EDUCATION AND ECONOMIC GROWTH IN IRAQ, 1953-1974

by

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to

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ABSTRACT

EDUCATION AND ECONOMIC GROWTH IN IRAQ, 1953-1974

The main objective of this study is to assess the impact of education on economic growth in Iraq over the years 1953-74. During this period real GDP (excluding crude oil extraction) had risen substantially from I.D. 219.02 million to I.D. 1015.09 million, that is, an annual average growth rate of 16.5%. There had also been a remarkable expansion in the educational system since the early 1930's and the numbers of school leavers and graduates increased at rapid rates. For this purpose the aggregate Cobb-Douglas production function approach was adopted and annual time series data on real GDP and such inputs as capital, labour, land and education were used in the empirical estimation.

The major finding of this work is that, considered as a quality augmenting variable to the labour force, education does contribute significantly to the growth rates of the GDP, and that this contribution stems from a positive, high and increasing marginal product to the educational input. The policy implication that emerges from this finding is that in order to sustain and promote higher rates of growth of the GDP, the rapid expansion which had taken place in the educational system should be encouraged and more resources should be allocated to this vital sector of the economy.

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INTRODUCTION

Over the twenty two years period 1953-74 real GDP (excluding crude oil extraction) had risen substantially from I.D. 219.02 million to I.D. 1015.10 million, that is, growth over the entire period was 363.5%. There had also been a considerable expansion in the educational system since 1930 and the numbers of students admitted, enrolled and graduated rose dramatically. The primary objective of this study, therefore, is to assess the impact of education on economic growth during that period.

Chapter 1 provides a statistical background of the Iraqi economy during the period under review. The first part (Section 1.1) shows that although the size of the public sector increased rapidly during the latter years of the period, the economy remained predominantly a market economy. In such an economy commodity prices and factor rewards were determined by the forces of supply and demand in their respective markets. Iraq's population during those years increased at a relatively rapid rate, rising from 5.68 million in 1953 to 10.77 million in 1974. Meanwhile, the Gross National Product (GNP) at current and constant prices rose at substantial annual rates to reach I.D. 3.324.40 million and I.D. 1.378.38 million respectively by the close of the period. Similarly, the Gross Domestic Product in real terms (net of crude oil extraction) had increased at an annual average rate of 16.5%. Since output growth, whether considered as real GNP or real GDP (net of crude oil) rose at a much faster rate than population growth, per capita real output increased considerably over those years. One of the factors that led to higher

growth rates was the successive economic plans, particularly those that were implemented after 1961. The sectoral decomposition of the GDP shows that growth was not confined to one sector of the economy, but that there were variations in the growth rates among sectors. There were also some differences in the pattern of growth among sectors, for instance, growth in agricultural output and output of the crude oil sector was characterised by cyclical fluctuations, but the trend was clearly upward.

The latter part of Chapter 1 deals with fiscal expenditures on education and health. Statistical data show that fiscal expenditures on education rose very sharply from I.D. 8.21 million in 1953 to I.D. 132.10 million in 1974. Hence, education ranked second only to defence in the Ordinary Budget. In addition to these expenditures, outlays on education by the successive economic plans increased from I.D. 2.24 million in 1960 to I.D. 10.06 million in 1974. Likewise, expenditures on health increased at a relatively rapid rate during those years.

Chapter 2 highlights the development of the schooling system since 1930. In consequence of the rapidly rising demand for schooling, stimulated by the large income differentials, and the enormous increases in public expenditures on education, the educational system expanded very rapidly. Hence, the numbers of schools, teachers and students enrolled in each of the educational levels increased substantially. For example, the primary school population rose phenomenally from 34,220 pupils in 1930 to 1.408.929 pupils in 1973. Secondary school population, on the other hand, increased from 2.082 students to 388.624 students in 1973. Finally, the number

of students enrolled for first degree courses rose from 119 in 1930 to 58,351 in 1973. However, the 1950's and 1960's witnessed a remarkable expansion in higher education, hence, while in 1952 only eleven colleges offered first degree courses, the number of colleges increased rapidly and in 1957 the first university was instituted when all the colleges were brought together to form the University of Baghdad. By 1968 the number of universities increased to five and each of these provided courses in most of the major disciplines. Moreover, in order to meet the growing demand for higher education the Foundation of the Technical Institutes was established to provide first degree courses in such subjects as agriculture, agricultural technology, public administration, engineering and other disciplines. Clearly, the development of the schooling system meant larger and larger numbers of students completed primary, secondary and tertiary schooling. These ultimately joined the employed labour force and by so doing imparted quality improvement to labour - which in turn constituted an important element in the production process.

Chapter 3 stresses the idea that expenditures on education are investments in the future productive capacity of the labour force and discusses two possible methods of measuring the returns to such investments. The micro-approach, on the one hand, relies on the calculation of the rates of return to investments in various levels of schooling. Several studies were carried out to calculate the rates of return to investments in various levels of schooling in Britain, but in these studies no adjustment for risk involved in the cash flow streams was made. In addition, this method overlooks the non-quantifiable benefits and costs of formal schooling. Finally, the rate of return method involves the unjustified assumption that such

investment decisions are rational in the sense that they are based on a careful comparison of alternative investment opportunities. It is rarely, if ever, that individuals equate the yield on marginal expenditure on education with the return on marginal expenditure on any other factor of production. On the other hand, the macro-approach purports to measure the macro-returns that accrue to the society from investments in formal schooling. One basic tool of measuring these returns is the production function technique which was used in this study to quantify the impact of education on national social output. The Cobb-Douglas production function was preferred to other forms, such as the Constant Elasticity of Substitution production function because the former permits direct estimation of the parameters after linearising the function by taking logarithms. The properties of the Cobb-Douglas production function are discussed in Section 3.2.3 and an exact specification of the economic model is given in the same section. The statistical model is discussed in Section 3.2.4. Finally, the latter part of Chapter 3 deals with the various adjustments that were introduced to resolve the problem of the large efficiency parameter, A; in other words the large "residual".

Chapter 4 deals with the specification of the various factor inputs and the methods by which they were computed. The capital stock, in real terms, was computed by the capital/output ratio method which, unlike the perpetual inventory method, starts by establishing a base year value of the capital stock. From the base year figure, values for the preceding and ensuing years could be calculated, given the availability of capital formation data. Compared to the

other method the capital/output ratio formula was found to offer satisfactory results with short series of capital formation data. Calculated as such the capital stock of Iraq appears to have increased continuously during the years 1953-74 and at a relatively rapid rate. To obtain a continuous time series of the aggregate man-hours performed during the years 1953-74 it was necessary to derive a time series of aggregate employment classified according to major sectors of the economy, namely the agricultural, the services and the industrial sectors. Assumptions relevant to each of these sectors were then made in order to convert sectoral employment into sectoral man-hours worked during these years. Finally, these were aggregated year by year to obtain annual man-hours series for the whole period. The time series for the land variable was derived from the agricultural censuses for the years 1953, 1958, 1965 and 1971. These show that the land input increased continuously but slowly during the years 1953-69, then declined very rapidly during the subsequent two years. In the last three years of the period 1972-74 it increased at a very low annual rate. For computing the educational input variable the educational attainment of the labour force by each level of schooling was calculated year by year for the whole period. These were then weighted by the respective means of the income differentials. Finally, these were aggregated on a yearly basis to obtain annual time series of the educational input variable which were then deflated by the price level to get the educational input in 1962 prices. Data show that this input increased continuously over the period and the rate of increase was relatively high.

CHAPTER 1

THE IRAQI ECONOMY 1953-1974: A STATISTICAL BACKGROUND

The present chapter aims at furnishing a statistical background of the Iraqi economy during the years 1953-74. A brief account of the recent developments that have taken place in a number of relevant indicators will, therefore, be presented. These include, among other indicators, population, GNP, per capita income, major sectors of the GDP, the major items of fiscal expenditures, etc. A discussion of the conditions necessary for the growth of the educational system will also be pursued.

These developments will be considered in money and in real terms (1962 = 100). The choice of the year 1962 as a base year is influenced by the fact that 1962 was a smooth year in the sense that no extraordinary economic or political event had taken place. Finally, comparisons will frequently be made between the sub-periods 1953-62 and 1963-72 and these will be compared with the latter two years of the period. But let us now turn our attention to deal with the main features of the economy.

1.1. THE NATURE OF THE ECONOMY

Prior to the revolution in July 1958 the economy was basically a free market economy in which commodity prices and factor rewards were determined by the forces of supply and demand in their respective markets. In the main it was an agricultural economy and the country was almost self-sufficient with regards to food-stuffs. During 1953-1957 Iraq was a net exporter of wheat, barley and in some years rice.

Prices of food items in the home market were determined by relative quantities supplied and demanded. In contrast, the manufacturing sector was relatively small and rising demand for manufactured goods was met through an open import policy which helped stabilise prices. Although the Industrial Bank offered loans at low interest rate to individuals wishing to invest in manufacturing industry, there was a small demand for these loans mainly because of the higher profitability in the import sector of the economy. Larger imports were sustained by the tremendous increases in oil proceeds. These revenues also promoted a slow increase in the size of the public sector whose value added/GDP had risen from 11.75% in 1953 to 14.30% in 1956 at current prices [1]. The public sector's activity was concentrated in such fields as Railway Lines, National Bus Company, National Airway, Electricity Generating Stations, Education and Health.

The new regime in 1958 was determined to pursue and promote a more balanced pattern of economic growth by channelling a larger proportion of developmental expenditures to the industrial sectors - public and private - than previously. To promote private sector's industrial expansion the Industrial Bank received larger allocations to enable it to extend more funds to private investors at a low rate of interest. Simultaneously, the public industrial sector was scheduled to expand by setting up a number of new industrial plants. These were specified in the agreements concluded between the Iraqi government

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[1] Hashim, J., Aumar, H. and Al-Manoofi, A. Evaluating Economic Growth in Iraq 1950-70, Vol. I, Second Edition, Ministry of Planning, Baghdad, 1970, p. 288.

and the Soviet Union, as well as in the agreements with other socialist countries [2]. Among these industrial plants were steel, sulphur, sulphuric acid, agricultural tools and machinery, antibiotics, etc. In the subsequent six years some of these projects were abandoned, others came to fruition and several other projects were still under construction.

In 1964, the government reorganised the department in charge of industry and passed laws nationalising the commercial banks together with several large industrial establishments including cement, asbestos and tobacco, thus preparing the way for more extensive government participation in the industrial sector. By the end of 1965, therefore, the ratio of public sector value added/GDP at current prices had risen to 24.06%. At the end of 1968 the ratio reached 26.10%. This increase was brought about by the commencement of production in the state owned footwear industry and the agricultural tools and machinery at Alexandria and some other plants.

Production in several other publicly owned industrial projects began in the early 1970's, such as food processing and food canning, while in 1972 production commenced in the Mishraq Sulphur Deposit. The import sector was gradually brought under public ownership and this had the impact of redirecting investments from the private import sector to the private manufacturing sector. As the Industrial Bank's power to extend loans at low rate of interest was increased, investors

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(2) The Agreement for Economic and Technical Cooperation between the Iraqi Government and the Soviet Union, Law No. 52, 1958, The Iraqi Official Gazette No. 147, Baghdad, 9th May 1959.

received additional impetus. Thus in 1971 the share of the public sector value added/GDP at current prices fell slightly to 25.64%. But owing to the nationalisation of the Kirkuk Oil Fields in 1972 and the subsequent nationalisation of Mosul and Basrah Oil Companies coupled with the start of production of crude oil in North Rumailah under the control of the Iraqi National Oil Company, the ratio had risen to 34.78% in 1972 and to 50.63% in 1973 [3].

In conclusion, the two sectors had grown at a relatively rapid rate but the private sector expanded at a faster rate during the years 1953-71, while the position was reversed during the years 1972-74. This meant that prices of a number of commodities were either monitored or regulated, for example, prices of bread, dairy products, detergents and some other items. In the factor market, the government introduced minimum wage legislation in 1958 which had influenced the determination of wages of unskilled workers. In addition, salaries of some of the civil servant grades were set by the government. As to the capital market, businessmen had access to finance made available by the specialised banks, such as the Industrial Bank and the Agricultural Bank as well as the commercial banks. However, growth in the public sector was strongly positively correlated with the increase in oil revenues. Finally, one could conclude that the economy remained essentially a market economy, particularly if we exclude

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(3) The Gross Domestic Product and National Income of Iraq 1964-74, The National Accounts Department, Central Statistical Organisation (CSO), Ministry of Planning, Baghdad, April 1976, p. 16.

the oil sector. In such an economy prices of goods and factors adjusted in response to the pressures of supply and demand. In 1973, for instance, the value of agriculture output originated in the public sector stood at I.D. 1.91 million compared with I.D. 223.95 million in the private sector [4].

