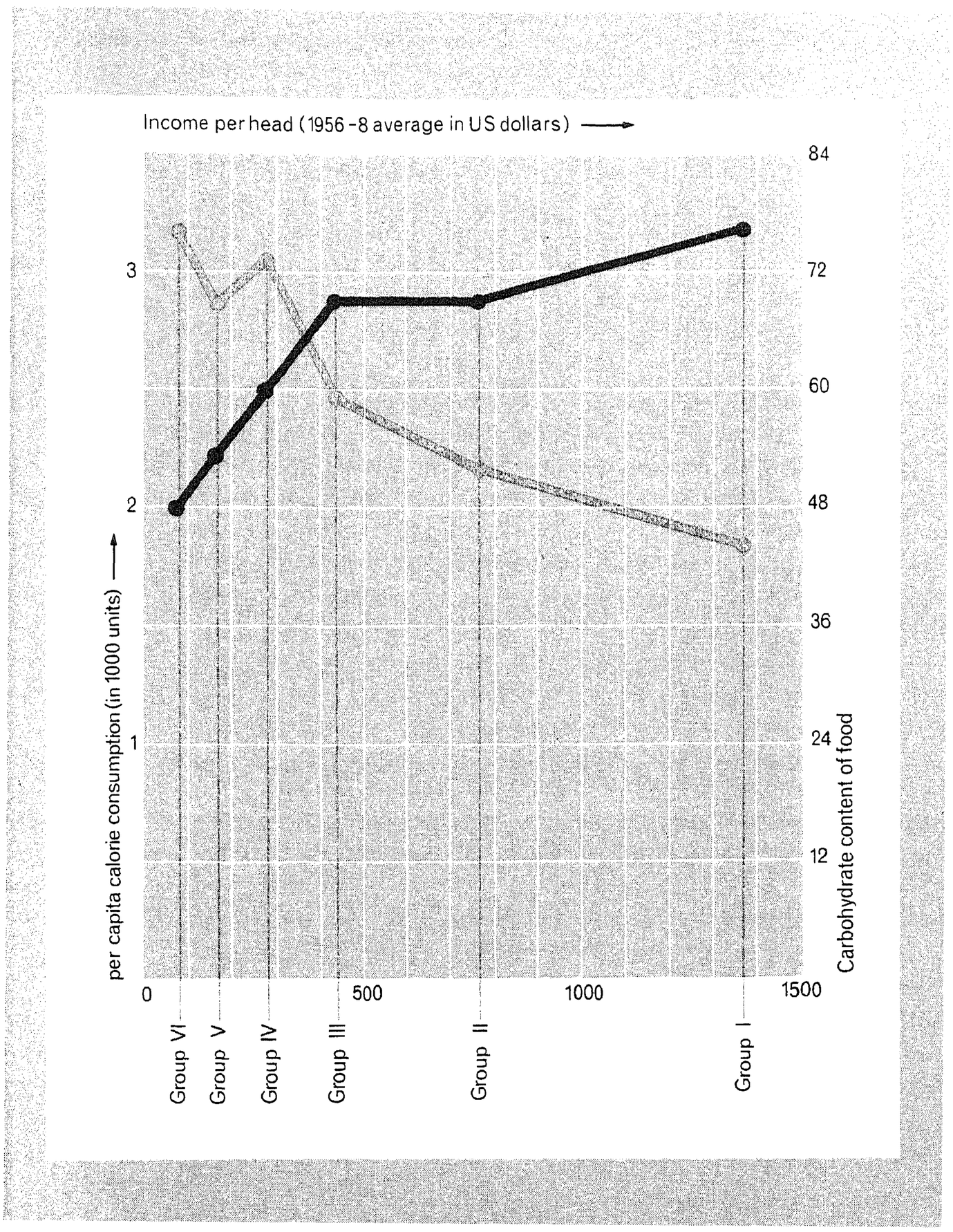
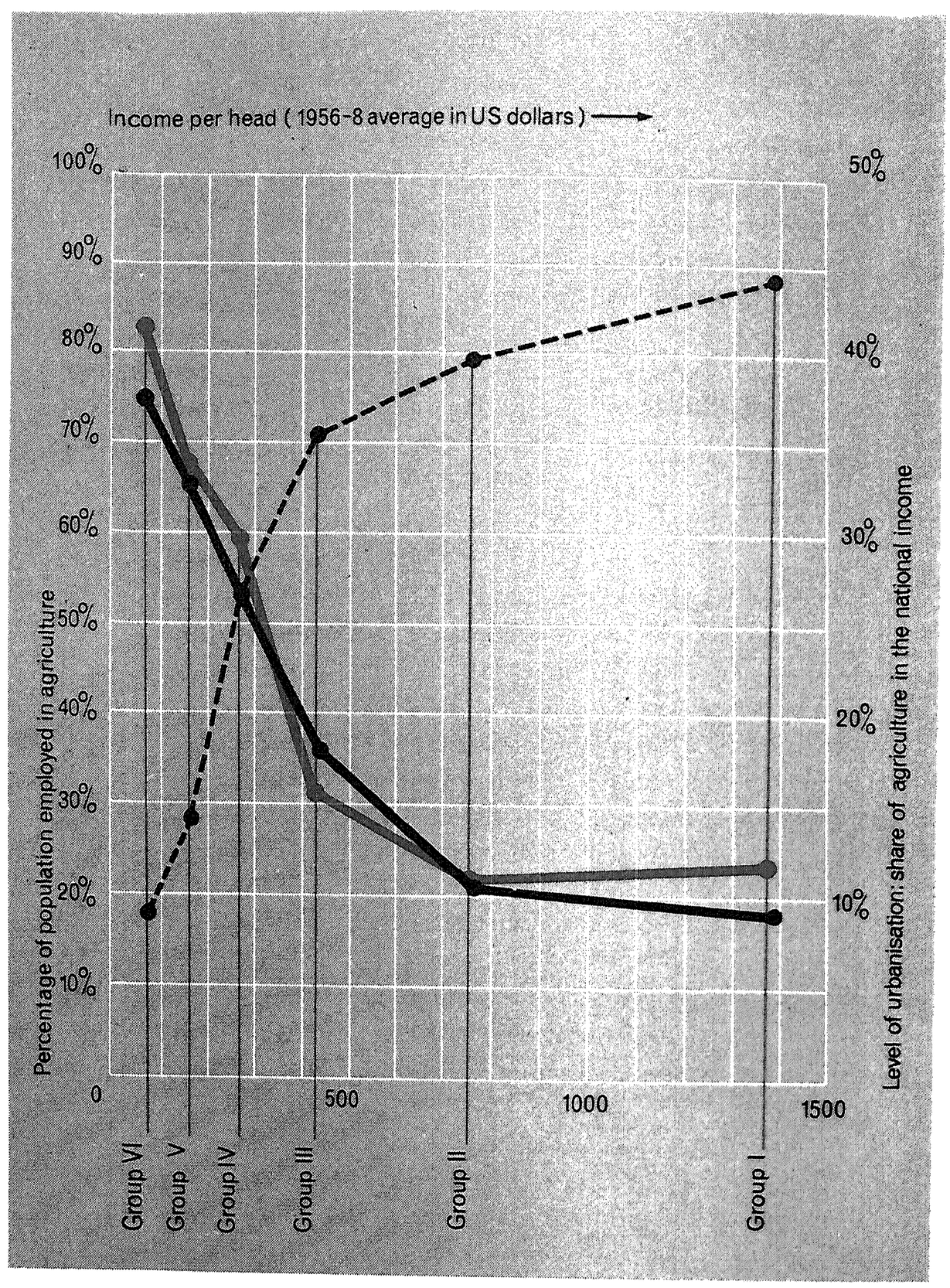


Figure 19. *Income per head, percentage of the population employed in agriculture (black line), degree of urbanisation (black dashes), and share of agriculture in the national income (brown line), in six groups of countries.* Low income countries give a rural picture, with a high percentage of the population employed in agriculture, and little urbanisation. The share of agriculture in total national



income is relatively high, but not nearly so high as the percentage employed in agriculture would seem to suggest. This is due to another characteristic of poor countries, the much lower incomes earned in agriculture than in other activities.

with the whole national or regional income, although this is sometimes done in the case of more relevant partial activities. Thus it is, for example, clear that certain forms of social work are more appropriate to urban populations, whereas others are better suited to rural populations. It is also obvious that certain forms of education are intended only for those who aim to enter certain professions. A further characteristic of education in general is that it takes a relatively long and fairly well defined period of time and that many different decisions have to be made at a given moment, long before the moment when the results are required. For this reason it is advisable to deal separately with the subject of planning for education and training.

