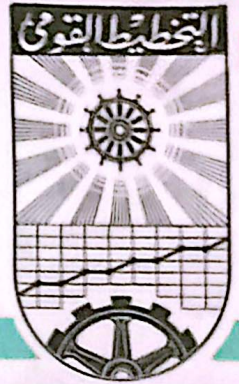


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Long-Term Manpower Planning
Research

The long-run development of different
sectors of the U.A.R. economy

By

Dr. Hans Linnemann

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The long-run development of different sectors
of the U.A.R. economy

1. The need for long-term growth estimates

The present note describes a first and rather superficial attempt to estimate future long-term growth rates of the U.A.R. economy broken down into some twenty different sectors of activity. These estimates were made primarily for use in the study of future manpower needs which obviously depend on the expected volume of output. The methods of manpower and education planning that are being developed in the U.A.R. can be applied, if only by way of exercise, to the set of production data obtained from the present forecast. As manpower and education planning is by its nature largely a long-term matter, it was considered to be necessary to have some information about the possible development of the U.A.R. economy up to the year 1985.

Perspective economic planning in the U.A.R. is still in its initial phase, and little is known about long-term development targets as yet. The General Frame of the five-year plan for economic and social development (see footnote 2) indicates some targets for the year 1969/70, but estimating economic growth after 1970 is indeed a very precarious matter. The uncertainty of the estimates is increased by the fact that they had to be made very quickly, thus forcing us to use a simple and rough method. The method used here is essentially that of applying a usual or normal growth pattern - determined through international comparison of production structures - to the U.A.R. data for a certain base year (1969/70). In other words, the particularities of the U.A.R. economy are neglected, at least to the extent to which they do not express themselves in the base year figures. The value of the present estimates is very limited, therefore; as was said

above, the figures should be considered as a first attempt at describing what possibly could happen in individual sectors in the future if a certain overall growth rate would be realized. Still, in spite of these limitations the figures do have some value because (i) the general growth tendencies and characteristics are much the same in all developing countries, and (ii) they form anyhow a jointly consistent set of sector growth rates. It goes without saying, however, that the present estimates should be improved as soon as possible through the use of better methods of planning or forecasting and of much more detailed information concerning individual sectors of the economy.

2. Estimates of growth till 1985

2.1. The Method

The method used in the present analysis for estimating the future growth rates of the sectors of the U.A.R. economy after 1970 is derived from two recent studies on sectoral growth patterns¹⁾. These studies "explained" rather successfully the level of output (in terms of value added) in a given sector by two explanatory variables, namely the level of per capita income and the size of the population. Although there are some differences between the two studies quoted above, the equation that was tested empirically was in principle the same. It can be written as

$$V_i = a_{0i} y^{a_{1i}} N^{a_{2i}} \quad (1)$$

in which the index i refers to a specific sector of the economy, and

1) Hollis B. Chenery, "Patterns of Industrial Growth", American Economic Review, Vol. I no. 4, September 1960, p. 624 ff;
A Study of Industrial Growth, prepared by the Division of Industrial Development, United Nations, New York, February 1962, (mimeographed; provisional).

V = per capita value added

y = per capita income

N = total population

The values of the parameters a_0 , a_1 and a_2 were estimated, for each industry separately, in an international cross-section analysis through least-squares regression methods. Equation (1) was written in logarithmic form:

$$\log V_i = a_{0i} + a_{1i} \log y + a_{2i} \log N \quad (2)$$

Our analysis is based on the values of a_1 and a_2 found the two original studies. The third parameter, a_0 , is eliminated because the present study is only interested in finding growth rates (the absolute level of production being determined by the base year values). If we divide equation (1) with variables referring to year t by the same equation with the base year variables, we get

$$\left(\frac{V_t}{V_0}\right)_i = \left(\frac{y_t}{y_0}\right)^{a_{1i}} \cdot \left(\frac{N_t}{N_0}\right)^{a_{2i}} \quad (3)$$

This equation shows how the growth rate of production per head (measured as value added) depends on (i) the growth rate of per capita income, modified through an "income elasticity of production" (a_{1i}), and (ii) the growth rate of population, modified by a "population-size elasticity of production" (a_{2i}). The growth rates of the different sectors of the U.A.R. economy for the period 1970-1985 are estimated in this paper on the basis of equation (3).