1.2 POPULATION GROWTH

A major phenomenon was the rapid growth in population which had risen from 5.676 million in 1953 to 10.765 in 1974, indicating a rise of 89.7%. During the ten years 1953-62 the annual average growth rate amounted to 2.87% compared with 3.24% in the subsequent ten years. The rate had risen to 3.37% p.a. in the latter two years. Over the entire period the annual average growth rate was 3.1%. However, Iraq's population remained smaller than those of other Middle Eastern countries, such as Egypt and Sudan whose populations stood at 33.305 million and 15.389 in 1970 respectively, compared with 9.52 million in Iraq in the same year [5].

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[4] The Gross Domestic Product and National Income of Iraq 1964-74, op cit, p. 16.

[5] United Nations, Economic and Social Office, Beirut, "Studies on Selected Development Problems in Various Countries in the Middle East", New York, 1970, p.73.

Since migration and emigration were insignificant during the whole period, the fast increase in population had been the outcome of either a rapid rise in birth rate or a significant decline in death rate or a combination of both. Birth rates, on the one hand, had risen from 46.1 per thousand in 1953 to a peak of 49.0 per thousand in 1962 and 1963 respectively, then taken a gradual downward turn to reach 47.7 in 1972, and risen slightly to settle at 47.8 in 1974. Death rates, on the other hand, declined steadily from 22.3 per thousand in 1953 to 18.3 in 1962 and to 15.2 in 1972, while in 1974 it reached 14.8 per thousand. These features are presented in Table 1.1 below [6].

Table 1.1

Demographic data of Iraq, 1953-74

Year	Population '000'	Birth rates per '000'	Death rates per '000'	Growth rates [7] %
1953	5676.3	46.1	22.3	[2.87]
1962	7320.8	49.0	18.3	
1963	7554.0	49.0	17.9	[3.24]
1972	10074.2	47.7	15.2	
1974	10765.4	47.8	14.8	[3.37]

See Table 1 in the Statistical Appendix.

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[6] Tables presented in the text of Chapters 1 and 2 are summary tables, while the corresponding detailed tables will be found in the Statistical Appendix.

[7] Figures in brackets [ ] are annual averages.

The increase in birth rate during the years 1953-63 was largely due to improvements in health, sanitation and socio-economic conditions, while its decline during the latter part of the period had been caused by the spread of education which encouraged the tendency towards smaller families in urban areas, and by the increase in female participation in the labour force. Death rate, on the other hand, continued to decline as a result of urbanisation, where medical facilities were concentrated in urban areas, and of improvements in hygiene and socio-economic conditions. Improvements in hygiene, which acted as a preventive measure against the spread of infectious diseases such as cholera, tuberculosis, smallpox, etc., were mainly due to the spread of education and the expansion of the health service, public and private.

However, although the mortality rate decreased steadily throughout the period it remained relatively high in comparison with that of Israel which had a rate of 6.0 per thousand in 1966 compared to approx. 16.0 per thousand in Iraq[8]. But the birth rate had risen at a sufficiently high rate to generate a rapid increase in total population. Thus, compared to other Middle Eastern countries Iraq had a higher population growth than Egypt, Sudan, Saudi Arabia and Lebanon, which had 2.5%p.a., 2.7%p.a., 2.8%p.a. and 3.0%p.a. during the years 1963-72 respectively.[9]

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[8] Schultz, P.T. "Fertility Patterns and their Determinants in the Middle East". Published in Economic Development and Population Growth in the Middle East, Editors: Cooper C.A. and Alexander, S.S., Elsevier, New York 1972, p. 404.

[9] Al-Khalidi, K.A. The Role of Supply and Demand for Labour in the Economic Development of Iraq 1957-80, Unpublished M.Sc. Dissertation, University of Baghdad, May 1975, Table 5, p. 38.

From the point of view of this study population growth is important in the sense that a rapidly growing population provided an appreciable inflow of pupils into primary schools. Even though there had been no one-to-one correspondence between the number of babies born and the number of primary school entrants six years later, as no universal compulsory system of education existed, population growth had played a significant role in increasing the demand for formal schooling. In this respect it acted as one of the conditions necessary for the development of the educational system, though by no means was a sufficient condition.

1.3 GROSS NATIONAL PRODUCT (GNP) AT CURRENT AND CONSTANT PRICES, 1953 - 74.

Over the ten years 1953-62, GNP at current prices rose by an annual percentage rate of 8.86% from I.D. 265.32 million in 1953 to I.D. 564.55 million in 1962. At constant prices, however, this had risen from I.D. 299.47 million in 1953 to I.D. 564.55 million, which represented an annual increase of 7.58%. In the subsequent ten years 1963-72 the rate slowed down to approx. 8.42% p.a., thus while in 1963 current price GNP stood at I.D. 562.50 million, it had risen to I.D. 1252.30 million. Real GNP during these years rose from I.D. 544.12 million to I.D. 987.94 million, which reflected an annual increase of 5.92%. Over the latter two years 1972-74, GNP in money terms increased at a phenominal rate of 70.5% p.a. to reach I.D. 3324.40 million in 1974. This was largely due to the spectacular increase in oil prices in 1973. Real GNP, however, had increased at a much lower rate of 18.2% p.a. during the years 1972-1974, to reach I.D. 1378.38 million. These features are presented in Table 1.2 below.

Table 1.2

Current and Real GNP, Average Annual Rates of Growth and per capita GNP 1953-74

Year	Current GNP			Real GNP		
	Million I.D.	Rate of growth %	per capita GNP (I.D.)	Million I.D.	Rate of growth %	per capita GNP (I.D.)
1953	265.32		46.8	299.47		52.8
		[8.86]			[7.58]	
1962	564.55		77.2	564.55		77.2
1963	562.50		74.5	544.12		72.1
		[8.42]			[5.92]	
1972	1252.30		124.3	987.94		98.1
1974	3324.40	[70.5]	308.8	1378.38	[18.2]	128.0

See Tables 2 and 3 in the Statistical Appendix

Although the absolute yearly increments were comparatively smaller in the first ten years than in the second ten years (1963-72), the annual percentage increases were higher owing to the smaller base in the former decade. This phenomenon is demonstrated in Table 1.3 below.

Table 1.3

Current and Real GNP, Absolute Increments in GNP and Percentage Increases 1959-60 and 1964-65

Year	Current GNP			Real GNP		
	Million I.D.	GNP (Million I.D.)	% Increase	Million I.D.	GNP (Million I.D.	% Increase
1959	423.89	-	-	418.15	-	-
1960	470.03	46.14	10.9	464.61	46.46	11.1
1964	675.40	-	-	639.60	-	-
1965	738.20	62.80	9.3	699.44	59.84	9.4

See Tables 2 and 3 in the Statistical Appendix

When the Crude Oil Sector was excluded from the GDP, that is, oil proceeds were regarded as pure rent or windfall, the GDP (net of Crude Oil) in 1953 stood at I.D. 194.04 million at current prices and I.D. 219.02 million at constant prices. This had risen to I.D. 448.19 million in 1962, which represented an annual average increase of 10.01% at current prices and 8.77% in real terms. Over the subsequent ten years the absolute figures had risen to I.D. 988.80 million in money terms and I.D. 790.09 million in real terms. This meant an annual average increase of 8.43% and 6.07% respectively. As before, the higher annual rates of growth in the first ten years compared to those in the ensuing ten years was due to the low start in the former period. For the latter two years current prices GDP (excluding crude oil) had risen by an annual rate of 20.75% to reach I.D. 1412.40 million in 1974, while real GDP (excluding crude oil) registered an annual increase of 14.0% to reach I.D. 1015.09 million. These features are presented in Table 1.4 below.

Table 1.4

Current and Real GDP (Excluding Crude Oil), Average Annual Rates of Growth and per capita GDP 1953-74

Year	Current GDP (Excluding crude oil)			Real GDP (Excluding crude oil)		
	Million I.D.	% Increase	per capita GDP (I.D.)	Million I.D.	% Increase	per capita GDP (I.D.)
1953	194.04		34.2	219.02		38.6
		[10.01]			[8.77]	
1962	448.19		61.2	448.19		61.2
1963	428.10		56.7	414.11		54.8
		[8.43]			[6.07]	
1972	988.80		98.2	790.09		78.4
1974	1412.40	[20.75]	131.2	1015.09	[14.0]	94.3

See Tables 2 and 3 in the Statistical Appendix.

Each of the indices discussed above, namely real GNP and real GDP (excluding crude oil) will, separately, be regressed on inputs of capital, labour, land and quality improvement in the labour force, in order to separately measure the sources of growth in the two dependent variables. Formally the function is written as follows:

$$Q = f(K, L, N)$$

Q = output

K = capital

L = labour

N = land.

Education could explicitly be introduced into the function either as a separate variable, hence:

$$Q = f(K, L, N, E)$$

where E = educational input

or as a quality improvement in the labour force so that the function reads:

$$Q = f(K, Lq, N)$$

where q = the average improvement in the quality of labour.

The primary aim of such an exercise is to investigate whether or not quality improvement in the labour force had contributed to the growth of real GNP and real GDP (excluding crude oil).

1.4 GNP AND GDP (EXCLUDING CRUDE OIL) PER PERSON, 1953-74

As growth in current and real GNP had surpassed population growth during the entire period, it is clear from Table 1.2 that per capita GNP at current and constant prices had risen from I.D. 46.8 and I.D. 52.8 in 1953 to I.D. 308.8 and I.D. 128.0 in 1974, respectively. The percentage increase attained was 559.8% at current prices and 142.4% in real terms over the entire period. Hence the annual average rate of growth in per capita GNP amounted to 10.7% at current prices compared to 4.6% at constant prices.

Similarly, per capita GDP (excluding crude oil) had risen substantially from I.D. 34.2 at current prices and I.D. 38.6 in real terms to I.D. 131.2 and I.D. 94.3 over the twenty two years period, (see Table 1.4). This represented an increase of 284.0% at current prices and 144.0% at constant prices. Expressed as annual average growth rates, these stood at 6.97% at current prices and 4.70% at constant prices.

The relatively rapid rise in real output per person was coupled with an increase in the shares of the various income groups across the spectrum; but the higher income groups had improved their share in real output at a faster rate than the lower income groups. This meant that the gap between the higher and the lower income groups had widened over the period. Principally, this was due to the fact that economic policy did not incorporate measures to redistribute income in favour of the lower income groups[10].

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[10] Al-Tuama, N.H. Economic Growth and the Distribution of Income in Iraq 1953-71, M.Sc. Dissertation, University of Baghdad, June 1975, Chapters 4 and 5.

1.5 PLANNING ECONOMIC GROWTH, 1953-74

As early as 1950, and in anticipation of increased oil revenues, the Iraqi government established a Development Board which was to receive the total revenues from oil to be spent directly on development projects. The Board produced a five year plan for the period 1951/52 - 1955/56, anticipating a revenue of I.D. 95.1 million and estimating expenditures at I.D.65.7 million, of which 70% were earmarked for water resources, flood control and transportation projects. Before implementation got under way the Board replaced the first five years plan by a new six years plan covering the period 1951/52 - 1956/57. This second plan provided for revenues of I.D. 168.7 million and expenditures of I.D. 155.4 million. The projected share for waterworks and transportation continued to figure very high, amounting to a full two-thirds of total expenditures. The development programme was once more revised and a new five years plan covering the period 1955/56 - 1959/60 was prepared and enacted into law in 1955. Once more both revenues and expenditures were revised upward, the former projected at I.D. 215.7 million and the latter at I.D. 304.0 million [11]. But almost a year later this plan was replaced by still another, based on a new projection of higher oil revenues. The fourth plan covered the six years period 1955/56 - 1960/61, and provided for an expenditure of I.D. 500.0 million and a revenue of I.D. 390.0 million. This was the plan in force when the revolution occurred in 1958. A feature of the Development Board plans was that they were expenditure plans and, therefore, did not project specific rates of growth.

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(11) Badre, A.Y. "The Economic Development of Iraq", published in Economic Development and Population Growth in the Middle East, edited by Cooper, C. and Alexander, S., Elsevier, New York 1972, pp 283-328.

The new government in 1958 abolished the Development Board and replaced it by the Ministry of Development. The latter decided to continue the implementation of certain projects already under way and to hold off on others until a new development machinery was established. The following year the Ministry of Development was replaced by a new Ministry of Planning. Only 50.0% of the oil revenues was to be used for financing development. In 1959 the Provisional Economic Plan was formulated to cover the four years period 1959/60 - 1962/63, with authorised expenditures of I.D. 393.0 million.. Like the previous plans, this did not specify a target rate of growth.

Two years later this plan was replaced by a more detailed five years plan covering the period 1961/62 - 1965/66. Total budgeted expenditures in this plan, known as the Detailed Economic Plan, was placed at I.D. 556.3 million, of which I.D. 315.8 million was to come from oil revenues. Loans from socialist countries were to provide I.D. 77.3 million. The plan projected the doubling of national income within a period of ten years, that is, a rate of growth of 10.0% p.a.. It also involved a shift of emphasis away from flood control and irrigation projects into manufacturing industry, transport and communications and agriculture. As it turned out, however, actual investment expenditures were substantially less than allocations. This had been primarily the result of a combination of initial inexperience, administrative incompetence, frequent political changes and the continuation of the war in the North of Iraq. Consequently, the GNP had risen at an annual rate of 9.73% at current prices and 8.65% at constant prices.