2 Education planning: the qualitative and quantitative aspects and short and long-term planning

For the sake of brevity, I shall, in this and the following sections, use the word education even when the less formal aspect of education, namely practical training, is meant. There is, moreover, a growing tendency to formalise what has hitherto usually taken place informally, by providing more and more formal courses of training in, for example, occupational centres for apprentices and programs of resettlement and retraining. This is in itself the outcome of a general tendency to carry out all human activities on more conscious and purposeful lines, and the result is, as we see it today, an ever increasing number of 'trainees'.

It is possible to distinguish, in all educational activity, between the qualitative and the quantitative aspects. The qualitative aspect of education is concerned with the choice of subjects and methods of instruction. The tacit assumption will be made, in this and the following sections, that all that experience and research have taught us about educational methods will be put to use in planning for education. Any educational improvement of this kind is also bound to have quantitative effects, for example, on the length of schooling and on the total number of pupils in each class. Total

numbers of both pupils and teachers, building investments and the educational supplies are among the most important of the quantitative aspects.

In what follows, I shall deal principally with the quantitative aspect of the development aimed at in education. This means that the ratios or coefficients, such as the pupil-teacher ratio, that occur will be assumed to be given. I shall even regard them as constant, which means that the validity of my results will be limited, since the fact that these ratios are given does not necessarily imply that they are also constant. This limitation can, however, easily be cancelled out in many cases, because the changes in these ratios often take place quite slowly.

Apart from this distinction between the qualitative and the quantitative aspects of education planning, it is also important to distinguish between short-term and long-term planning activity. Short-term education plans are those with a period of only a few years or less. Long-term plans in education, on the other hand, may cover any period from rather more than a few years to between one and two decades. This extreme length is explicable when it is remembered that the education of the highest qualified personnel may in fact take as many as twenty years.

Almost every education consists of a general stage followed by a more specialised stage. Within this broad framework, it is possible to distinguish further grades of specialisation. For almost every pupil, the first stage or level, primary education, is a general preparation. For some pupils, the second level, secondary education, is still a fairly general preparation, whereas for others it may already be specialised. Even further specialisation can take place at this level, as for example in the industrial schools. A further stage in specialisation also occurs at the third level, that of university education or its counterpart. Almost every trade or profession, whether education for it is completed at the end of the first, second or third level, requires a final period of practical training. This can be done either in the work itself or else in special courses, often organised within the industries concerned. Finally, rapid

technical development is making it more and more necessary for re-training or refresher courses to be followed at a later age, so that already trained personnel can keep up with the latest developments in their trade or profession.

The whole educational process can therefore be regarded as a system of flows (see figure 20), beginning as a very broad flow, that of general education at the lower level, and ending with an increasing number of branches at the specialised level of education. As I have already said, the length of the whole process may, in the case of the most highly qualified professions, take twenty years or longer, especially if further training or re-training during later life is included.

The most essential task of education planning is to aim to have the various kinds of qualified, skilled or trained labour available at the right time and in the right numbers, to ensure that society develops smoothly. It is therefore important to avoid both surpluses and shortages and, as far as possible, a wrong initial choice of education. Instead of thinking of education as a system of flows, it is also possible to think of it as a system of fibres, each fibre representing the education of a single person. Initially, the fibres are grouped closely together in broad batches, but these are divided into increasingly narrower batches. The beginning of each fibre must as far as possible correspond to an occupation to be taken up at the end of the fibre. The essential planning problem is therefore how to gear education to the requirements of society. To do this successfully, it is in principle necessary to know how many men will be needed in a given trade or profession in the relatively distant future – sometimes as far ahead as twenty years – and to gear educational activity to this objective.

In short-term planning, interest – and it cannot be otherwise – is concentrated on the ends of these fibres (which will be two or three years in length) with the aim of fitting them as far as possible into the existing needs of society. It is possible to do this because there is on the whole still some flexibility left – training can be speeded up to some extent, students can be switched from one course to

another and so on. Short-term education plans will also be detailed because of the great number of fibres at the final stage. It is also possible for these plans to go into considerable detail because the requirements of society and of technical development can be predicted with reasonable certainty in the relatively short term. Finally, there is a close connection between short-term planning in education and so-called labour market policy.

There is, on the other hand, no need in long-term education planning for a very detailed distinction to be made between different types of trade, profession or education. Planning in the long term is far more concerned with the volume of fibres at the stage at which these are still grouped closely together in broad batches, forming relatively few main types of education. These plans cannot go into much detail as it is not possible to know exactly, ten to twenty years ahead, what kinds of labour will be required. Short-term planning in education is thus, of its very nature, micro-economic and long-term planning macro-economic.

3 Stocks and flows of qualified persons

An essential aspect of education planning is the result of the long expectation of life – from the economic point of view – of the great majority of people today. As with durable goods – which incidentally form only a part of all goods – there is clearly a difference between the 'stock' of persons with a given qualification, such as brick-layers, marine engineers or teachers of English, and the annual 'flow' entering the trade or profession or leaving it because of retirement, death or change of work. This situation has an inevitable effect on the basic structure of education planning. The method used both for short and for long-term plans is based on the following structure. The number of persons with certain qualifications that will be required is deduced from the desired volume of the various economic activities in a future year, these activities being taken in the widest sense, so as to include every trade or profession. This will be the stock of persons required with that

Figure 20. *The educational structure in Holland.* The same basic education is given to practically all the children from the ages of six to eleven, with the exception of handicapped children who are taken care of separately (N stream). From the age of twelve differentiation begins.