For a complete discussion of the rationale of this approach the reader is referred to the two studies mentioned before. It may be good to add here a word about the elasticities a_1 and a_2 which are obviously of crucial importance for the results. Neglecting for a moment the second expla-

natory variable, population, it can easily be seen that a value of 1 for a_1 implies that the industry concerned is growing at the same pace as national income; the share of its contribution to total national income remains the same. If $a_1 > 1$, the industry's share in national income is falling; its product is a basic necessity rather than a luxury good, according to traditional economic theory; The reverse is true if $a_1 < 1$. If $a_1 < 0$ we would have an inferior good; this is unlikely to apply to the product of a whole sector of the economy, however.

As far as the second explanatory variable is concerned, it should be kept in mind that V is defined as value added per capita. This means that total value added increases proportionally with total population if $a_2 = 0$ (neglecting now the first explanatory variable). If total value added, V , would have been the dependent variable instead of v ($V = v.N$), this case of equal growth rates would require that $a_2 = 1$. Actually this is the approach followed in the United Nations study mentioned in footnote 1; it is clear that the latter formulation can be transformed easily into the one adhered to in this paper, namely through dividing both sides of the equation by N . In the present formulation, we may find $a_2 < 0$, implying less than proportionate growth of value added, or $a_2 > 0$ with more than proportional growth of production. The value of a_2 will be positive for those industries where efficient production is possible only on a relatively large scale. The weighted average of the a_2 's should, of course, be zero; there can be no net effect of population growth on the growth of per capita value added, because this would require an increase in per capita income and therefore express itself through the first explanatory variable rather than the second. Thus, the values of a_2 for the different industries will be positive and negative; their combined effect is a change in relative growth rates of the different sectors, but not in the total or overall growth rate of per capita value added.

2.2. The data and the basic assumptions.

For 1959/60 total value added (which is equal to national income) and its breakdown by a large number of sectors is given in the General Frame of the five-year plan²⁾. The General Plan Frame specifies in detail the production levels of the various sectors for the year 1964/65; it mentions some planned figures for 1969/70 as well, although for the latter year the plan is less detailed. Applying the information concerning the development of production in the individual sectors during the period 1959/60 - 1964/65 to the somewhat more aggregated plan figures for 1969/70, it is possible to arrive at a set of target figures for the latter year which is as detailed as the plan for 1964/65. The production figures for 1959/60, 1964/65 and 1969/70 are all expressed in terms of value added; they are given in Table 1.

For the period after 1970, the method described in section 2.1. will have to be followed; estimates of value added in each sector are made for 1975, 1980 and 1985. For six major economic sectors estimates of the parameters a_1 and a_2 are obtained from the article by Professor Chenery, whereas the United Nations study contains estimates of a_1 and a_2 for 13 sectors of manufacturing industry (for references see footnote 1). For electricity and public utilities the income elasticity a_1 has been estimated from other sources (again through an international cross-section analysis), which brings the number of individual sectors for which estimates of a_1 and a_2 are readily available at 19. Unfortunately it was impossible, for the time being, to refine the analysis beyond this point. Particularly the services sector remains too heavily aggregated; the growth pattern is likely to be different for its various components like education services, health services, domestic services, and so on. Further improvements of the present study will have to pay attention to this point.

The targets of the General Plan Frame are based on the main aim of doubling national income in ten years time. This aim implies an annual

2) General Frame of the 5-year plan for Economic and Social Development, July 1960 - June 1965, National Planning Committee, Presidency of the Republic, Cairo, 1960, p. 39 ff.

rate of growth of national income of 7.2 per cent. For the period 1970-1985 this target figure has been maintained. As population growth may be estimated at about 2.5 per cent per annum (for the entire twenty-five year period till 1985), per capita income may be supposed to increase by something like 4.7 per cent annually.