In 1965 a new plan was adopted to cover the five years from 1965/66 - 1969/70. Expenditures under this plan were budgeted at I.D. 820.0 million, that is, I.D. 140.0 million per year. The target rate of growth was set at 8.0% p.a. Priorities were given to industrial and agricultural sectors, each of which received an allocation of I.D. 159.0 million and I.D. 157.0 million during the plan period respectively. Nonetheless, actual investment expenditures fell considerably short of allocations, amounting to I.D. 446.67 million, that is, 54.5% of total appropriations. Thus, the realised rate of growth stood at 7.2% p.a. at current prices and 6.1% p.a. at constant prices.

The five years Comprehensive Economic Plan was announced in 1970 to cover the period 1970-1974 inclusive. Total expenditures were estimated at I.D. 1144.0 million for the period [12]. Of this amount 50.0% was to come from oil revenues; the balance was to be provided by socialist countries' loans, state organisations and the private sector. Particular emphasis was placed both on the revitalisation of the agricultural sector, which was to receive 41.0% of total public investments, and on the industrial sector, to which was allotted 35.0% of the allocation. The plan projected an annual increase in national

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[12] Originally the figure was set at I.D. 973.0 million, but it was adjusted upward because of the rapid increase in oil proceeds; particularly after the Tripoli and Tehran Agreements with the Oil Companies in 1971.

income of 7.1%. But due to the gigantic increase in oil prices in 1973 the annual average growth rate during the five year period stood at 33.9% at current prices. In real terms, however, the average percentage increase stood at 10.2% p.a., which means that the target rate of growth was attained in money and in real terms. The large discrepancy between annual growth rates at current and constant prices over the period was attributable to the tremendous discrepancy between the international price indices of crude oil and the domestic price indices of crude oil. The international price of crude oil quadrupled in 1973, while the domestic price of crude oil rose at a much lower rate. Thus, if we had considered the internal price of crude oil the discrepancy would have been much less and the current GNP in absolute terms would have been much lower.

Clearly, economic planning, particularly from 1961 onwards, had contributed a great deal toward achieving a faster rate of economic growth.

1.6 THE ANATOMY OF ECONOMIC GROWTH, 1953-74.

This section will provide sectoral decomposition of the GDP into its basic components, which will enable us to shed light on the performance of each of the major sectors and their respective contribution to the GDP. In addition, this will permit the examination of the dominant role of the crude oil sector in the national economy during the twenty two years period.

1.6.1 Agriculture

Over the twenty two years period agricultural production in money terms increased from I.D. 71.50 million in 1953 to I.D. 284.00 million in 1974, that is, an annual average rise of 8.3%, while constant prices output had increased from I.D. 80.70 million in 1953 to I.D. 172.60 million in 1974, indicating a growth rate of 5.4% p.a. For the first ten years, however, annual growth rate averaged 9.8% at current prices and 8.8% at constant prices. During the subsequent ten years the annual growth rate decreased to 7.6% at current prices and 4.6% in real terms. But due to adverse weather conditions and the sharp decline in the flow of the Euphrates river agricultural output fell in 1973 by 16.1% in money terms and 21.0% in real terms. In 1974 output experienced substantial increases amounting to 25.7% and 9.1% at current and constant prices respectively. Output per head, on the other hand, rose from I.D. 12.6 in 1953 to I.D. 26.4 in 1974 at current prices, while in real terms it had increased from I.D. 14.2 in 1953 to I.D. 16.0 in 1974. The contribution of this sector to the GDP varied cyclically over the period, thus, while in 1953 its contribution amounted to 22.1% at current prices, it decreased to 16.3% in 1963, but rose to 19.4% in 1972, following which it declined dramatically to 8.0% in 1974. In real terms the pattern was very similar, hence, while in 1953 the share stood at 22.1%, it decreased to 16.3% in 1963, but twisted upward to 18.4% in 1972 following which it declined to 12.2% in 1974 (see Table 1.5 below).

Table 1.5

Agricultural Output, Average Annual Growth Rates, Output per Head and Share in the GDP at Current and Constant Prices, 1953-1974.

Year	Current Prices				Constant Prices			
	Agricultural output (Million I.D.)	% Change	per capita output (I.D.)	Share in GDP %	Agricultural output (Million I.D.)	% Change	per capita output (I.D)	Share in GDP %
1953	71.50		12.6	22.1	80.70		14.2	22.1
		[9.8]				[8.8]		
1962	140.38		19.2	21.3	140.38		19.2	21.3
1963	109.30		14.5	16.3	105.72		14.0	16.3
		[7.6]				[4.6]		
1972	269.40		26.7	19.4	200.39		19.9	18.4
1974	284.00	[25.7]	26.4	8.0	172.60	[9.1]	16.0	12.2

See Table 6 in the Statistical Appendix.

Although there was an upward trend in agricultural output, year-to-year cyclical variations persisted throughout the period. Several factors accounted for these fluctuations, including floods, the insufficient and untimely rainfall in some years, the fallow system of cultivation, etc. Fluctuations in agricultural output induced oscillation in the incomes of those engaged in agriculture and therefore in the demand for agricultural and non-agricultural commodities. Similarly, the share of agriculture in the GDP varied cyclically over the period. This was the outcome of not only the changes in agricultural output but also the much faster growth rate - notably in 1974 - of the value added crude oil sector compared to that of the agricultural sector.

Over the years, there emerged a growing realisation that intensive efforts were necessary not only to eliminate cyclical fluctuations in output and income but to accelerate the growth of agricultural production too. This view was instigated by a number of factors. Firstly, that sooner or later crude oil will deplete and that the country will be deprived of one of the most important sources of income. Thus, it was felt that the opportunity to develop and harness other inexhaustible resources should be ceased. Secondly, that a major proportion of the population earned their living in agriculture and, therefore, a rapid and sustained growth in agricultural output and income would be of great benefit not only to the inhabitants immediately affected but to the country as a whole. Thirdly, economists who advised the Iraqi governments in the 1950's maintained the view that Iraq had comparative advantage in the production of agricultural commodities such as wheat, barley and rice.

Clawson, Landsberg and Alexander advocated a comprehensive agricultural policy to deal with the immense problems encountered by Iraqi agriculture [13]. They pointed out that isolated measures to overcome these problems were bound to lead to temporary improvements in agricultural production but that in the long run these improvements would fade away. Hence, the only course of action was a fully fledged agricultural programme encompassing all the essential ingredients such as desalinating the soil, increasing the

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[13] Clawson, M., Landsberg, H.H. and Alexander, L.T. The Agricultural Potential of the Middle East, Elsevier, New York, 1971, pp 1-55.

acreage of irrigated lands, an intensive use of agricultural land, better management and marketing, the introduction of improved varieties of seeds, wider use of chemical fertilisers, a more extensive use of agricultural implements and machinery, wider use of insecticides and weed killer materials, improvement of health and the expansion of the educational facilities in rural areas - particularly vocational education , the provision of incentives to skilled personnel to move to agriculture, etc.(14) To these must be added the essential measure of speedy and effective implementation of the Agrarian Reform Law of 1958 and the Agrarian Reform Amendment Law of June 1971. The original law of 1958 had the triple objectives of more equitable land distribution, rent control and the establishment of minimum wages for agricultural workers. With regard to land tenure, it stipulated that maximum personal holdings should be limited to 1,000 donums (620 acres) of irrigated land or 2,000 donums of rainfed land. All holdings in excess of these limits were to be confiscated and redistributed to individual holders in lots ranging between 30 and 60 donums in irrigated land and double that amount in rainfed land (15). The whole operation was to be completed in five years. The Agrarian Reform Amendment Law of 1971 reduced the maximum limit of personal holding to 1,000 donums in the rainfed areas or 500 donums in the irrigated

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(14) These measures necessitate the allocation of substantial amounts for investment in this sector.

(15) Agrarian Reform Law No. 30, The Official Gazette No. 4., 30th September 1958, Baghdad.

areas. However, progress in confiscation and redistribution was very slow, hence, by 1970 only 4.2 million donums (out of 12.0 million) were acquired and much less was redistributed. At the end of 1973 approximately 9.7 million donums were confiscated but only 5.2 million donums were allotted to individual holders. An effective implementation of the Agrarian Reform Laws would reduce the mismanagement associated with the vast concentration of land ownership. It would also provide incentives to the recipients of the small plots to put more effort into their individual holdings and this might result in an increase in agricultural output. Finally, the laws constituted a move to a competitive policy, since they did not stipulate price regulation of agricultural commodities.

Such measures, if implemented, would accelerate agricultural output, income and employment, since at a very low level of income the marginal propensity to consume tends to be very high. Consequently the circular flow of income would be enhanced and the market for agricultural and non-agricultural commodities will expand.

1.6.2 Manufacturing Output.

Manufacturing output in money terms increased from I.D. 20.63 million in 1953 to I.D. 165.60 million in 1974, that is a rise of just over 700.0%; while in real terms this had risen from I.D. 23.29 million in 1953 to I.D. 140.68 million, that is an increase of 504.0%. For the years 1953-62 the annual growth rate was 14.4% at current prices compared to 12.6% at constant prices. Over the subsequent

ten years 1963-72, the rate declined to 7.9% p.a. at current prices, while in real terms the annual growth rate stood at 5.6%. In the latter two years annual growth rates were 8.9% and 11.6% at current and constant prices respectively. For the period as a whole average annual growth rates were 10.3% and 8.7% in money and in real terms respectively.

Clearly, output growth was faster than population growth over the twenty two years period. Hence per capita output in money terms increased from I.D. 3.6 in 1953 to I.D. 15.4 in 1974; while at constant prices this had risen from I.D. 4.1 in 1953 to I.D. 13.1 in 1974. In 1963 the absolute level of output decreased slightly, in money and in real terms, because of the two political changes that occurred in that year. The share of manufacturing output in the GDP had risen steadily during the years 1953-73 (with the exception of the year 1963). Thus, in 1953 the share was 6.4% in money terms compared to 10.0% in 1973; while in real terms this had increased from 6.4% to 10.8%. But as a result of the phenomenal increase in oil prices and output in 1974, the percentage contribution decreased to 4.7% and 9.9% at current and constant prices respectively. These features are summarised in Table 1.6 below.

Table 1.6

Manufacturing Output, Average Annual Growth Rates, Output per Head and Share in the GDP, 1953-74

Year	Current Prices				Constant Prices			
	Manufacturing output (Million I.D.)	% Change	Per capita output (I.D.)	Share in GDP %	Manufacturing output (Million I.D.)	% Change	Per capita output (I.D.)	Share in GDP %
1953	20.63		3.6	6.4	23.29		4.1	6.4
		[14.4]				[12.6]		
1962	66.94		9.1	10.2	66.94		9.1	10.2
1963	66.10		8.8	9.9	63.95		8.5	9.9
		[7.9]				[5.6]		
1972	140.00		12.2	10.1	113.13		11.2	10.4
1974	165.60	[8.9]	15.4	4.7	140.68	[11.6]	13.1	9.9

See Table 7 in the Statistical Appendix

Industrial output (excluding oil), that is manufacturing output, building and construction and electricity, water and gas, followed much the same pattern as manufacturing growth. Thus, output in money terms grew over the entire period from I.D. 33.36 million in 1953 to I.D. 306.10 million in 1974, expressing a rise of 817.6%. In real terms, this had risen from I.D. 37.66 million in 1953 to I.D. 225.80 million in 1974, indicating an increase of 500.0%. Output per head increased from I.D. 5.9 in 1953 to I.D. 28.4 in 1974, compared with a rise in real output from I.D. 6.6 in 1953 to I.D. 20.1 in 1974. The ratio of industrial output value added/GDP in money terms rose from 10.3% in 1953 to 14.6% in 1973, but declined to 8.7% in 1974 owing to the vast increase in the value of crude oil.

However, at constant prices the percentage contribution of industrial output to the GDP had increased from 10.3% in 1953 to 15.9% in 1974. These features are presented in Table 1.7 below.

Table 1.7

Industrial Output, Average Annual Growth Rates, Output per Head and Share in the GDP, 1953-74

Year	Current Prices				Constant Prices			
	Industrial output (Million I.D.)	% Change	Output per head (I.D.)	Share in GDP %	Industrial output (Million I.D.)	% Change	Output per head (I.D.)	Share in GDP %
1953	33.36		5.9	10.3	37.66		6.6	10.3
1962	92.12		12.6	14.0	92.12		12.6	14.0
1963	91.60		12.1	13.7	88.62		11.7	13.7
1972	198.90		19.7	14.3	159.92		15.9	14.7
1974	306.10		28.4	8.7	225.85		20.1	15.9

See Table 8 in the Statistical Appendix

The growth in industrial output over the period was largely due to increased capital investment in this sector - particularly after 1958 - and to the growth of employment that had taken place during the period under consideration (see Table 4.2, Column 3). Promotion of faster growth rate in this sector is seen by many as an essential measure to balance the composition of the economy by reducing the dependence on crude oil exports.