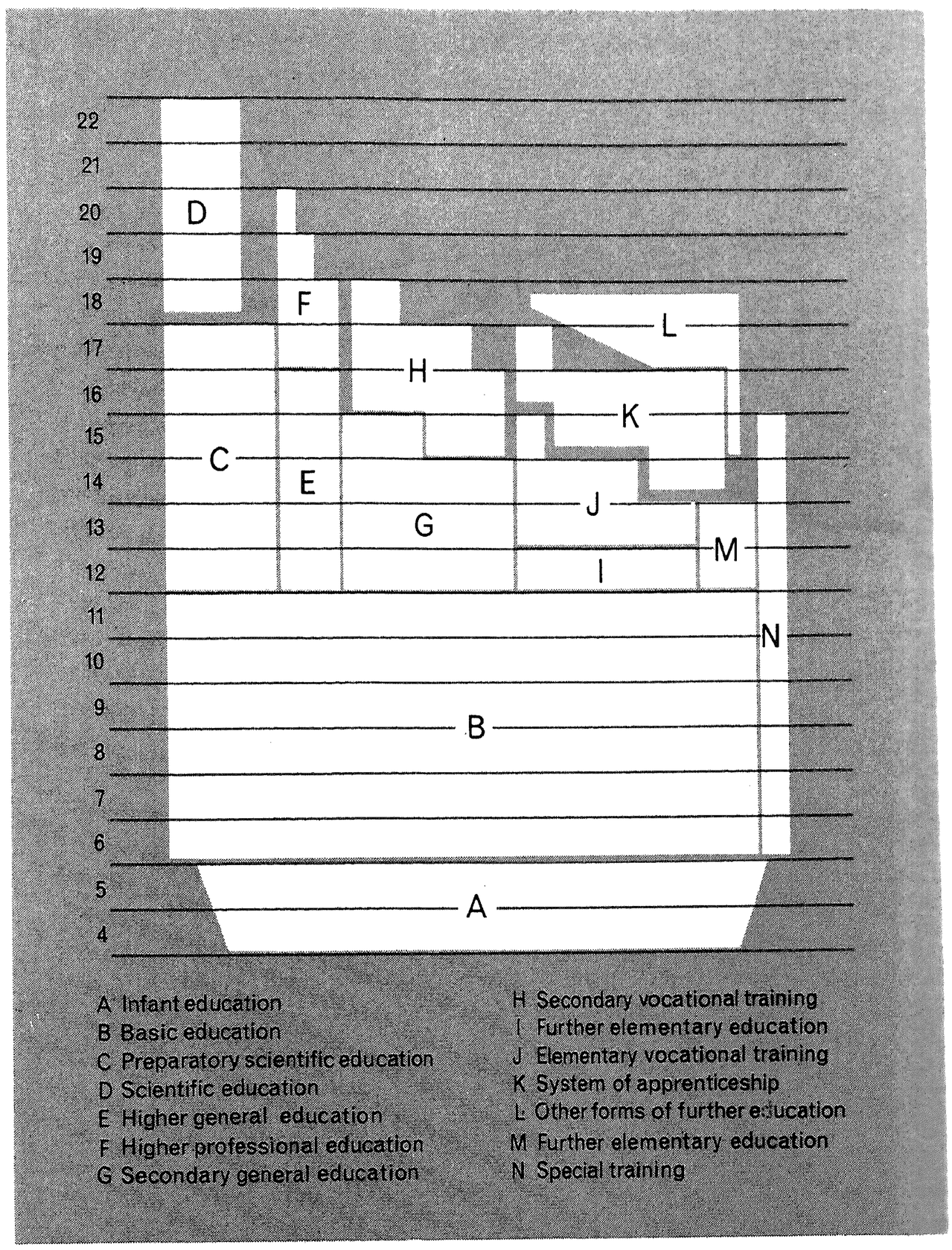
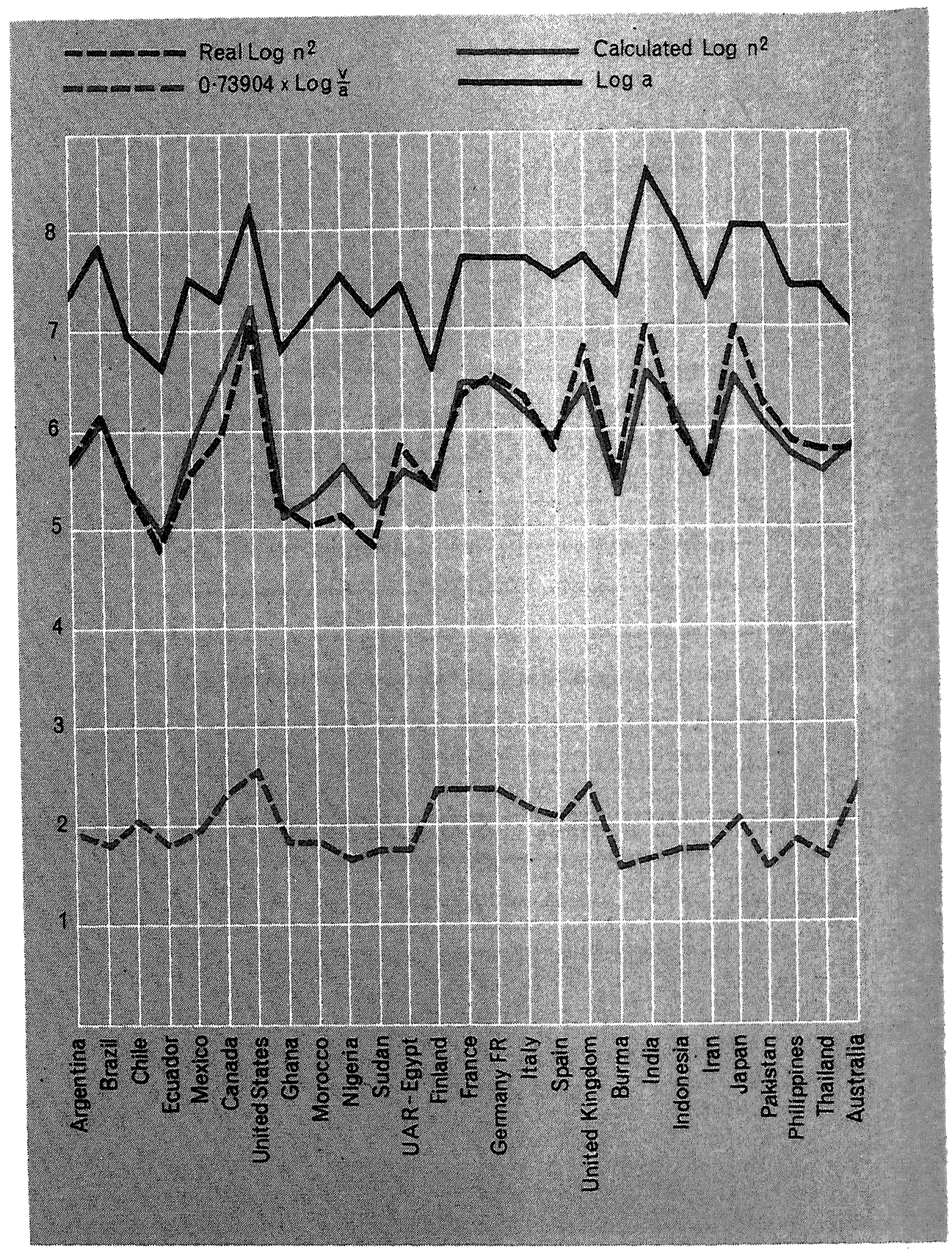


Figure 21. *Assessment of the number of pupils receiving secondary education from size of population and income per head, in 27 countries.* 1 *Influence of income per head* (*brown dashes*). 2 *Influence of size of population* (*black line*). 3 *Calculated number of pupils* (*from* 1 *and* 2) (*black dashes*). 4 *Observed number of pupils* (*brown line*). An expectation of the number of pupils who should be receiving secondary education can be assessed from two other variables, size of population and income per head.



We can see how these two components shape the observed curve (black dashes). Thus we see that the population is high in both the United States and India (black line), but because the per capita income in the United States is so much larger (brown dashes), the calculated curve (brown line) is much higher too. We also see that the number of pupils in Nigeria is even lower than we would expect, and in Japan and Pakistan slightly higher.

particular education. This stock will have to be composed of the existing stock, with additions of newly trained personnel, both to bring about the necessary net increase and to replace the loss or 'fall-out' of personnel due to retirement, death or change of work. Change of work is, of course, a net component, since every such change, although it means a loss of a person in the old trade or profession, at the same time means a gain of a person in the new work.

In the foregoing, I have referred to persons with certain qualifications or with a certain education. This does not always have to be taken literally to mean one single form of education – there are frequent cases of groups or batches, especially in long-term planning in education.

This relationship between stocks and flows means that the relationship between the most desirable economic development and educational activity is not so simple as it would appear to be if the method of complementarity for the social sectors, as outlined in Section 1 of this chapter, is used. Educational activities will not take place roughly in proportion to general economic activity, but will, for example, at a given level of economic activity, vary with the rate of growth of the country. That is why even highly simplified models showing the relationship between economic life and education can be quite valuable.

4 The relationship between the stock of man-power and the economic level of a country

In the short term and viewed rather in isolation, it may be assumed that the volume of production tends to be proportionate to the number of people, in other words, the man-power, required for this desired production. It is this proportion which also forms the basis of the input-output ratios that are used as a starting-point for production planning.