The values for a_1 and a_2 were taken from the two sources indicated earlier; they were supposed to be constant and independent from the per capita income level - with one exception, however. As it is well-known that the relative importance of the services sector in the process of economic development first decreases (shifts from petty trade, domestic services etc. to other occupations), and later on again increases at high-income levels, the (average) income elasticity of services of 1.066 was rejected as unrealistic in U.A.R. conditions and replaced by a (arbitrarily chosen) value of 0.9. Also the population elasticities had to be modified somewhat so as to make the set of values of the a_2 's consistent. Table 2 summarizes the values of a_1 and a_2 that have been used.

2.3. The results

The data given in the preceding section can be substituted for the variables in equation (3); no figures for y_0 and N_0 are needed because it is only the growth rate of per capita income and of population that matters.

The growth rate of per capita value added has been calculated from equation (3) for the period 1970-1985, and for the three five-year periods separately. The growth rates of total value added can be computed easily by multiplying the per capita value added growth rates of each industry by the growth rate of population over the relevant period. The total five-year's growth rates of value added, per sector of the economy, are multiplied by the absolute figures indicating value added in 1970 for obtaining value added by sectors in 1975; multiplying the 1975 figures by the growth rates gives us the

Table 1

Value added, by sectors, for the U.A.R. in 1959/60, in 1964/65 and in 1969/70 according to the General Plan Frame (in constant prices of 1959/60), in millions of L.E.

	1959/60	1964/65	1969/70
Agriculture	399.9	511.7	627
Mining (excl.oil)	5.5	20.6	35
Oil extraction etc.	34.2	89.7	140
<u>Manuf. industry:</u>			
Food, Bev. Tobacco	77.3	99.9	140
Spinning, weaving, etc.	51.1	86.7	138
Clothes and shoes	10.3	12.2	20
Wood	7.6	10.6	14
Paper	1.1	6.6	9
Printing and publ.	9.5	16.4	22
Leather	1.4	2.1	3
Rubber	2.2	3.3	6
Chemicals (excl.oil)	12.9	46.3	75
Non-metallic	9.1	12.1	16
Basic metallic	7.3	48.6	69
Metallic products	19.9	48.2	68
Miscellaneous	12.1	13.4	18
Electr. & Publ.Util.	19.1	32.7	40
Construction	52.0	51.0	75
Transport	97.5	117.5	160
Trade & Finance	127.0	161.8	265
Services	325.0	403.6	624
Nat. income	1282.0	1795.0	2564

Table 2

Assumed income and population elasticities of industrial growth in the U.A.R., 1970-1985.

	a_1 = income elast. a_2 = population elast.	
Agriculture	0.47	- 0.15
Mining (excl. oil)	0.94	0
Oil extraction etc.	1.55	+ 0.17
<u>Manuf. industry :</u>		
Food, Bev. Tobacco	0.98	- 0.10
Spinning, weaving, etc.	1.21	+ 0.22
Clothes and shoes	1.36	- 0.03
Wood	1.53	+ 0.02
Paper	2.04	+ 0.08
Printing and publ.	1.72	+ 0.03
Leather	0.89	- 0.10
Rubber	1.58	+ 0.13
Chemicals (excl.oil)	1.55	+ 0.17
Non-metallic	1.16	+ 0.01
Basic metallic	1.99	+ 0.43
Metallic products	1.98	+ 0.21
Miscellaneous	1.85	+ 0.22
Electr. & Publ. Util.	1.55	0
Construction	1.15	- 0.05
Transport	1.29	- 0.05
Trade and Finance	0.90	0
Services	0.90	0

Sources: see text

Table 3

Value added, by sectors, for the U.A.R. in 1970, 1975, 1980 and 1985 according to the present forecast (in constant prices of 1959/60) in millions of L.E.