1.6.3 Crude Oil Output

In terms of value added / GDP this had been the dominant sector, while in terms of employment it absorbed a very small proportion of the employed labour force [16].

Crude oil output in money terms rose from I.D. 128.91 million in 1953 to I.D. 2123.0 million in 1974, reflecting an increase of 1546.8%. In real terms the increase amounted to 177.2%, rising from I.D. 145.50 million in 1953 to just under I.D. 403.40 million in 1974. During the years 1953-62 crude oil output in money terms registered an annual growth rate of 7.4%. compared with 8.0% in the years 1963-72. At constant prices, however, the annual growth rate was 6.1% during the years 1953-62, compared with 4.2% in the years 1963-72. For the years 1973-74 the rates were 158.5% and 17.6% p.a. at current and constant prices respectively. Per capita output increased dramatically from I.D. 22.7 in 1953 to I.D. 197.2 in 1974, while real output per head had risen from I.D. 25.6 in 1953 to I.D. 37.5 in 1974. The ratio of value added / GDP fluctuated cyclically over the period because of the Arab-Israeli wars of 1956, 1967 and 1973, and because of the nationalisation of the Iraqi Petroleum Company in 1972. Thus, in money terms the ratio fell from 39.9% in 1953 to 28.8% in 1972, then increased to 60.0% in 1974. At constant prices, however, the ratio declined from 39.9% in 1953 to 27.5% in 1972, then rose slightly to 28.4% in 1974. These features are shown in Table 1.8 below.

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[16] This means that the oil industry was a capital-intensive industry. One must also add that the oil industry did not depend on domestic provision of capital, as capital investment was undertaken by the multinational oil companies.

Table 1.8

Crude Oil Output, Annual Average Growth Rates, per capita Output and Share in the GDP, 1953-74

Year	Current prices				Constant prices			
	Output (Million I.D.)	% Change	per capita output (I.D.)	Share in GDP %	Output (Million I.D.)	% Change	per capita output (I.D.)	Share in GDP %
1953	128.91		22.7	39.9	145.50		25.6	39.9
		[7.4]				[6.1]		
1962	210.23		28.7	31.9	210.23		28.7	31.9
1963	242.50		32.1	36.2	234.57		31.1	36.2
		[8.0]				[4.2]		
1972	400.00		39.7	28.8	300.35		29.8	27.5
1974	2123.00	[158.5]	197.2	60.0	403.38	[17.6]	37.5	28.4

See Table 9 in the Statistical Appendix

However, the 1952 agreement between the Iraqi government and the multinational oil companies provided an equal division of profits on crude oil production. This meant that approximately half of the value added crude oil was transferred abroad and this was the underlying cause behind the large magnitude of the item "Net Factor Payment Abroad" in the national income account. Undoubtedly, however, net oil proceeds to the Iraqi government had risen substantially over the period (except the years 1956, 1967 and 1972). Oil revenues increased from I.D. 57.75 million in 1953 to I.D. 95.12 million in 1962, while in the subsequent ten years these had increased from I.D. 110.05 million in 1963 to I.D. 251.60 million in 1972, that is an increase of 127.0%.

In the year 1973 oil revenues had more than doubled rising from I.D. 251.60 million in 1972 to I.D. 519.30 million in 1973. Per capita oil revenues over the years had risen from I.D. 10.2 in 1953 to I.D. 13.0 in 1962 and to I.D. 14.6 in 1963. In 1972 this stood at I.D. 25.0 and this had doubled during the year 1973, totalling I.D.49.9 per head. As a proportion of the GNP oil revenues percentage share increased from 21.5% in 1953 to 34.5% in 1973 (see Table 13 in the Statistical Appendix).

The substantial growth in oil proceeds stimulated a rapid increase in gross capital formation. Hence in money terms this had increased from I.D. 82.20 million in 1953 to just over I.D. 305.61 million in 1974 (see Table 21 in the Statistical Appendix). In addition large oil proceeds facilitated a rapid rise in aggregate consumption. The country, therefore, did not often resort to squeeze aggregate consumption to sustain large investment expenditures. Finally, oil revenues provided the major source of foreign exchange earnings which enabled the country to finance large and growing import programmes.

1.6.4 Wholesale and Retail Trade.

Compared to other sectors in the distribution trades this was the largest in terms of value added. In money terms this amounted to I.D. 17.85 million in 1953 and had increased to I.D. 156.00 million in 1974, that is a rise of 774.0%. At constant prices value added rose from I.D. 20.15 million in 1953 to I.D. 112.71 million, indicating a growth of 459.4%. Over the ten years 1953-62 the growth rate in money terms was 9.5% p.a. compared to 11.5% p.a. during the years

1963-72. While annual growth rate in real terms amounted to 8.2% during the period 1953-62 and this moved upwards to reach 10.1% in the subsequent ten years. For the latter two years annual growth rates in money and in real terms reached 22.9% and 16.1% respectively. Similarly, per capita value added in money terms had increased from I.D. 3.1 in 1953 to I.D. 14.5 in 1974. At constant prices this had risen from I.D. 3.5 in 1953 to I.D. 10.5 in 1974. The contribution of this sector to the GDP at current prices increased from 5.5% in 1953 to 7.4% in 1973. As a result of the gigantic growth in value added crude oil in 1974 the percentage share fell to approximately 4.4%. In real terms, however, the percentage contribution to the GDP rose from 5.5% in 1953 to 8.0% in 1974. These features are summarised in Table 1.9 below.

Table 1.9

Value Added Wholesale and Retail Trade, Annual Average Growth Rates, per capita Value Added and Share in the GDP, 1953-74.

Year	Current prices				Constant Prices			
	Value Added (Million I.D.)	% Change	per capita value added (I.D.)	Share in GDP %	Value Added (Million I.D.)	% Change	per capita value added (I.D.)	Share in GDP %
1953	17.85	[9.5]	3.1	5.5	20.15	[8.2]	3.5	5.5
1962	38.56		5.3	5.9	38.56		5.3	5.9
1963	35.90	[11.5]	4.8	5.4	34.72	[10.1]	4.6	5.4
1972	102.60		10.2	7.4	84.18		8.4	7.7
1974	156.00	[22.9]	14.5	4.4	112.77	[16.1]	10.5	8.0

See Table 11 in the Statistical Appendix

Until 1970 this was largely a privately operated sector, but in order to effectively control the level of imports State Organisations were set up in the 1970's to import a large number of items. This government policy had the effect of controlling imports and redirecting private sector savings toward investments in small scale import substitution industries, such as textiles, plastics, dairy products, food processing etc. Thus government control over imports provided an indirect encouragement to individuals to take risks and this resulted in greater employment opportunities and higher manufacturing output.

1.6.5 Transport, Communication and Storage.

In terms of value added this activity ranked second to Wholesale and Retail Trade amongst the distributive sectors. Current prices value added increased from I.D. 21.37 million in 1953 to I.D. 99.60 million in 1974, reflecting a percentage growth of 366.1%; while value added in real terms increased from I.D. 24.12 million in 1953 to I.D. 71.83 million in 1974, that is a percentage growth of 197.8%. The annual average growth rate in money terms decreased from 9.3% during the years 1953-62 to 7.8% for the subsequent ten years. This rate remained the same over the latter two years 1973-74. In real terms the annual percentage growth rate declined from 7.9% in the years 1953-62 to 3.9% in the following ten years. For the latter two years, 1973-74, the growth rate rose slightly to reach 5.0% p.a. Per capita value added in money terms increased from I.D. 3.8 in 1953 to I.D. 9.3 in 1974; while in real terms this had risen from I.D. 4.2 in 1953 to I.D. 6.7 in 1974. The contribution of this sector to the GDP had declined in money and in real terms. Thus, while the percentage share in money terms stood at 6.6% in 1953, it fell to 5.8% in 1973 and was

down to 2.8% in 1974. In real terms the decline was less dramatic as the percentage decreased from 6.6% in 1953 to 5.1% in 1974. These features are summarised in Table 1.10 below.

Table 1.10

Value Added Transport, Communication and Storage, Average Annual Growth Rates, per capita Value Added and Share in the GDP, 1953-74.

Year	Current Prices				Constant Prices			
	Value Added (Million I.D.)	% Change	per capita value added (I.D.)	Share in GDP %	Value Added (Million I.D.)	% Change	per capita value added (I.D.)	Share in GDP %
1953	21.37	[9.3]	3.8	6.6	24.12	[7.9]	4.2	6.6
1962	47.02		6.4	7.1	47.02		6.4	7.1
1963	48.80	[7.8]	6.5	7.3	47.21	[3.9]	6.2	7.3
1972	85.90		8.5	6.2	65.44		6.5	6.0
1974	99.60	[7.8]	9.3	2.8	71.83	[5.0]	6.7	5.1

See Table 10 in the Statistical Appendix

1.6.6 Public Administration and Defence.

This was the largest sector amongst all of the services. Moreover, the growth rate over the period was higher than the remainder of the economy. This stood at 1441.8%, for in money terms value added increased from I.D. 18.29 million in 1953 to I.D. 282.00 million in 1974. Value added in real terms increased from I.D. 20.65 million in 1953 to I.D. 221.99 million in 1974, representing a rise of 975.0%. The annual average growth rate at current prices was 14.2% for the

years 1953-62, which decreased to 8.8% in the subsequent ten years. Over the latter two years the growth rate rose dramatically to 48.1% p.a. At constant prices, however, the annual rate of increase was slower, being 12.7% for the years 1953-62 compared with 8.1% for the ensuing ten years. The annual growth rate rose sharply to 32.9% over the latter two years. Per capita value added in money terms increased steadily from I.D. 3.2 in 1953 to I.D. 26.2 in 1974; while in real terms this rose from I.D. 3.6 in 1953 to I.D. 20.6 in 1974. Over the period the percentage contribution to the GDP in money terms had risen from 5.5% in 1953 to 8.0% in 1974. At constant prices the percentage rose substantially from 5.7% in 1953 to 15.6% in 1974. These features are shown in Table 1.11 below.

Table 1.11

Value Added Public Administration and Defence, Annual Average Growth Rates, per capita Value Added and Share in the GDP, 1953-74.

Year	Current Prices				Constant Prices			
	Value Added (Million I.D.)	% Change	per capita value added (I.D.)	Share in GDP %	Value Added (Million I.D.)	% Change	per capita value added (I.D.)	Share in GDP %
1953	18.29		3.2	5.7	20.65		3.6	5.7
		[14.2]				[12.7]		
1962	59.76		8.2	9.1	59.76		8.2	9.1
1963	67.40		8.9	10.1	65.21		8.6	10.1
		[8.8]				[8.1]		
1972	136.00		13.5	9.8	128.31		12.7	11.8
1974	282.00	[48.1]	26.2	8.0	221.99	[32.9]	20.6	15.6

See Table 12 in the Statistical Appendix

A feature of this sector was the rapid growth of employment throughout the period which had been greater than that achieved by the industrial sector.

In conclusion, it is clear from the above presentation that aggregate output - whether considered as real GNP or real GDP (excluding oil) - had displayed cyclical changes. These were caused mainly by the fluctuations in output of the agricultural sector and that of the crude oil sector. However, despite these fluctuations the trend was upward and the annual average growth rates were relatively high.

1.7 FISCAL REVENUES AND EXPENDITURES

Public revenues and expenditures grew dramatically over the years 1953-73. Growth in revenues was the outcome of the rapid increase in net oil proceeds. The growth on percentage terms amounted to approximately 700.0%; thus, while in 1953 fiscal revenues stood at I.D. 47.72 million, in 1973 revenues totalled I.D. 382.02 million. The major source of these revenues had been oil proceeds, whose contribution to fiscal revenues increased from I.D. 26.1 million in 1958 to I.D. 179.3 million in 1973. In contrast, the contribution of Income and Property Tax increased from I.D. 3.8 million in 1958 to I.D. 24.4 million in 1973. The heavy reliance of the Ordinary Budget on oil proceeds meant that during the years when the latter fell, as in the years 1956-57, the contribution of oil proceeds to the Ordinary Budget had declined by 3.9% and 1.4% respectively. This dragged

down the proportion of fiscal revenues / GNP from 20.7% in 1955 to 17.3% in 1956 and to 16.1% in 1957. Thus, cyclical patterns in oil proceeds induced fluctuations in revenues of the Ordinary Budget (see Table 14 in the Statistical Appendix). There was therefore a case for reforming the tax system in a manner that would enhance the contribution of the direct and indirect taxation to the Ordinary Budget. Such a reform will lead to the stabilisation of fiscal revenues and will make possible a reduction in the reliance of the Ordinary Budget on oil revenues. Consequently larger proportions of these oil revenues would be allocated to the development of other resources. In other words, a dominant proportion of oil revenues would be utilised to promote faster economic growth.