This assumption cannot, however, be taken as correct for an economy as a whole over a longer period. As long as there continue

to be unused reserves of people – and this is a common enough situation in developing countries – production can be expanded simply by increasing the number of people required for this expansion. Production can be increased for a period of time in industry by drawing on the reserves of partially used or unused persons in the agricultural areas. If most of the skilled and qualified persons are needed in industry, then it may be assumed that the desired volume of industrial production and the stock of qualified persons are in proportion.

As the economy continues to develop, however, this proportionate relationship will cease to be valid. There are two main forces which can cause a departure from this proportion. On the one hand, as the productivity of labour increases – and this is one of the essential characteristics of development – the number of persons needed to attain a given volume of production will decrease. On the other hand, as income per head of population rises, there will be a change in production itself, in other words, there will be a decrease in the production of primary necessities of life and an increase in that of luxury goods and services. Finally, the number of persons in all trades and professions will tend to rise roughly in proportion to the increase in the population as a whole. It is also possible that the growth of total income will lead to savings through better organisation.

An attempt has been made by the Economic Institute of the Netherlands to ascertain empirically the influences of these various factors by comparing data drawn from a great number of countries at widely different levels of development, first for the stock of man-power educated only as far as the second level and secondly for the stock of man-power educated up to the third level. The symbol Y denotes the national income, expressed in dollars (1957 purchasing power), and N the population. The income per head of population will thus be Y/N. The symbol N^3 represents the number of persons with an education at the third level, and N^2 the number educated up to the second level. The following formulae can then be found by multiple correlation analysis:

$$N^2 = C^2 N \left(\frac{Y}{N}\right)^{0 \cdot 67}$$

$$N^3 = C^3 N \left(\frac{Y}{N}\right)^{1 \cdot 05}$$

Virtually the same formulae are obtained if persons providing education are left out of account.

It is therefore clear that with increasing prosperity $\left(\frac{Y}{N}\right)$ the number of persons with secondary education increases comparatively slowly, whereas the number with a university or similar education increases very rapidly. It is also evident that the absolute income Y results in a greater demand for more qualified persons. (More are required in large countries than in small countries, when the level of prosperity in both is the same.)

5 Some other coefficients and their values

The ratios discussed in the preceding section are not the only ones that need to be known if planning in education is to be put into effect. The number of persons with third level education needed in the education service itself must also be known, and it is useful if this number is related to the number of pupils or students in the various categories of education concerned. A fairly normal ratio in secondary education is one teacher to twenty-five pupils. The ratio for higher education varies considerably from country to country. In countries with exceptionally good educational facilities, there may be in the region of ten to fifteen students to each teacher. This ratio is for the most part to be found in prosperous countries, but it is also common in many African countries, for example, where their educational systems have simply been modelled on those of the more prosperous countries. In countries with a very low income, such as India, the ratio is much higher. It is also higher on the continent of Europe.

Figure 22. *Assessment of the number of pupils receiving university education from size of population and income per head, in 27 countries (see figure 21).* We observe similar deviations between real and calculated numbers for university students as for pupils at the secondary level. In a number of African countries there are fewer students and in a number of Asian countries more students than the expectation from income and population warrants.

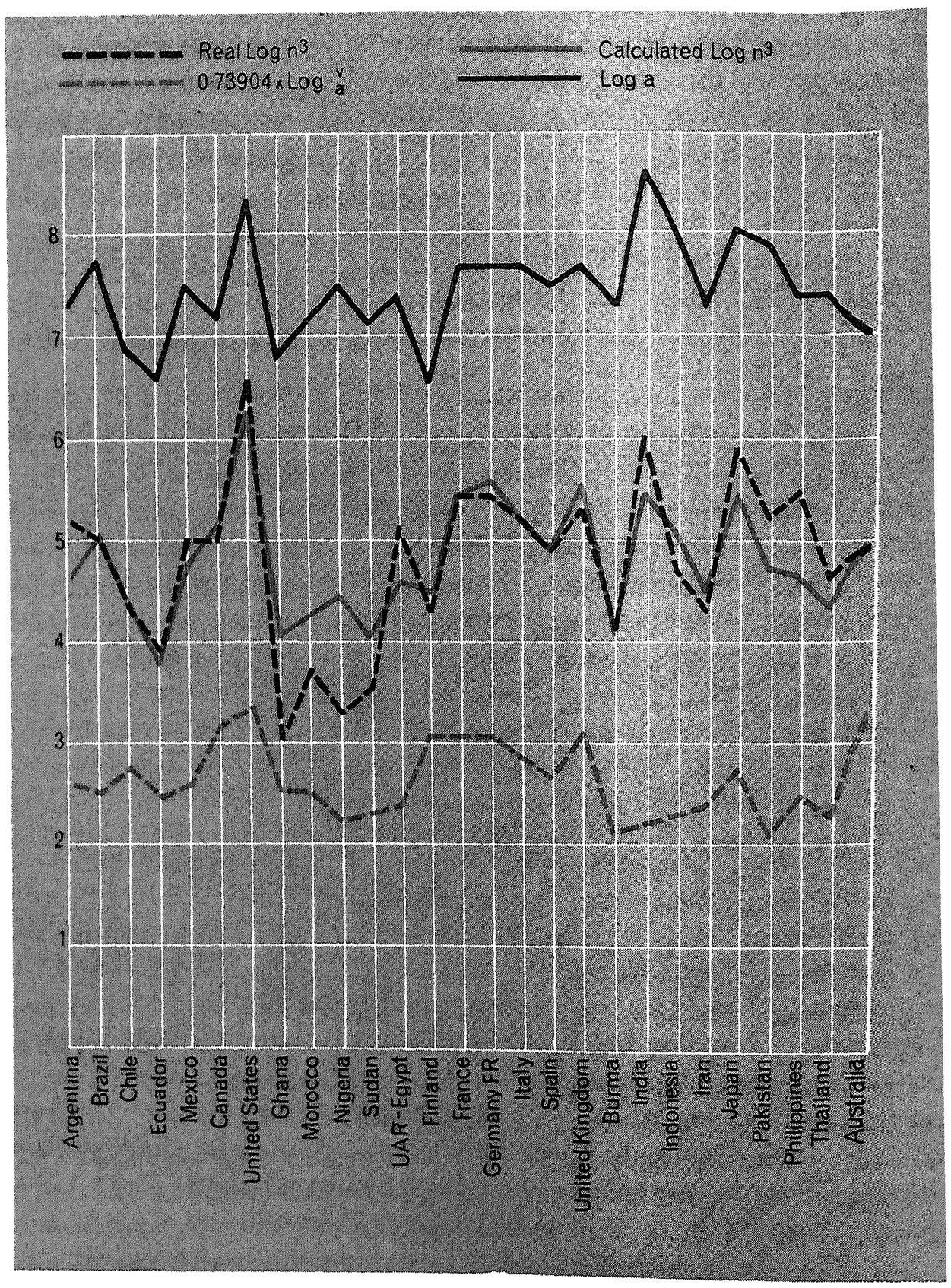


Figure 23. *Number of students in higher education per hundred inhabitants in three groups of countries.* At the same per capita income there are more students in Asia than in Africa and Latin America, at least in the lower income groups. But Latin America shows more students in the upper income group.