	1970	1975	1980	1985
Agriculture	627	760	922	1118
Mining (excl. oil)	35	48	66	91
Oil extraction etc.	140	226	365	590
<u>Manuf. industry:</u>				
Food, Bev. Tobacco	140	192	264	362
Spinning, weaving, etc.	138	208	312	470
Clothes and shoes	20	30	46	69
Wood	14	22	35	55
Paper	9	16	29	51
Printing and publ.	22	36	60	99
Leather	3	4	5	7
Rubber	6	10	16	25
Chemicals (excl. oil)	75	121	196	316
Non-metallic	16	23	34	49
Basic metallic	69	127	235	433
Metallic products	68	122	218	391
Miscellaneous	18	31	55	95
Electr. & Publ. Util.	40	63	100	158
Construction	75	108	154	222
Transport	160	237	351	520
Trade and Finance	265	362	493	673
Services	624	851	1161	1584
Nat. income	2564	3597	5117	7378

1980 figures, and these again lead to the 1985 estimates of value added by sectors of activity. The results are summarized in Table 3.

It has been stated in section 1 already that the present estimates of sectoral growth rates have been prepared primarily for use in manpower and education planning exercises. For this purpose the most suitable form of the results is probably that of the future value added levels given in Table 3. These estimates of national income and value added are expressed in constant prices, i.e. the prices of the base year 1959/60.

In order to illustrate the changes in the economic structure of the U.A.R. that are implied by these figures, the percentage breakdown of national income by major sectors of activity is given in Table 4. On aprioristic grounds these figures seem to be quite acceptable, except possibly for the mining sector. Manufacturing industry is gaining substantially in importance, mostly at the expense of the agricultural sector. The relative importance, of the services sectors is diminishing only slightly.

2.4. Further improvements of the estimates

It has been stressed from the beginning that the accuracy and reliability of the present estimates is limited. The estimates can be improved in several ways. Firstly, more reliable value added data than those taken from the General Plan Frame may exist. Secondly, the growth rates (or the elasticities) for the individual sectors might be scrutinized in the light of more detailed information about the role of the different sectors in the U.A.R. economy. In principle, this applies to all sectors, but such an evaluation of the specific U.A.R. conditions is particularly important for sectors in agriculture and mining. Thirdly, a further breakdown of several sectors may be desirable; it has been marked already that specially the services sector is a too heavily aggregated branch of activity, composed of rather hetero-

Table 4

Composition of National Income of the U.A.R. by major sectors of activity, in 1959/60, 1970, and 1985, in per cent.

	1959/60	1970	1985
1	2	3	4
Agriculture	31.2	24.5	15.2
Mining (excl. oil)	0.4	1.4	1.2
Oil extraction etc.	2.7	5.5	8.0
Manuf. industry	17.3	23.3	32.8
Electricity and publ. utilities	1.5	1.6	2.1
Construction	4.0	2.9	3.0
Transp. and comm.	7.6	6.2	7.1
Trade and finance	9.9	10.3	9.1
Services	25.4	24.3	21.5
	100.0	100.0	100.0

geneous elements. The educational requirements for manpower employed in, say, health services, educational services and the government administration is likely to differ significantly from case to case.

The above mentioned possibilities for improvement do not require a change in the method of analysis itself. There are, however, also other and superior methods of analysis conceivable. These are likely to require the formulation of a complete model of the U.A.R. economy. Essential features of such a model would have to be (i) the incorporation of the system of interindustry flows, (ii) the explicit introduction of imports and exports, and (iii) the determination of the final bill of goods through the use of demand elasticities. The potentialities of a model of this type are obviously much greater than those of the method of analysis followed in this study. The statistical problems that have to be solved before such a large model can be built and used are, however, not negligible. Until a workable model with this degree of detail becomes available, the present method of analysis may be a helpful shortcut. (with all advantages and disadvantages of it) for finding basic tendencies in the future development of the different sectors of the U.A.R. economy.