Fiscal expenditures rose during the years 1953-73, from I.D. 50.16 million to I.D. 510.18 million, that is an increase of 917.2%. In annual terms the average growth rate was 11.3% for the years 1953-62, but fell slightly to 10.6% in 1963-72. The percentage growth rate rose markedly to 47.7% in 1973. Expressed as a proportion of the GNP fiscal expenditures constituted 18.9% in 1953, and it had risen to 26.6% in 1972 and to 33.9% in 1973. Current fiscal outlays per capita increased from I.D. 8.8 in 1953 to I.D. 49.0 in 1973.

One feature of fiscal expenditures was the rapidly rising outlays on the provision of a "public good", that is, Defence and Security, as outlays in this item rose from a total of I.D. 15.89 million in 1953 to I.D. 246.30 million in 1973, representing an increase of 1450.0% over the period. Annual average growth rate was 14.8% for the years 1953-62 compared with 12.7% over the years 1963-72. In 1973 the growth rate

rose dramatically to 60.6%. Per capita expenditures on this item increased rapidly from I.D. 2.8 in 1953 to I.D. 23.7 in 1973. Expenditures on defence and security as a proportion of total fiscal expenditures increased from 31.7% in 1953 to 48.3% in 1973. As a proportion of the GNP the percentage rose significantly from 6.0% in 1953 to 16.4% in 1973. Defence expenditures were characterised by a high import component per unit of outlay. In other words, it had acted as a drain on the foreign exchange resources of the country and constituted a large component in the total imports bill.

1.7.1 Expenditures on Education.

As in the United Kingdom, current expenditures on education ranked second only to defence expenditures in the ordinary budget. Current outlays on education had risen sharply from a total of I.D. 8.21 million in 1953 to I.D. 80.69 million in 1973. As a percentage of total budgetary expenditures, this represented a rise from 16.4% in 1953 to 17.7% in 1973. However, due to the sudden upsurge in total fiscal expenditures in 1974, the share of education fell to 9.7%. Even though, expenditures on education in absolute terms rose dramatically to I.D. 132.09 million, that is, an increase of 63.7% over the previous year. As a proportion of the GNP, expenditures on education constituted 3.1% in 1953 compared to 5.5% in 1972. Over the latter two years 1973-74, the ratio fell to 5.4% in 1973 and to 4.0% in 1974. Annual average growth rates in educational outlays fell from 17.0% for the years 1953-62 to 8.3% for the years 1963-72. Over the latter two years the growth rate surged upward to reach 38.3% p.a. Per capita current

educational expenditures increased from I.D. 1.4 in 1953 to I.D. 12.3 in 1974. Capital expenditures on education under the various plans displayed cyclical fluctuations, as in 1960 this amounted to I.D. 2.24 million but declined to I.D. 0.7 million in 1963. This increased rapidly to reach I.D. 10.06 million in 1974. These features are shown in Table 1.12 below.

Table 1.12

Current Educational Outlays, Annual Average Growth Rates, per capita Expenditures, as a ratio of the GNP and Capital Expenditures under Various Economic Plans, 1953-74.

Year	Current Expenditures (Million I.D.)	Annual % Change	As a ratio of total Fiscal expenditures %	As a ratio of the GNP %	per capita current expenditures (I.D.)	Capital expenditures (Million I.D.)
1953	8.21		16.4	3.1	1.4	-
1960	24.55	[17.0]	21.5	5.2	3.6	2.24
1962	32.43		21.3	5.7	4.4	1.54
1963	33.30	[8.3]	22.3	5.9	4.4	0.70
1972	71.45		20.7	5.5	7.1	3.50
1974	132.09	[38.3]	9.7	4.0	12.3	10.06

See Table 19 in the Statistical Appendix

In Section 1.2 it was emphasised that population growth generated an increase in demand for education and thus acted as one of the factors behind the development of the schooling systems. A more important factor was the positive and large income differentials which accrued

to holders of various certificates and degrees of formal education (see Table 4.8). In addition there was the incremental income stream brought about by income rights - as a pension - after fifteen years of employment. Moreover, drop-outs from the secondary school stage were, at the age of 18, liable to conscription, and that entailed a very small monthly payment compared to those in employment at the same age. Hence, conscription had a negative impact on income and this constituted a factor that generated higher demand for education. Finally an additional dimension is introduced when we consider the probabilities of receiving various income streams, that is the probability of securing employment was much higher for certificates and degree holders than for those with no education.

On the supply side, rapidly rising allocations to education facilitated the growth of the educational system, since these permitted the various governments to increase the number of schools and colleges as well as the number of teachers and lecturers. In Chapter 2 the growth of the educational system will be examined in detail.

1.7.2 Expenditures on Health

Current expenditures on health compares unfavourably with outlays on defence and education for in 1974 the allocations earmarked to this sector were trivial. Nonetheless, over the period as a whole expenditures rose sharply from a total of I.D. 2.79 million in 1953 to I.D. 27.64 million in 1974. For the first ten years the annual average growth rate amounted to 12.0% compared to 9.2% for the subsequent ten years. The annual growth rate accelerated to reach 25.4% in the latter two years.

As a proportion of total budgetary expenditures, the share declined from 5.6% in 1953 to 5.1% in 1972, and fell very rapidly to 2.0% in 1974. Similarly, the ratio of health expenditures to the GNP fell from 1.1% in 1953 to just over 0.8% in 1974. Per capita expenditures increased from I.D. 0.5 in 1953 to I.D. 2.6 in 1974. These features are presented in Table 1.13 below.

Table 1.13

Current Health Expenditures, Average Annual Growth Rates, per capita Expenditures and Share in the GNP, 1953-74.

Year	Current Expenditures (Million I.D.)	% Change	As a ratio of Fiscal expenditures %	As a ratio of the GNP %	per capita Health expenditures (I.D.)
1953	2.79	[12.0]	5.6	1.1	0.5
1962	7.45		5.8	1.3	1.0
1963	7.11	[9.2]	4.8	1.3	0.9
1972	17.64		5.1	1.4	1.8
1974	27.64	[25.4]	2.0	0.8	2.6

See Table 20 in the Statistical Appendix

Clearly, expenditures on health had not kept pace with the rapid increases in total fiscal expenditures and the GNP. Meanwhile, recent studies show that there is a positive correlation between health expenditures per person and output per man. In other words health expenditures constitute a form of investment in human capital, which if increased will generate higher GNP in the future (17).

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(17) Mushkin, S. "Health as Investment", Journal of Political Economy Supplement, October 1962.

CHAPTER 2

THE DEVELOPMENT OF FORMAL SCHOOLING, 1953-74

In Chapter 1 (Section 1.7.1) we examined the factors that generated a rapidly rising demand for education. On the supply side it was pointed out that the considerable increase in outlays on education contributed a great deal to the rapid development of the schooling system. The present chapter provides an account of the evolution of the system since the early 1930's. This will be followed by an examination of the substantial growth in the number of students enrolled, admitted and graduated from all educational stages over the period 1953-73. Growth in the number of teachers and schools corresponding to each stage will also be discussed. Finally, the inflow of Iraqi graduates from foreign universities will be considered.

2.1 THE EVOLUTION OF THE SCHOOLING SYSTEM, 1930-1952.

The foundation of the modern educational system was laid down by the 1929 Education Law which was amended by the Education Law of 1940. These two legislations placed a considerable emphasis on the importance of developing a public and centralised system of education. The 1929 Law stipulated a minimum age of six years for enrolment in primary schools. The duration of study in the primary stage was limited to six years, at the end of which pupils were required to pass a Public Examination before they could proceed to the intermediate level of education. Public primary schools were encouraged while

private and foreign schools were restricted. Centralisation of the schooling system featured highly in both enactments, hence the Ministry of Education was entrusted with the responsibility for the curricula, the textbooks taught and the Public Examinations. Finally, the 1929 and 1940 Education Laws gave a tremendous impetus to the growth of the schooling system in general and primary schooling in particular.

A pre-condition for enrolment in the intermediate level of education was the possession of primary school leaving certificates. The intermediate stage was one part of secondary education, and was of three years duration. The curricula were general in nature and the subjects taught included algebra, geometry, physics, chemistry, and languages as well as other subjects. At the end of the third year students were required to sit the Intermediate School Public Examination, so as to be eligible to proceed to the preparatory part. At the preparatory level students had the opportunity to specialise either in pure or in human sciences. The pure science students were given instruction in mathematics, physics, chemistry and other related subjects, while students of human sciences received tuition in such subjects as history, geography, economics and allied subjects.

Secondary school leavers had the option to pursue higher education in accordance with their specialisation. Pure science students who obtained the Secondary School Public Examination Certificate had the choice to specialise in such subjects as medicine, engineering, chemistry, physics, etc. Human science secondary school leavers, on the other hand, were eligible to pursue higher education in geography, history, economics, law and commerce. Although higher education was still in its infancy in the 1930's and to some extent in the 1940's, there was

a rapid growth in the number of institutions that offered first degree courses. In 1952, for instance, the number totalled eleven institutions and colleges. In 1908 the College of Law was instituted while the College of Medicine was inaugurated in 1927. Several other colleges and institutions were set up during the 1930's and 1940's, such as the College of Engineering and the College of Arts and Sciences.

Over the years 1930-1952 there was a substantial increase in the numbers of teachers, students and schools and colleges for all stages of education. However, several observations could be made regarding the development of the educational system.

First, there was a lack of clear and well-defined educational policy. Although the 1940 Education Law stated categorically that the objective of the system will be to "provide children with a basic education and culture which would make them good citizens and to discover their capabilities and aptitudes so as to guide them accordingly in their work"[18], the Law did not define the policy most suitable for attaining this objective. Consequently, there was uneven growth in the various branches of education, for instance, vocational education developed at a much lower rate than primary, secondary and higher education. In addition, the lack of educational policy meant that there was a lack of integration between the educational sector and the rest of the economy.

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(18) The World Survey of Education, Volume I, UNESCO, Paris, 1955, pp 352-60.

Second, the system was far from being universal, compulsory and free. The 1931 Report of the Commission of Inquiry into the Education System of Iraq advised that "a natural growth as far as possible upward from the people themselves will have better and more lasting consequences than a forced growth working downward from the government and through compulsory schooling laws".(19) The Report, therefore, concluded that the initiation of compulsory education had to wait until such time when the public began to realise the necessity of compulsory schooling. But this recommendation was shortsighted as the Commission had overlooked the immense socio-economic problems emanating from the very low rural per capita income which inhibited such a demand for compulsory education. Data on rural per capita income during the 1930's and 1940's are not available, but figures for the year 1953 show that this amounted to I.D. 22.4 at current prices as compared with I.D. 23.6 at constant 1962 prices (20). It is very hard to envisage a situation whereby people demand public compulsory education with such a very low per capita income. It was, therefore, the responsibility of the government to introduce such a system in conjunction with some measures to raise rural income per person.

Thirdly, the growth of the schooling system was unevenly distributed among the regions. Rural areas, for instance, had a much smaller number of schools than urban areas and hence a small number of teachers and students. In addition, major cities such as Baghdad, Mosul and Basrah had a much larger number of schools, teachers and students than other cities.

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(19) World Survey of Education, Volume I. op. cit. pp 352-60.

(20) Al-Tuama, N.H. Economic Development and the Distribution of Income in Iraq, op. cit. pp 153-155.

In the forthcoming sections we shall examine the developments that had taken place in the numbers of schools, teachers and students for each stage of formal schooling.

2.2 PRIMARY EDUCATION

In 1930 barely 34,220 pupils were enrolled in primary schools, but the number had risen dramatically to reach 280,378 by 1953, that is an annual average growth rate of 31.0%. Correspondingly, the number of teachers increased from 1,325 to 9,521 over the same period. This reflected an average growth rate of 25.8% p.a. The number of primary schools had almost quadrupled rising from 314 to 1,549, which represented an annual increase of 16.4%. The secular upward trend in primary schools population continued throughout the period 1953-73. Over the years 1953-62 the number had risen by an annual average rate of 13.4% to stand at 849,682. The percentage rate of growth slowed down to 4.4% p.a. for the years 1963-72 as in 1972 the number totalled 1,297,756 pupils. In 1973 the figure had risen to 1,408,929, that is, a percentage increase of 8.6% over the previous year. Similarly, the number of schools grew at a relatively rapid rate of 11.3% p.a. in the years 1953-62. The absolute figure for the year 1962 stood at 4,018 schools. The annual growth rate slowed down to 4.6% during the years 1963-72 to reach 6,269 schools. The percentage increase was 7.4% in the subsequent year and in 1973 there were 6,731 schools. In line with these developments the number of primary school teachers increased substantially from 9,521 in 1953 to 29,352 in 1962, that is an average annual growth rate of 13.2%. The rate of recruitment slowed down to 6.7% during the years 1963-72 and the number stood at 54,979. In 1973 the rate fell slightly to 6.3%;

thus by the end of 1973 the number of teachers totalled 58,445. These features are presented in Table 2.1 below.

Table 2.1

The Number of Primary School Pupils, Teachers and Schools, Average Annual Growth Rates, 1930-73.