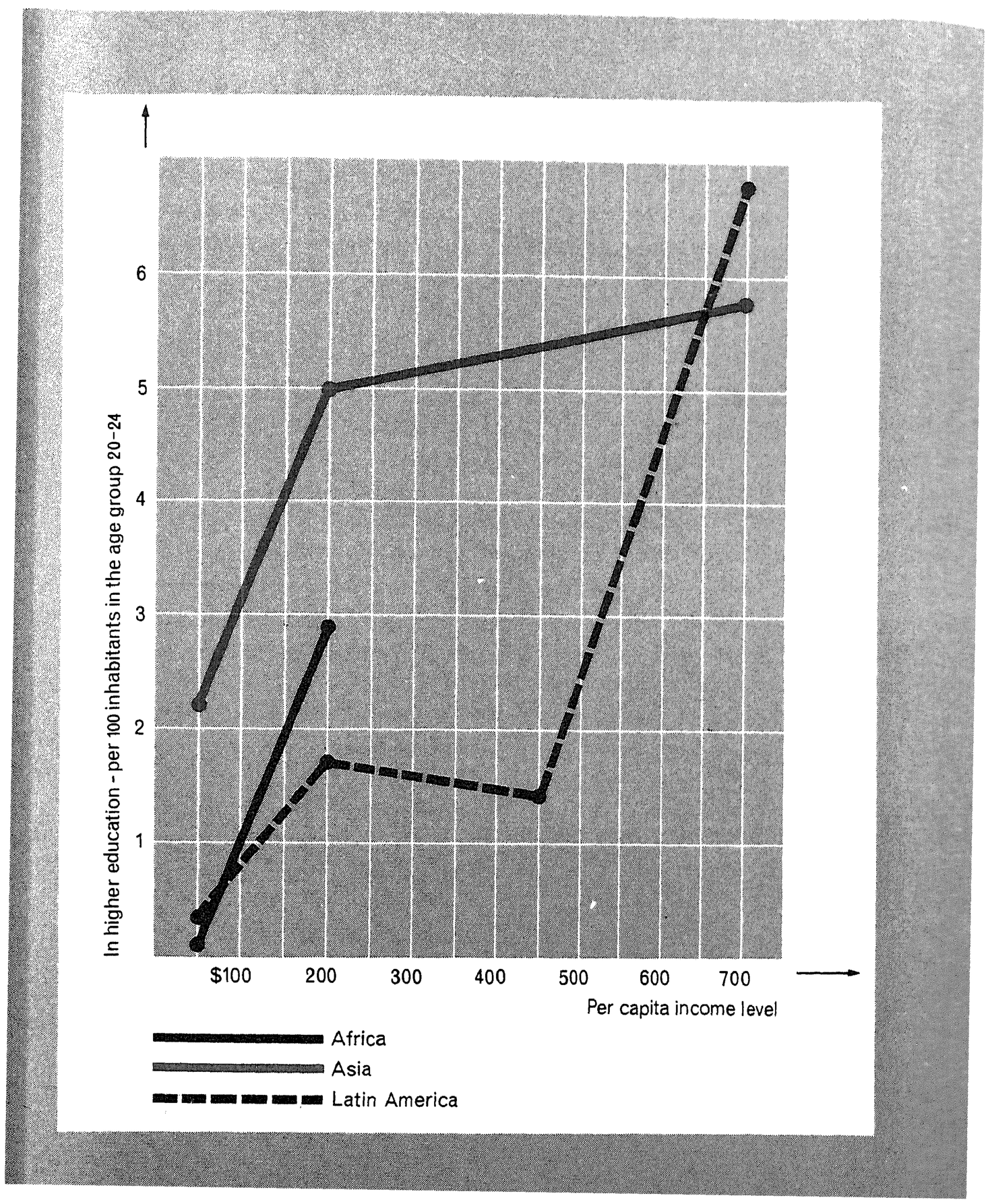
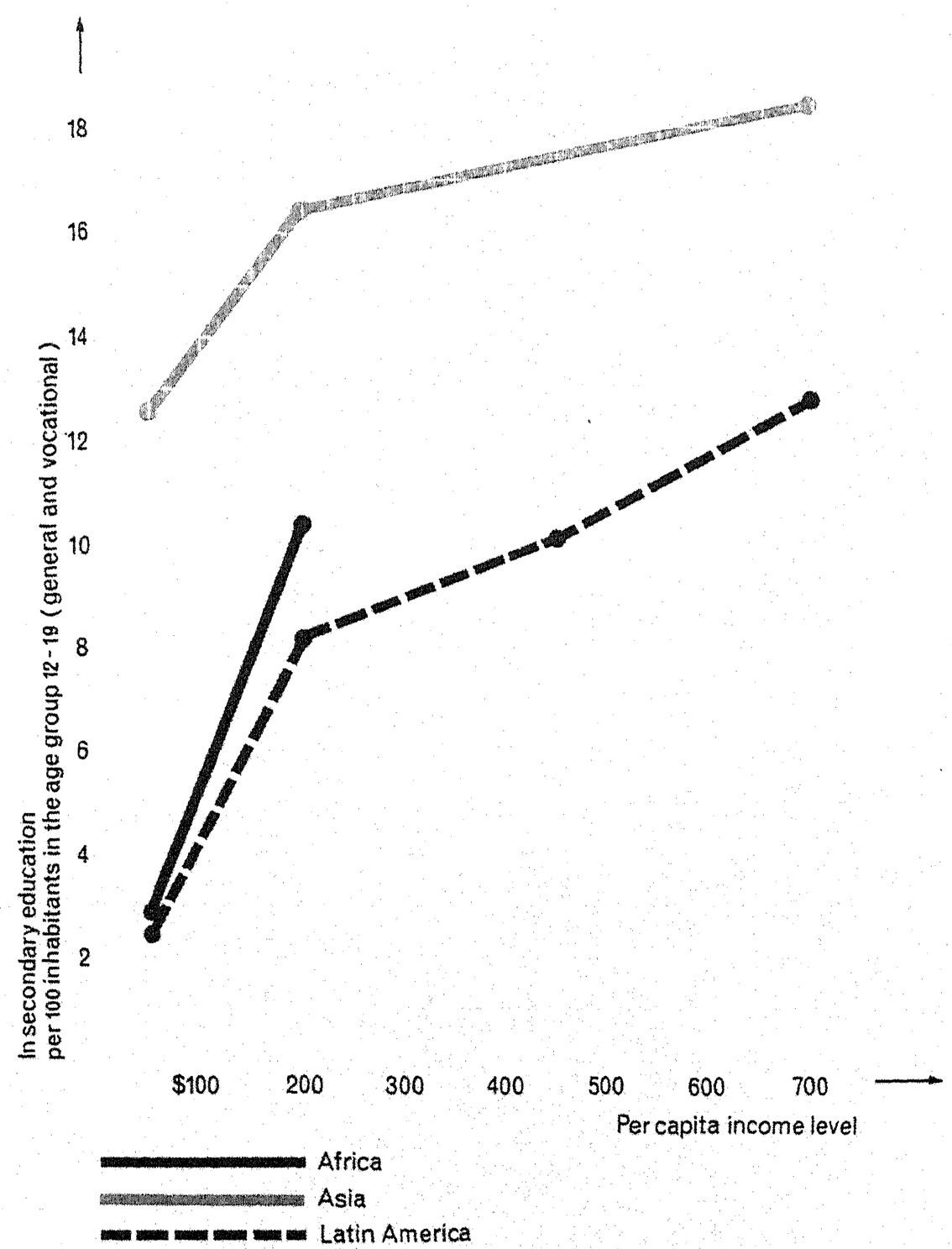


Figure 24. *Number of students in secondary education per hundred inhabitants in three groups of countries.* In secondary education Asia shows higher figures than the other two continents for all income groups.



Another indispensable datum is the coefficient (for each of the egories of man-power considered) showing by how much the ck is reduced in a given period because of retirement or death. re too there is great variation, in accordance with the medical ditions of the country and the average age of the category of n-power in question. For the period of six years that I shall use his chapter, a fall-out of 10 per cent is a fairly acceptable figure. f a more accurate analysis is to be made, several fall-out ires will have to be known. These will include the numbers lost ing the educational process itself and possibly even the number persons who have completed their education but who do not e up employment, because of marriage, for example, in the case a number of girls. Both the statistics of education and census ires are valuable here, and enable planners to go into greater ail. At the same time, however, there is a real need for better a about the most suitable forms of education for different des or professions in various industries. These data have for the st part still not been collected systematically.