Year	Numbers of:			% Change in the Numbers of:		
	Pupils	Schools	Teachers	Pupils	Schools	Teachers
1930	34,220	314	1,325			
				[31.0]	[16.4]	[25.8]
1953	280,378	1,549	9,521			
				[13.4]	[11.3]	[13.2]
1962	849,682	4,018	29,352			
1963	867,283	3,943	31,390			
				[4.4]	[4.6]	[6.7]
1972	1,297,756	6,269	54,979			
1973	1,408,929	6,731	58,445	8.6	7.4	6.3

See Table 22 in the Statistical Appendix

Although data on the number of pupils admitted are not available for the entire period, figures for the years 1969-72 show that this had increased from 67,510 to 162,677, that is an annual increase of 27.0%. On the other hand, statistical data show that the number of pupils who completed the primary stage had increased from 48,867 in 1963 to 102,166 pupils in 1972, expressing an annual increase of 10.2%.

A major factor that contributed to the rapid growth of primary schooling had been the large and increasing allocations appropriated to this educational stage. Hence, the share of primary education in total educational outlays increased from 60.3% in 1954 to just over 67.0% in 1960 (21). There had also been a relative improvement in the quality of primary schooling as indicated by the fall in the pupils/teachers ratio. The average for the years 1953-62 declined from 31.1 to 23.1 during the subsequent ten years.

Nonetheless, there was an alarming increase in the number of failures and drop-outs over the years (22). Only 45.5% of the pupils completed the primary stage at the set time, while the average number of years spent by each pupil was 13.83 instead of 6 years (23). This phenomenon was, in part,due to the system of dual attendance which was introduced as a measure of dealing with the acute shortage of school buildings. Clearly, dual attendance in a single building implied an inadequate number of hours of instruction. Furthermore, as a result of the shortage in school buildings successive governments resorted to renting large houses and converting them into schools.

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(21) World Survey of Education, Volume II, UNESCO, Paris 1958, pp. 567-74.

(22) Al-Shaikhli, F. Education and Development in Iraq with Special Emphasis on Higher Education, Unpublished PhD Thesis, Center For International Education, University of Massachusetts, April 1974, pp. 83-110.

(23) A Plan to Introduce Universal Education 1975/76 - 79/80, Educational Planning Section, The Social and Cultural Department, Ministry of Planning, Baghdad, December 1973, pp. 9-10.

In 1966 the number of rented houses converted into small schools totalled 930, that is, just over 20.0% of the total number of primary schools. Undoubtedly, these had inadequate facilities and the environment was somehow uncongenial. Finally, the high rate of failures and drop-outs had been attributed to the curricula taught at primary schools.

2.3 SECONDARY EDUCATION

This stage consisted of two parts, namely intermediate and preparatory schooling [24]. The duration of the former was three years, while the latter was of two years duration.[25] In order to move from the intermediate to the preparatory stage, students had to pass the Intermediate School Public Examination. Tuition was of general nature in the intermediate stage in contrast with a specialised tuition in the preparatory part. Data on secondary school student population show that there was a substantial increase over the years 1930-1953, amounting to 15.4% p.a., hence in absolute terms the figure had risen from 2,082 to 46,463 students. The average annual growth rate increased slightly to 15.8% for the years 1953-62, thus by 1962 the number totalled 172,652. In the subsequent ten years 1963-72, the rate of expansion slowed down to 6.3% p.a., for in

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(24) This will be treated as one stage owing to the ambiguity in the statistical data on the number of students, schools and teachers.

(25) In the academic year 1969-70 the duration of the preparatory part was raised from two to three years.

absolute terms the figure rose from 192,803 to 353,114 students. In 1973 the number increased to 388,624, that is, an increase of 10.1% over the previous year. The number of schools grew in a similar pattern, rising from 197 in 1953 to 446 in 1962, that is, an annual average increase of 9.8%. The rate of increase fell to 8.9% p.a. over the years 1963-72, while the figure in absolute terms rose from 506 to 1,033 schools. In 1973 the figure totalled 1,093 schools, that is, a rise of 5.8% over the preceding year. Teachers recruitment increased at an annual rate of 7.5% over the years 1953-62, rising from 2,679 to 4,562. The rate accelerated during the years 1963-72 to reach 12.3% p.a., and the absolute figure rose from 4,924 to 14,338 teachers. In 1973 the growth rate fell sharply to 3.7% and the number totalled 14,871 teachers. These features are shown in Table 2.2 below.

Table 2.2

The Number of Secondary School Students, Schools, Teachers and Annual Average Growth Rates, 1930-73

Year	Numbers of:			% Change in the numbers of:		
	Students	Schools	Teachers	Students	Schools	Teachers
1930	2,082	-	-			
				[15.4]	-	-
1953	46,463	197	2,679			
				[15.8]	[9.8]	[7.5]
1962	172,652	446	4,562			
1963	192,803	506	4,924			
				[6.3]	[8.9]	[12.3]
1972	353,114	1,033	14,338			
1973	388,624	1,093	14,871	10.1	5.8	3.7

See Table 23 in the Statistical Appendix

The number of students who successfully completed secondary education over the years 1964-73 had just over doubled, rising from 9,571 to 20,435. The average students/teacher ratio for the years 1953-58 stood at 19.3 compared to 27.9 for the years 1953-62. The ratio increased further to 30.3 in the years 1963-72, but fell to 24.1 over the years 1970 - 73. Thus, there was a relative decline in the quality of secondary education. However, the increase in the number of years of preparatory schooling from two to three had resulted in an improvement in the quality of graduates due to the introduction of more advanced syllabuses.

2.4 VOCATIONAL EDUCATION

Vocational education institutes provided a specialised type of education, such as medical, agricultural, industrial, crafts and commerce. The duration of courses provided varied between two and three years, depending on whether the candidates had intermediate school certificates or secondary school certificates. The number of students enrolled fluctuated cyclically over the years 1930-53, but nevertheless the trend was upward. The average annual growth rate stood at 13.0%, hence, in absolute terms the figure increased from 120 to 1,674. A much higher annual growth rate was attained during the years 1953-62 amounting to 33.8% and the number increased to 8,044 in 1962. The annual percentage increase fell dramatically during the years 1963-72 to approximately 3.3%, while the absolute figure totalled 11,426. In 1973 the number of vocational students

increased substantially by 36.9% to stand at 15,639 students. Cyclical changes in the number of students were associated with oscillations in the number of institutes. This increased from 11 in 1949 to 15 in 1953. The annual average growth rate was 16.3% for the years 1953-62, as in 1962 the number totalled 43. In the subsequent ten years 1963-72 the annual percentage growth rate fell considerably to 4.8%, hence by 1972 the number of institutions totalled 62, and this increased to 64 in 1973. Similarly, the number of teachers in vocational education institutes changed cyclically. The average annual growth during the years 1957-62 stood at 29.3%, hence, the number increased from 225 to 869. For the ensuing ten years 1963-72, the annual percentage increase was 3.3%, thus the number had risen from 879 in 1963 to 1,130 teachers in 1972. In 1973, the total number of teachers increased to 1,250, that is a rise of 10.6%. These features are presented in Table 2.3 below.

Table 2.3

The Numbers of Vocational School Students, Institutes, Teachers and Annual Average Growth Rates, 1930-73

Year	Numbers of:			% Change in the Numbers of:		
	Students	Institutes	Teachers	Students	Institutes	Teachers
1930	120	-	-			
				[13.0]	-	-
1953	1,674	15	-			
				[33.8]	[16.3]	-
1962	8,044	43	869			
1963	7,973	46	879			
				[3.3]	[4.8]	[3.3]
1972	11,426	62	1,130			
1973	15,639	64	1,250	36.9	3.2	10.6

See Table 25 in the Statistical Appendix

There had also been a relative improvement in the quality of vocational education as indicated by the decline in the students/teacher ratio from an average of 14.9 for the years 1953-62 to an average of 10.0 for the years 1963-72 (26).

2.5 TEACHERS TRAINING EDUCATION

Teachers training courses were offered either to holders of intermediate school certificates for a period of three years or to holders of secondary school certificates for a period lasting two years. Graduates of teachers training institutes were given appointments to teach in primary schools. There was also the "High Teachers Training Institute", graduates of which were allocated to teach in intermediate and preparatory schools. Developments in this branch of education were marked by cyclical fluctuations. The number of students increased from 1,694 in 1942 to 1,798 in 1947, then fell to 1,594 in 1948. Over the years 1953-72 the number varied cyclically, thus, while in 1953 it stood at 11,050, it had fallen to 7,230 in 1962. In 1963 the number increased by 24.6% to just over 9,000 students, but declined dramatically to 7,405 students in 1972. Similarly the number of institutes fluctuated sharply, as this increased from 16 in 1953 to a peak of 62 in 1959, then declined steadily to settle at 4 institutes only in 1972. The number of teachers also exhibited year-to-year variations, thus, while in 1953 it totalled 277, it had risen to a peak of 512 in 1960, following which it declined steadily to 48 in 1971, then increased to 120 by 1972.

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(26) Originally we intended to test the relationship between drop-outs and failures and the students/teachers ratio but the unavailability of long enough series on drop-outs and failures made this task impossible.

The major cause of the cyclical variations described above was the frequent changes in the rules and regulations introduced by the government to affect the conduct of these institutes. A large number of these institutes were either abolished or integrated with others. For example, the High Teachers Training Institute was brought under the College of Culture and Education of the University of Baghdad. In addition, in 1970 no student was admitted to these institutes and enrolled students were transferred to other educational colleges. In part, the variations were also due to the changes in the demand for teachers by primary, intermediate and preparatory schools.

2.6 HIGHER EDUCATION

By 1952 there were 11 colleges offering first degree courses. Few other colleges were set up in the 1950's until the year 1957 when those colleges were brought together to form the University of Baghdad. The 1960's witnessed a rapid increase in the number of colleges associated with Baghdad University in addition to the establishment of several other universities. By 1968 a total of 5 universities provided higher education courses. Each of these offered courses in almost all of the major specialisations, such as medicine, engineering, pure sciences, law, economics, linguistics and other courses. Beside these there were a few private colleges which catered for first degree courses. Early in the 1970's the Foundation of Technical Institutes was formed to meet the growing demand for higher education. This consisted of seven or eight institutes specialising in technology, public administration, agricultural technology and other fields.

The increase in demand for higher education is evident from the rapid rise in the number of students enrolled for first degree courses. This accelerated from 119 students in 1930 to 5,255 in 1953, that is, an annual increase of 24.2%. Over the years 1953-62 the annual growth rate fell to approximately 14.1%, and the number rose to 14,701. In the subsequent ten years the growth rate declined slightly to 13.5% p.a., thus, the number increased from 19,811 in 1963 to 49,194 in 1972. The number increased substantially to 58,351 in 1973, that is a percentage increase of 18.6%. The number of university teachers rose significantly from 377 in 1957 to 1,312 in 1962 [27]. This represented an annual average growth rate of 21.2%. For the latter ten years the figure increased by a smaller annual rate of 4.8%, hence, while in 1963 the number totalled 1,270, it had risen to 2,108 teachers in 1972. The number of teaching staff increased by 26.6% in 1973 to settle at 2,669. These features are summarised in Table 2.4 below.

Table 2.4

The Numbers of Students, Universities, Teachers and Annual Average Growth Rates, 1930 - 73.

Year	Numbers of:			% Change in the numbers of:		
	Students	Universities	Teachers	Students	Universities	Teachers
1930	119	-	-			
				[24.2]	-	
1953	5,255	-	-			
				[14.1]	-	
1962	14,701	2	1,312			
					-	
1963	19,811	2	1,270			
				[13.5]		[4.8]
1972	49,194	5	2,108			
1973	58,351	5	2,669	18.6	-	26.6

See Table 26 in the Statisitcal Appendix

[27] These figures refer to full-time university teaching staff and do not include part-time lecturers.

The number of university graduates increased from 7,061 in 1969 to a peak of 9,998 in 1971, while in 1973 it totalled 8,457. On the other hand, the number of students admitted increased steadily from 7,759 in 1969 to a total of 18,664 in 1973, that is an increase of just over 140.0%.

There was a relative decline in the quality of higher education as indicated by the rise in students/teachers ratios which had risen from an average of 13.3 for the years 1957-62 to 19.3 during the years 1963-72.

Post-graduate courses started early in the 1960's at the University of Baghdad and later at the University of Mosul. The number of students registered for M.Sc. degrees increased from 14 in 1961 to 125 in 1967, that is an average annual rate of 50.3%. For the year 1972 the figure totalled 742 students; 705 of these were at the University of Baghdad and the remaining at the University of Mosul. The distribution of the candidates among various specialisations was almost even.

2.7 GRADUATES FROM ABROAD.

The final source of supply of individuals with various grades of educational attainment was the inflow of Iraqi graduates from foreign universities and institutions. Since the Second World War the number of Iraqi students who received educational training abroad had increased rapidly. The increase accelerated after 1958 as the government offered a higher number of scholarships to students to pursue higher education courses abroad. During the years 1960-69 successive governments financed the studies of approximately 2,000 students in foreign countries. Among these 223 students were pursuing their education in Arab countries,

such as Egypt, Syria and Lebanon; while 861 students were receiving education in European countries such as Germany, the U.K. and France. Of the remainder, 383 were in America and 412 in the Socialist countries. The courses for which they were sent to pursue varied from engineering, physics, chemistry, economics, and law to anthropology and other specialisations. Out of the 2,000 government sponsored students, 1,113 completed the courses successfully, while a large proportion of the remainder were still pursuing their educational training.