The principle of education planning for a previously given nomic development may therefore be formulated as follows. e total stock of the various kinds of labour that will be needed ensure the volume of production desired will be known for each ure year. It will then be known by how much this stock must rease from year to year. If we also know how many persons e to be replaced because of retirement and death, we can imate how many newly trained persons will have to be available order to bring the stock up to the required level. These newly ined persons will, of course, be those who have completed their ication in that year. If this number of persons who have com-ted their training is to be reached, it will have been necessary for umber of pupils or students to have commenced their education ne years previously. The number of years is determined by the gth of the training period. The number of those commencing ir training must be equal to the required number of those npleting their education plus the losses caused by leaving the

school or college concerned or by falling behind in the course of study. The latter will be a net figure, since a (gross) number is lost by students or trainees falling behind in one year, but a number of those who fell behind in the preceding year will be available in the next. Similar adjustments can be made in the case of those who change their course of study or training or who do not take up employment after completing their studies.

6 Smooth development in the educational system

If it is the aim of an economy that its production should develop smoothly, that is, that its national production should have a certain constant growth-rate, it is possible to calculate, as it were backwards, how many persons there must be at each of a number of successive periods both pursuing a course of study or training and having completed their training. I have taken, from a number of simplified calculations made by the Economic Institute of the Netherlands[7] in co-operation with H. Correa, an example of smooth growth of this kind. The following assumptions have been taken as a starting-point. A period of six years has been taken as a unit of time, on the assumption that this is the length of both the second and the third level of education. The stock of persons required with education up to the second level is reckoned, at the chosen units of national income and labour, to be 0·2 × the national income, and the stock of persons required with education up to the third level is reckoned to be 0·02 × that income, not counting the persons needed to provide this education. As far as the teachers are concerned, it is assumed that these will be educated as far as the third level – this applies both to teachers at the secondary level and to those in higher education, in other words, at both of the educational levels under consideration here. It is also assumed that one teacher will be required for every twenty-five pupils at the secondary level and one for every 12·5 students at the higher level. The final assumption is that 10 per cent of the stock of persons at each of these levels will have to be replaced in the course of the

Table 10. Smooth growth in the educational system at two rates of growth: A: 30 per cent per six years and B: 40 per cent per six years. Production in milliard $ of 1940. Numbers of persons in millions.

Case		A : 30 per cent				B : 40 per cent			
Period of time		0	1	2	3	0	1	2	3
Volume of production		100	130	169	219	100	140	196	274
Stock of persons	2nd Level	20·0	26·0	33·7	43·7	20·0	28·0	39·2	54·8
	3rd Level	2·45	3·19	4·14	5·35	2·57	3·60	5·03	7·03
Pupils	2nd Level	9·4	12·2	15·8	20·5	12·0	16·8	23·5	32·9
Students	3rd Level	0·98	1·27	1·65	2·15	1·29	1·80	2·54	3·53
Employed for the first time	2nd Level	6·2	8·0	10·5	13·6	7·2	10·1	14·1	19·8
	3rd Level	0·76	0·98	1·27	1·65	0·93	1·29	1·80	2·54

six-year time-unit because of retirement or death.

Two examples of a development at constant growth are contrasted in table 10. Example A shows an increase in production of 30 per cent per six years. Example B shows a 40 per cent increase per six years. The reader will see for himself that all the various conditions are fulfilled. Thus, the number of persons with an education up to the second level is always 20 per cent of the national income. The number of persons with an education up to the third level is equal to 2 per cent, plus the numbers required to provide education. These can be calculated from the number of pupils or students with the appropriate coefficients. The number of those 'employed for the first time' – called in the foregoing section

those who have completed their education – shows all those who were still receiving their education in the previous period. At the third level of education, the number of those who are employed for the first time will be seen to correspond to the number of students in the previous period. At the second level, the number of those employed for the first time is smaller than the number of pupils in the previous period, because a certain number of second level pupils become third level students one unit of time later. (Certain deviations occur here, as we are working with round numbers.) The persons in employment for the first time who have been educated to the second or the third level are equal to the net increase in the stock plus 10 per cent of the stock of the previous period.

It is, therefore, clear from the figures that the number of pupils and students is higher in case B, with a higher growth-rate, than in case A, even at period 0, when the level of production is the same. The ratio at which the number of students is higher is not far removed from the ratio of the growth-rates in both cases.

It should, of course, be remembered that the example given above is simplified, perhaps even oversimplified. It is, however, not difficult to calculate other figures that in many respects are more realistic, using the same mathematical methods that were used to calculate the figures shown here. Detailed studies and fully elaborated examples can be found in a publication of the OECD.[12] It is possible to take as one's starting-point the relationship discussed in section 4 of this chapter, that between the stocks of man-power and the economic and demographic development of the country, instead of the assumed proportion with the national income, as in table 10. The fall-out due to retirement and death can be calculated more accurately. The fall-out that takes place during the educational process and the fact that some of those who are trained do not enter employment can also be taken into account in the calculations. More types of man-power per level, more industries and more levels of education, etc., can also be distinguished.

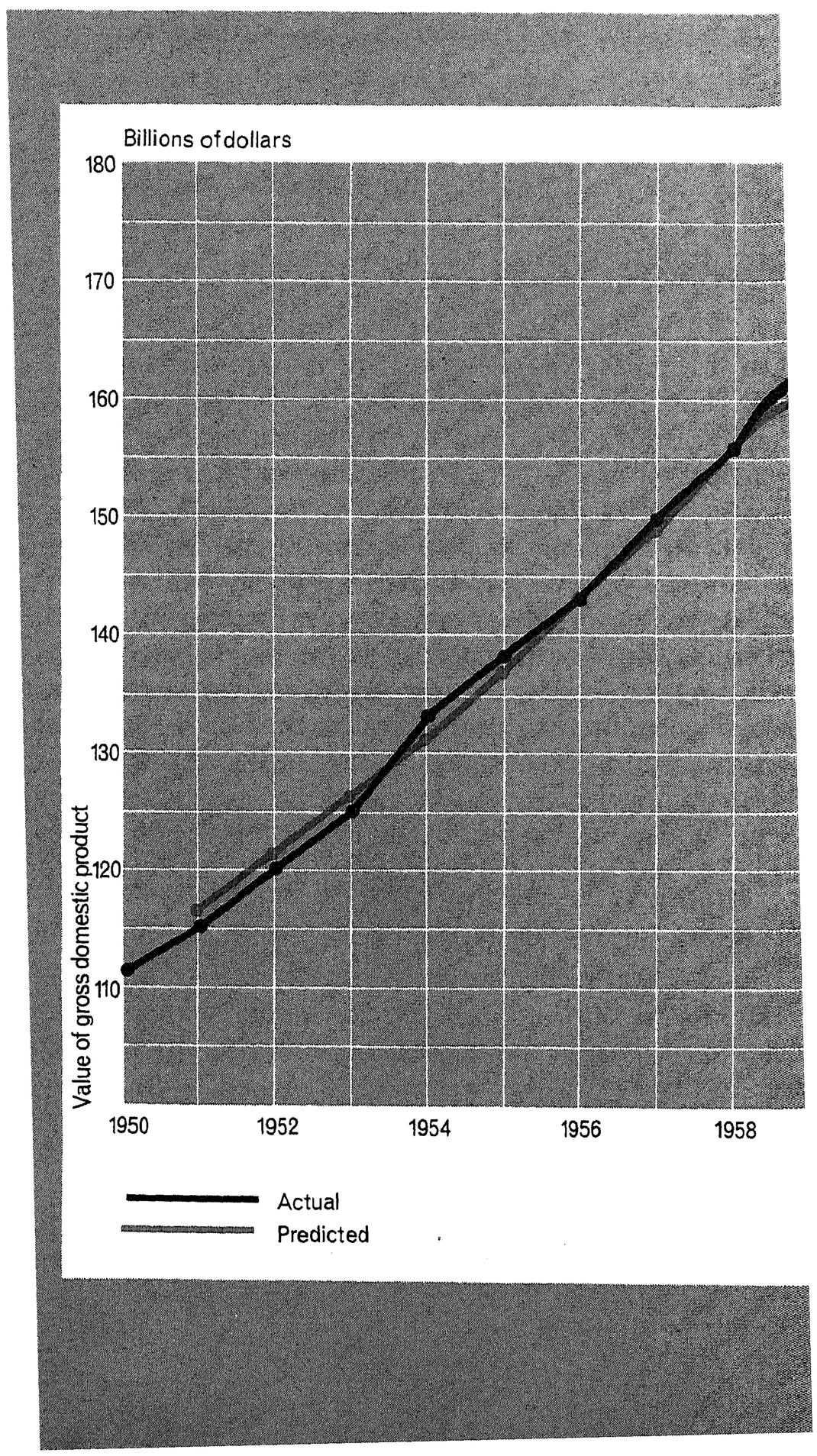
7 Measures for converting an economy to a different growth-rate