In addition to the 2,000 government sponsored students there were 17,000 private students in various countries. A sample of 250 private students was analysed by the Educational Section of the Ministry of Planning [28]. Their results showed that of the sample 65 were studying in the Arab countries, 51 in the European countries, 76 in the Socialist countries, 20 in America and 36 in Turkey and other Eastern countries. Approximately one-third of the 250 students successfully completed their courses, while a significant proportion of the remainder were still following the educational training courses. However, more meaningful results could have been obtained with a larger sample size. That is to say the sample considered was very small, constituting 1/68 of the total private student population during the years 1960-69. The results would have been more useful if the period considered was longer than nine years, since it would require a minimum of ten years to proceed from a pre-first degree course to the Ph.D. degree. The implication is that there was a higher proportion of private students who obtained educational qualifications than the results of the sample survey had shown.

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(28) An Evaluation of the Studies of Iraqi Students Abroad for the years 1960-69, The Educational Planning Section, Ministry of Planning, Baghdad, November 1973.

To conclude this chapter it is clear from the above presentation that the educational system was well established in the early 1950's and that the output of this system, that is, graduates with various degrees and school certificates, had increased substantially over the years. Untimately these had joined the employed labour force and by so doing they imparted quality improvement to the labour force which in turn constituted an important element in the production process.

CHAPTER 3

THE PRODUCTION FUNCTION APPROACH TO THE STUDY OF ECONOMIC GROWTH

Interest in the economics of education has, over the past two decades, grown enormously. A major factor contributing to this phenomenon has been the widely held view that education significantly contributes to the growth of gross national social product. In the latter part of the 1950's the findings of Abramovitz and Solow magnified this interest and stimulated further research into the causes of economic growth. The study by Abramovitz revealed that between 80.0 - 90.0% of the growth of output per head in the United States could not be accounted for by capital per head[29]. In his examination of the data of the non-farm sector Solow found that approximately 90.0% of the growth of output per head could not be explained by increases in capital per head, confirming thereby the results arrived at by Abramovitz[30]. Although possibly exaggerated, the magnitude of the residual factor (residual in the sense that it is that part of economic growth that cannot be explained by the classical factors, namely capital, manpower and resources) has directed attention to an undefined "third factor" that explains the rise in output relative to inputs.

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(29) Abramovitz, M. "Resources and Output Trends in the United States since 1870". American Economic Review, Papers and Proceedings, May 1956, pp 5-23.

(30) Solow, R. "Technical Change and the Aggregate Production Function". Review of Economics and Statistics, August 1957, pp 312-20.

In his 1962 study on the sources of economic growth in the United States Denison attributed 23.0% of measured growth during the years 1929-57 to formal education [31]. On the other hand, Schultz' estimate of the contribution of education to measured growth for the same period showed that this amounted to approximately 21.0% [32]. Finally, Bowman's revision of the estimates made by Denison and Schultz credited between 18.0 - 19.0% of the national income growth rate to the increased education of the labour force [33].

This empirical evidence would confirm an expectation that education does contribute to economic growth. Indeed, this

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[31] Denison, E.F. The Sources of Economic Growth in the United States and the Alternatives Before Us. New York, Committee for Economic Development, Library of Congress 1962.

[32] Schultz, T.W. "Education and Economic Growth", published in Social Forces Influencing American Education, National Society for the Study of Education, Chicago, 1961.

[33] Bowman, M.J. "Schultz, Denison and the Contribution of the 'Eds' ". Journal of Political Economy, October 1964, Vol. 72, No. 5. pp 450-64.

expectation is at the root of the manpower planning approach [34]. Moreover if investment in education did not make an economic payoff countries would not have allocated a substantial part of their scarce resources to education. Accordingly, expenditures on education have been treated as investment expenditures that generate higher rate of growth in the future.

There are at least two possible methods of measuring the returns to investment in education. On the one hand, there is the micro-approach which relies on calculation of the rates of return to investment in various levels of schooling. On the other hand, the production function approach has been widely used to measure the macro-returns to education in several countries.

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[34] The basic components of detailed manpower plans, in almost all of their variants, consist of several steps. Firstly, the specification of a target rate of growth of the GNP. Secondly, the specification of the composition of manpower requirements with various amounts of schooling at some future date. Thirdly, the specification of manpower availabilities which includes estimation of the flows of new manpower out of educational institutions on the one hand, and losses by dropouts or retirement or death on the other. The fourth step consists of balancing stages two and three. Clearly, manpower planners assume a strong positive correlation between the rate of growth of output and the skills generated by the schooling system. Implicitly, therefore, manpower planners believe that educated people are more productive than uneducated individuals.

3.1.1 THE MICRO-APPROACH: RATES OF RETURN TO INVESTMENT IN VARIOUS LEVELS OF EDUCATION.

A number of writers, notably Schultz, placed an overwhelming emphasis on the relation between resources utilised to form human skills and competencies (resources, cost of education) and the increment to productivity that results [35]. Clearly, people with more education earn, on average, higher incomes than people with less or no education, at least if the people being compared are of the same age. Schultz' idea, therefore, implies that resources put into formal schooling are an investment in the acquisition of potential incremental future income streams, whether looked at from the individual or the societal point of view.

Translated into rates of return to investment in education we find that these differ for different cohorts of individuals with different educational achievements. One of the major reasons why rates of return to investment in various levels of schooling differ is that individuals with higher education are more productive, that is to say, their marginal product is higher than those with less or no education.

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(35) Schultz, T.W. "Investment in Human Capital". The American Economic Review, Vol. 15, 1961, pp 1-17. This article was based on the presidential address by Schultz to the Annual Meeting of the American Economic Association in December 1960, to which Mark Blaug attributes the "birth" of the economics of education. See also Becker, G. Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, N.B.E.R., 1964.

A second reason is that educated people have greater ability to respond to information much more quickly than uneducated individuals. Consequently, educated personnel can obtain any abnormal gains that may be available in the market place. Thirdly, people with more education have greater ability to adapt themselves to changes in technology, and are more mobile (both within and between countries). These ensure that they have higher probability of securing employment, in addition to their ability to transfer to more rewarding jobs. Fourthly, a large number of highly educated individuals become decision makers, such as scientists, engineers, doctors, business executives, etc. which could mean much higher payoff [36]. Finally, it could be argued that earnings of educated individuals exhibit greater variability than those of less educated individuals and that given risk aversion and few opportunities to diversify occupations, a greater mean rate of return is earned as compensation for this greater variability.

3.1.2 INDIVIDUAL AND SOCIAL DECISION RULES IN A RISK-FREE CONTEXT.

Rates of return for investments in education have been calculated either for the individual or for the society as a whole. In the calculation of the individual rate of return, the incremental (after tax)

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[36] Nelson, R.R. "Comment" on a paper by Grilliches, published in W. Lee Hansen, Education, Income and Human Capital, N.B.E.R. 1970, pp 124-127.

earnings ascribed to education as well as the costs incurred by the individual are used. When social rates of return are calculated, incremental (pre-tax) earnings and total resource costs (private and social) are employed. However, both of these measures overlook the non-quantifiable benefits and costs.

Any decision rule for the individual should incorporate all those variables that are regarded as benefits from higher education, for instance, incremental (after tax) income, greater leisure opportunities, greater discretion in work, etc. Similarly, all costs should be taken account of, such as the opportunity cost of pursuing higher education. However, there are difficulties in quantifying several of these variables and what the individual might do as a preliminary step is to look at the decision rules that deal with the strictly quantifiable elements, for example, income. The individual will then look at the outcome of the decision rule and then assess intuitively whether the non-quantifiable benefits and costs change the decision.

For the estimation of the internal rates of return data on costs - total resource costs and private resource costs - for various levels of schooling as well as data on age-income patterns by each level of schooling are required [37]. From these, cost-income streams can be established that show for each level of schooling the flow of costs incurred during schooling and the subsequent flows of additional income

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[37] Data on earnings differentials are usually obtained from the age-income-educational attainment profiles, which are based on a cross-section study of the classification of the labour force by sex, age, income and level of schooling.

that can be attributed to that schooling. The internal rate of return is defined as that rate of discount that equates the present value of the cost outlays with the present value of the incremental income. Formally, this is written as:

$$V = \sum_{t=12}^{60} \frac{(E_t - C_t)}{(1+i)^t} = 0$$

where

V = the net present value of the earnings and the costs streams.

E_t = the earnings differentials between any two educational groups at age, t.

C_t = the costs of additional education.

i = the internal rate of return.

t = 12, stands for the age of leaving primary schools in Iraq, and t = 60 is an assumed age of retirement.

In the formula above, we solve for i, which is the risk free rate of return. The individual would accept additional education if i is greater than the required rate of return. The rationale behind the rate of return calculation is that as individuals decide to pursue higher studies, for example, getting enrolled in M. Sc. courses after success in the first degree, additional costs will be incurred. In addition, the decision implies foregoing present earnings, that is, the individual starts earnings at a later date. However, when the M.Sc. degree is obtained earnings will be higher relative to those with B.Sc. degrees at the same age.

The procedure described above can be represented diagrammatically, where along the horizontal axis, i, the rate of discount is measured, and along the vertical axis, V, the net present value is measured. The net present value profile of the (M.Sc.-B.Sc.) is represented by the curve intersecting the horizontal axis, implying the use of the B.Sc. degree as a base. As higher and higher values of i are taken, V gets smaller and smaller because the incremental earnings in the distant future become less and less important. Eventually, we reach a point at some i, where the present value of incremental earnings is smaller than the present value of costs and the net present value becomes negative. In the diagram $*_i$ is the internal rate of return which sets $\sum \frac{(E_t - C_t}{(1 + i)^t} = 0$. Clearly, from the diagram there is an alternative decision rule, namely, accept greater education if the net present value is positive at the required rate of return and reject it if it is negative.

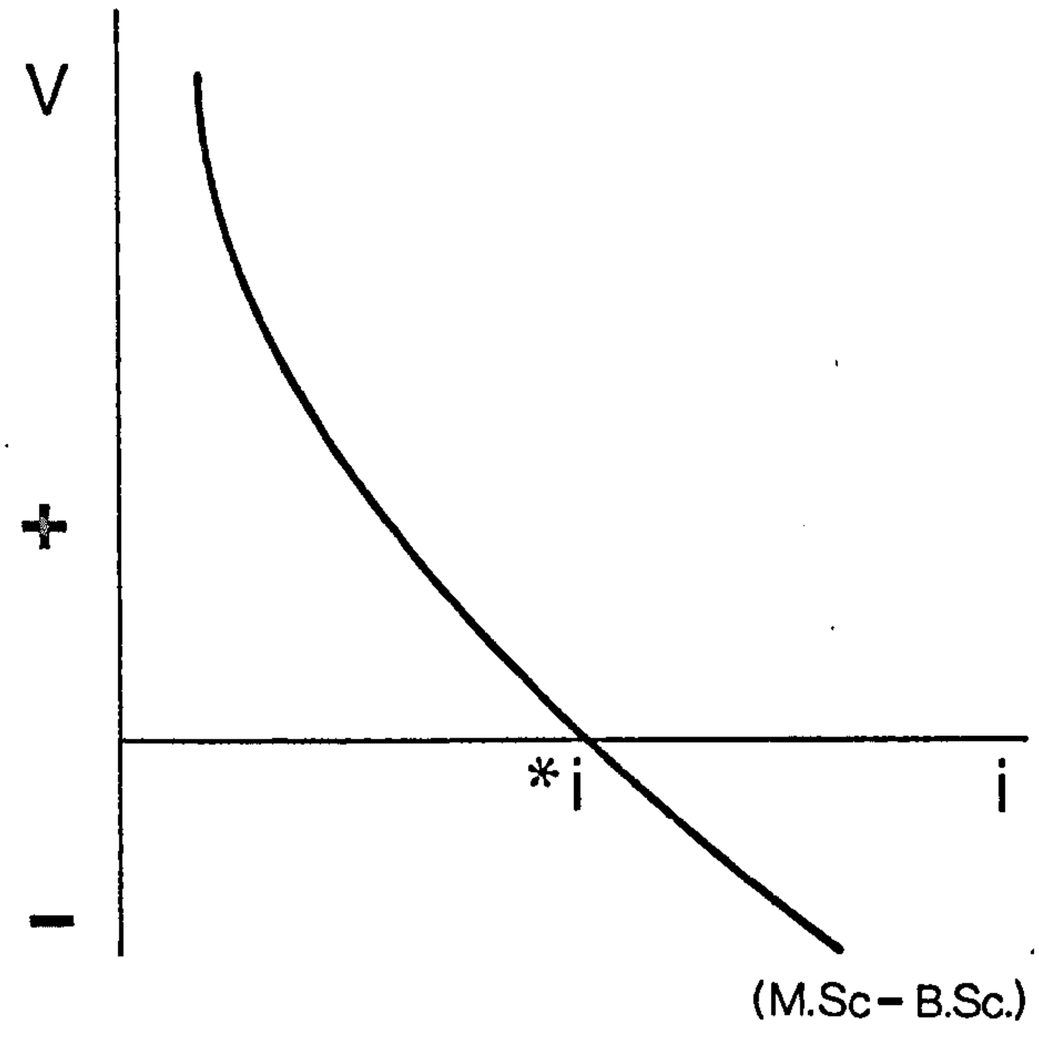

Figure 3.1

Similarly, the social rate of return will involve quantifiable and non-quantifiable benefits and costs. The only difference between this and the private rate of return is one of externality, that is, the social rate of return considers social benefits and costs.