It will be clear from the table that an economy that is developing smoothly at a certain growth-rate, for example A, cannot be switched to another, for example B, without special measures. If nothing special is done, development will take place in the educational system according to the figures shown in case A. This will mean that, after a short time – for example at period 1 – there will be an insufficient number of persons with an education up to the second and the third level for the volume of production required at period 1 in case B. The Economic Institute of the Netherlands has elaborated various examples in a number of publications [7] [23] of the kind of conversion methods that can be taken and has indicated the extent to which they should be applied.

The most important problems to be considered are, on the one hand, how this conversion can be brought about with foreign technical aid and, on the other, how a similar effect can be achieved by means of increased effort on the part of the educational system itself and, if needs be, on the part of non-educational production as well. One of the first questions that must be answered in connection with these two problems is how much time it will take for the economy to function smoothly at the new rate of development. The answer will of course depend on what means are used. The more means that are used, the quicker the conversion will take place. But the length of the period of conversion itself will, of course, also depend on the limits that are placed on the measures adopted. If, for example, it has been decided to try to achieve this conversion by means of increased effort on the part of the machinery of education, there will be certain limits to the increase in effort that can be expected.

The figures shown in table 11 (page 145) illustrate three different methods of conversion that can be used to adapt the situation in case A (table 10) at period 0 to the development in case B. In the first method – the immigration method – qualified manpower is introduced from abroad and remains in the country until retirement

Figure 25. *Actual and predicted values of the gross domestic product of the developing countries (1950–61).* This is an example of an attempt to forecast the course of an economic variable with the help of econometric methods. It can be seen that the model used gave a satisfactory forecast of the rise.



'igure 26. *Actual and predicted values of the imports f the developing countries (1950–61).* The model is ble to explain the general trend of imports, but not ıe cyclical or quasi-cyclical fluctuations around ıis trend. These must be due to factors not ɜpresented in the model.

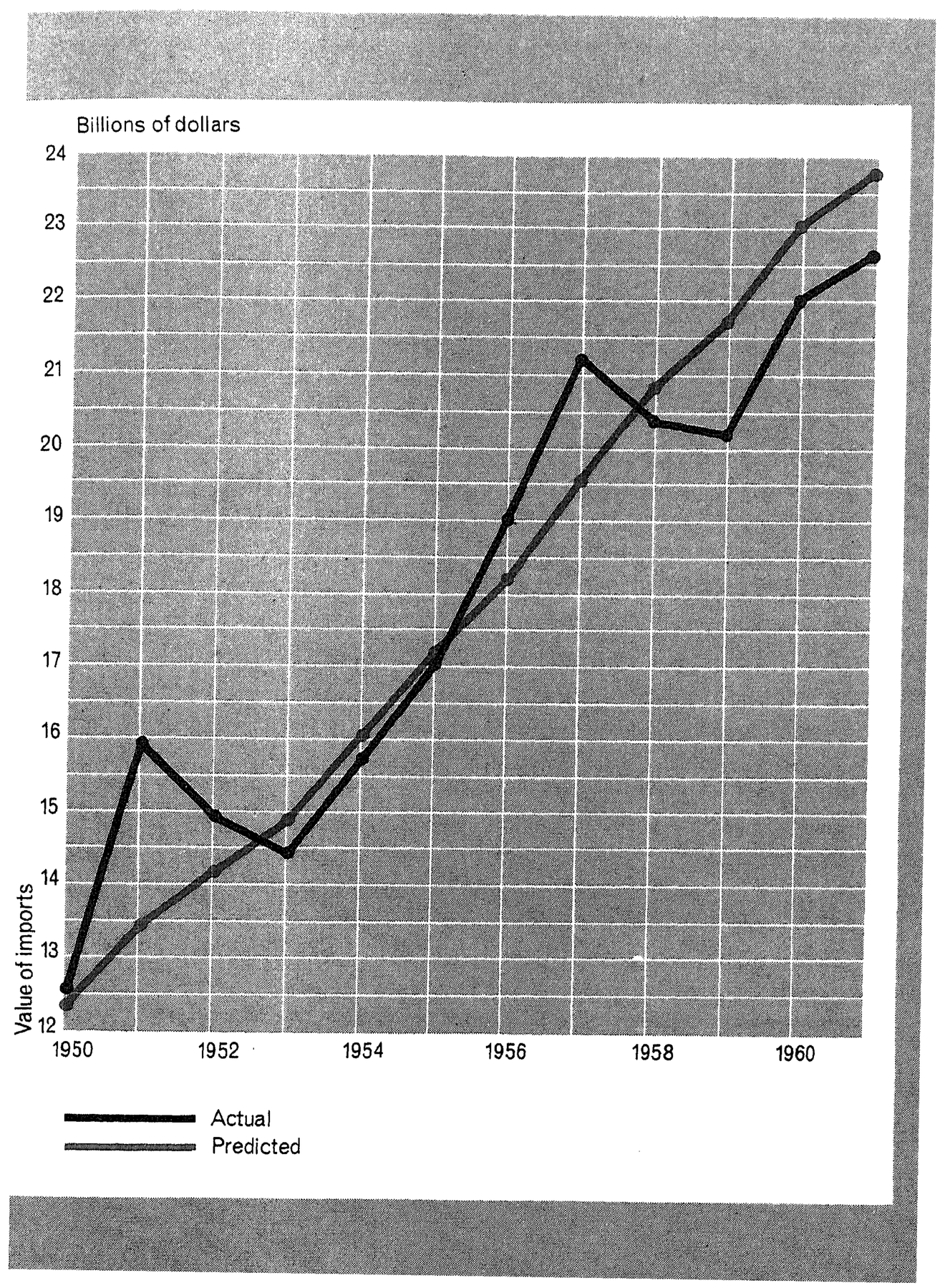


Figure 27. *Actual and predicted values of domestic savings of developing countries (1950–61).* Like figure 26, this diagram shows that the model used was able to explain the trend, but not the deviations from the trend, such as the dip in 1957.

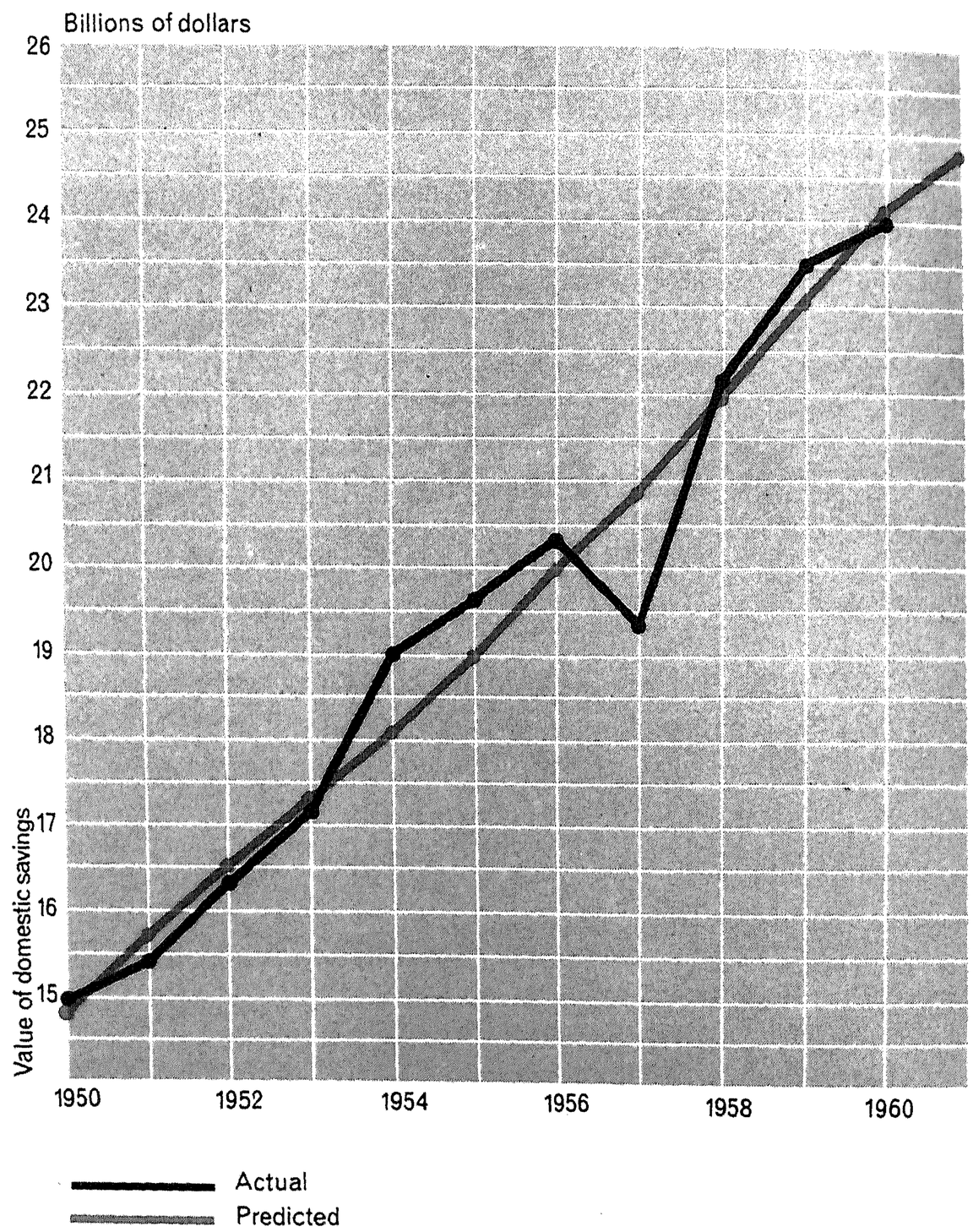


Table 11. Development over the periods 0–3 of the variables shown in table 10, using three methods of conversion from the situation in case A to the development in case B (the values applicable in development B are shown in italics).

Method:		Immigration				Technical aid (temporary)				Increased effort at home			
Period:		0	1	2	3	0	1	2	3	0	1	2	3
Production		100	140	196	274	100	140	196	274	100	140	196	274
Stock of persons	2nd level	20	28·0	*39·2*	*54·8*	20	28·0	*39·2*	*54·8*	20	25·2	*39·2*	*54·8*
	3rd Level	2·45	3·60	*5·03*	*7·03*	2·45	3·75	*5·03*	*7·03*	2·45	3·19	*5·03*	*7·03*
Pupils	2nd Level	9·4	16·8	*23·5*	*32·9*	9·4	19·1	*23·5*	*32·9*	9·4	19·0	*23·5*	*32·9*
Students	3rd Level	0·98	1·80	*2·54*	*3·53*	0·98	2·16	*2·54*	*3·53*	0·98	2·16	*2·54*	*3·53*
Employed for the first time*	2nd Level	6·2	10·0	*14·1*	*19·8*	6·2	10·0	*14·1*	*19·8*	6·2	7·2	16·5	*19·8*
	3rd Level	0·76	1·40	*1·80*	*2·54*	0·76	1·56	1·64	*2·54*	0·76	0·98	2·16	*2·54*
Imports of foreigners	2nd Level		2·4				2·76–2·48						
	3rd Level		0·48				0·58–0·52						

* Both domestic and foreign labour

or death. In the second method – that of temporary technical aid – use is made of the temporary assistance, in period 1 only, of qualified foreign labour, which leaves the country again in period 2 if it has not already 'fallen out' in the meantime. The third method is that of increased effort on the part of the country's own machinery.

The same variables obtain as in table 10. It will be seen that those

for period 0 correspond to those of case A in table 10, and those for period 3 to those of case B. It will also be seen that the situation in case B is already achieved in period 2 with the immigration method. This is not the case when the other two measures are adopted.

It will also be clear from the table that, in the case of increased effort on the part of the country's own machinery during period 1, the number of persons with an education up to the second level that is available for production is 10 per cent lower than normal. This indicates that an 11 per cent greater effort is necessary.

A great number of other problems concerned with education can be dealt with by means of these and similar methods. To take one example, they can help to plan the Africanisation of education and industry in a number of African countries. Dependent on the length of time allowed, the number of 'degrees of freedom' available can be increased – the longer the period, the greater the number – and then be used again to attain an optimum of another kind, for example, the most economical way of achieving Africanisation.

8 Concrete recommendations concerning educational development

The following concrete applications made by three research fellows of the OECD and now published may be taken as examples of the kind of conclusions that can be drawn from the models for education planning discussed in the preceding sections. The research was carried out by L. Emmerij into Spain, by J. Blum into Turkey and by G. Williams into Greece. Each of these three men worked in detail on the model in his own way and adapted it to the special problems of the country he was dealing with. The phenomenon of the fall-out of pupils during the educational process was more explicitly introduced in all three countries. In the case of Greece, surpluses of certain kinds of man-power, the emigration of labour and study abroad were taken into account. It was assumed that the relationship between the stock of qualified persons and the national

Table 12. A comparison between the actual number of pupils or students and the desired number (calculated in thousands by different methods).

Country	Level of education	Actual number	Number most desired (calculated by different methods)			
Greece	2	273	501	320	273	—
	3	37	36	34	18	—
Spain	2	571	356	802	364	601
	3	77	95	235	98	137
Turkey	2	477	501	598	547	—
	3	62	101	121	110	—

income would change over the period in Spain. In Turkey, not only the demand for, but also the supply of labour was considered.

The initial results do not always appear to have been changed by the various refinements, such as the introduction of three sectors in the case of Spain.

Taking the same units in calculating the stock of qualified persons and national incomes, there was clearly not much difference, either between the three countries themselves or in comparison with the United States, in the number of university graduates (the stock) per unit of national product and in the number of pupils per teacher in secondary education. On the other hand, the figures for the number of persons with secondary education per unit of national product and the number of students per teacher at the universities showed considerable divergences. Greece has thirty students per teacher at the university level, compared with twelve to fourteen in the

other three countries. In this respect, Greece is in a similar position to several European countries and to India, for example.

If the number of pupils at secondary schools and the number of students at universities is compared with the number of pupils and students required to attain the desired growth of the economy in the future, table 12 (page 147) is obtained.

For the details of the methods used for each of the calculations, the reader is advised to consult the published report. The concrete conclusions that can be drawn are first that there are too few university students in Spain and Turkey and perhaps rather too many in Greece, and secondly that there are rather too few secondary school pupils in Turkey.