However, one of the problems associated with the rate of return analysis is that when solving for i, there is the possibility that there may be more than one i that equates the present value of the incremental earnings with the present value of the costs incurred. For i to be unique there should be one and only one change in sign of the cash-flow stream. In addition, for the curve to be downward sloping as shown in the diagram, the undiscounted sums of net cash flows, i.e. $\sum (E_t - C_t)$, should be positive [38].

3.1.3 DECISION RULES ADJUSTED FOR RISK

Clearly, the rate of return method described in section (3.1.2) did not make any allowance for risk in the cash flow streams. There are a number of approaches in adjusting for risk of which the most common are the risk adjusted discount rate and the certainty equivalent approach. The first alternative envisages an individual confronted with various rates of return distributed around the mean or the median and that some rates of return are likelier than others. In other words, this method envisages the possibility of a probability distribution of rates of return and the decision maker has the difficult task of making a decision as to whether to pursue higher education or not. The risk adjusted discount rate approach envisages the decision maker taking perhaps the expected rate of return and comparing it with a required rate of return. This required return is seen as some rate adjusted for other characteristics of the distribution,

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(38) For a full discussion see Hirshleifer, J., Investment, Interest and Capital, Prentice-Hall, 1970, Chapter 3, pp 46- 98.

for example, standard deviation and skewness. In other words, a decision is made on the basis of several characteristics of the distribution [39]. If the expected value of the rate of return is greater than the required rate of return the individual will accept further education. However, this approach is not very precise with regards to the choice of the risk adjusted rate of return.

Alternatively, we could envisage the decision maker mapping this distribution into a unique rate of return, that is, he is looking for a certainty equivalent rate of return. Since it is a certainty equivalent he compares it with the risk free rate of return and if the certainty equivalent rate of return is greater the decision maker accepts further education [40].

Clearly, the decision rules discussed above involve individuals' attitudes to risk, for example, we may find that the most likely rate of return is greater than some prevailing market rates of return, but this does not necessarily imply that the individual would accept further education.

3.1.4 EVALUATION OF THE RATE OF RETURN ANALYSIS TO INVESTMENT IN EDUCATION

Several studies have been carried out to measure the rate of return to investment in education using the cash flow method. Blaug, for instance, calculated the mean private rate of return on the costs

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(39) Hirshleifer, J., Investment, Interest and Capital, op cit, Chapter 8, pp 215-241.

(40) Hirshleifer, J., Investment, Interest and Capital, op cit, Chapter 8, pp 215-241.

of three years to complete secondary schooling in Great Britain in 1963 to be approximately 13.0%; and the corresponding rate on three years of higher education is approximately 14.0% [41]. Morris and Ziderman's calculations show higher rates of return for first degree holders (males) and for holders of Higher National Certificates [42]. Unfortunately neither author indicates whether individuals would accept or reject such opportunities since no mention is made of a discount rate and how it may be adjusted forrisk.

Moreover, the method ignores the non-quantifiable benefits and costs at the social level. Weisbrod has argued that placing emphasis on incremental earnings attributable to education disregards the external effects of education [43]. Schooling benefits many individuals other than the student, for example, neighbours from quietness and from social values developed in children by the school. He maintained that one of the external benefits of widespread elementary education in the United States is that of permitting an ever larger number of taxpayers to prepare their own income tax return instead of purchasing the services of a tax accountant; he estimated the value of this benefit in 1956 to be 250 million dollars, or about 3.0% of the total resource costs of American elementary schooling in that year. Similarly, Weisbrod argued that the provision of elementary schools raises the female labour force participation rate over what would otherwise be and estimated the value of participation by approximation of child-minding. He estimated the value of childminding resulting from

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(41) Blaug, M., "The Rate of Return on Investment in Education in Great Britain", The Manchester School, Vol. 33, No. 3. pp 205-51.

(42) Morris, V. and Ziderman, A., "The Economic Return on Investment in Higher Education in England and Wales", Economic Trends, May 1971, p xxvii.

(43) Weisbrod, B..A. External Benefits of Public Education: An Economic Analysis, Princeton University Press, 1964.

American elementary schooling in 1956 to be approximately 2000 million dollars, or about 25.0% of the total costs of elementary schooling. These figures throw light on the importance of some of the external benefits of education.

Furthermore, Weisbrod suggested that the direct benefits of education are quantitatively less important than the indirect spill-over benefits and these are not adequately reflected in the social rates of return which simply relate income differentials before tax to the total resource costs of education. He pointed out that there are a number of options available to the individuals receiving education. These can be divided into financial and non-financial options (44). He went on to suggest that the value of additional education may be thought of as having two components: (a) the additional earnings resulting from completion of a given level of schooling; and (b) the value of the option to obtain still more education together with the rewards accompanying it. Weisbrod proposes to measure the indirect benefits in the following way: if further education is undertaken then the expected value of the option is any excess of the returns obtainable on the best comparable alternative investment. As to other non-financial options, he argued that these include job options, income-leisure options, security options, on the job learning options and that these should also be taken into consideration. However, immense difficulties

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(44) Weisbrod, B.A., 'Education and Investment in Human Capital", Journal of Political Economy, Vol. 70, 1962, pp 106-123.

are involved in quantifying these options. Thus, even when we supplement the direct rate of return to education by measurements of some of the external effects, it will still represent an understatement of the true impact of education.

Finally, to the extent to which expenditures on education are treated as investment it is rarely, if ever, a rational investment based on a careful comparison of alternative investment opportunities with the anticipated monetary returns and the degree of safety as guiding principles. Hence, it is misleading to suppose that people equate the yield on marginal expenditure on education with the return on marginal expenditure on any other factor of production.

On these grounds, we conclude that the rate of return method provides a doubtful measure of the return to investment in education.

3.2 THE MACRO APPROACH: THE AGGREGATE PRODUCTION FUNCTION METHOD OF MEASURING RETURNS TO FORMAL EDUCATION

Aggregate production functions can be used to answer a variety of questions, such as returns to scale in an economy, returns to factor inputs, income shares, allocative efficiency, substitution between inputs and economic growth [45]. In the latter case, the aggregate production function has been widely used to provide empirical explanation of the sources of economic growth in a number

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[45] Desai, M., Applied Econometrics, Philip Allan, 1976, Chapter 4, pp 105-36.

of countries. Since the main objective of this study is to measure the sources of economic growth in Iraq (with a particular emphasis on the role of education) over the years 1953-74, the production function approach will be employed.

In the following section we will discuss the nature and the existence of the aggregate production function, the characteristics and the statistical estimation problems involved when testing the theory of long run competitive equilibrium and finally two studies that have been carried out using this production function technique.

3.2.1 THE AGGREGATE PRODUCTION FUNCTION

Attempts have been made to define the conditions for the right aggregation procedure in order to arrive at an aggregate production function. One such attempt stipulates that if micro Cobb-Douglas production functions exist and the aggregates of inputs and output are geometric means, then there exists an aggregate Cobb-Douglas production function, the parameters of which are the weighted averages of those of the micro production

functions [46]. However, such data are rarely, if ever, published which means that this method cannot be used in empirical work.

When summation is used as an aggregation procedure for inputs and output one condition that must be satisfied is what is known as the "additive separability" condition, which is very restrictive [47]. This condition holds if

$$\frac{\partial}{\partial L_i}\left(\frac{\partial f_i}{\partial K_i}\right) = 0 \qquad \text{for all } i$$

and

$$\frac{\partial}{\partial K_i}\left(\frac{\partial f_i}{\partial L_i}\right) = 0 \qquad \text{for all } i$$

Where K_i = capital for the i^{th} function.

f_i = micro production functions

Where L_i = labour for the i^{th} function.

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(46) Formally if the micro production functions are

$$Q_1 = A_1 K_1^{\alpha_1} L_1^{\beta_1}$$

$$Q_2 = A_2 K_2^{\alpha_2} L_2^{\beta_2}$$

$$\vdots$$

$$Q_n = A_n K_n^{\alpha_n} L_n^{\beta_n}$$

Then we can write

$$\log Q = \log A + \alpha \log K + \beta \log L$$

if

$$\log Q = \frac{1}{n} \Sigma \log Q_1$$

and

$$\log A = \frac{1}{n} \Sigma \log A_1$$

also

$$\alpha = \frac{\Sigma \alpha_i \log K_i}{\Sigma \log K_i} \qquad \text{and} \qquad \beta = \frac{\Sigma \beta_i \log L_i}{\Sigma \log L_i}$$

(47) Bridge, J. L. Applied Econometrics, North Holland, Amsterdam, 1971 Chapter 6, pp 348-352.

Thus f_i must be expressible as

$$f_i = g_1(K_i) + g_2(L_i)$$

where g_1 and g_2 are functions.

Clearly, the Cobb-Douglas production function does not satisfy this condition of additive separability.

Alternatively, a change of definition of the aggregate production function has been proposed, such that a macro production function is defined as the relationship between a set of inputs and the maximum output attainable from those inputs. Accordingly, both technical and economic efficiency are implied by this definition. In other words, the macro relationship implicitly assumes that factors are allocated in such a way that each micro unit is producing efficiently. Thus, if capital K and labour L can move freely between firms then each individual production function must be expressible in terms of a common function, f, which is homogeneous of degree unity so that

$$Q_i = f_i(K_i, L_i)$$

$$= g_i [f(K_i, L_i)]$$

Where f is homogeneous of degree unity. This implies that $\alpha + \beta = 1$ and that resources are allocated optimally[48].

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(48) Bridge, J. L. Applied Econometrics, op cit. pp 348-52.

This assumption of the free mobility of capital and labour is of course quite restrictive. However, Fisher has shown that an aggregate production function will exist even if capital is not freely mobile between firms[48a]. Unfortunately, within this framework the aggregate production function will not have a simple form. For example, when aggregating two Cobb-Douglas firms (with constant returns to scale) a capital augmenting technical difference is required for the existence of an aggregate production function. Thus the actual form of the aggregate function is not necessarily Cobb-Douglas. More recently, Fisher has argued through a simulation exercise that an aggregate production function exists although it is not easily explained[48b].

Finally, Nelson has shown that when finite periods of time are considered, total growth will not equal the sum of the contributions of different factors when a significant interaction term (between factors) exists[48c]. It is argued here that this interaction term - which should be added to give total growth - does exist for Iraq but that it is largely attributable to education. Specifically, technical progress depends upon the dissemination of education. Accordingly, the contribution of education to measured growth is measured with a downward bias and the results are to be regarded as a lower bound.

[48a] Fisher, F.M. "The Existence of Aggregate Production Functions", Econometrica, 1969.

[48b] Fisher, F.M. "Aggregate Production Functions and the Explanation of Wages: A Simulation Experiment". Review of Economics and Statistics, Vol. LIII, Nov. 1971.

[48c] Nelson, R.R. "Recent Exercises in Growth Accounting: New Understanding or Dead End?", American Economic Review, Vol. 63, No. 3, 1973.

3.2.2 THE NEO-CLASSICAL PRODUCTION FUNCTION

The production function, then, is a technological relationship between inputs in flow terms (for example capital, K, and labour, L) and a flow of output, Q; it does not depend on the relative prices of capital and labour, or other market conditions. To each combination of inputs there is a unique maximum quantity of output. Formally in its most general two factors form we have

$$Q = F(K, L)$$

This neo-classical production function, $Q = F(K, L)$ is assumed to be single-valued, continuous and twice differentiable. It has the following partial derivatives:

$$F_K > 0, \quad F_L > 0, \quad \text{and}$$

$$F_{KK} < 0, \quad F_{LL} < 0$$

which ensures that marginal products are positive and decreasing. The production function is also assumed to be homogeneous, that is,

$$F(\lambda K, \lambda L) = \lambda^s F(K, L) = \lambda^s Q$$

with the degree of homogeneity given by s. The production function is assumed to exhibit increasing, constant or decreasing returns to scale according as

$$s \gtreqless 1$$

In applying Euler's theorem to homogeneous functions we have

$$F_K K + F_L L = sQ$$

that is, the sum of inputs weighted by their marginal products equals the level of output weighted by the degree of homogeneity. For the constant returns to scale case, we have

$$F_K K + F_L L = Q$$

Thus, if factors are paid their marginal products the product is exactly exhausted, that is:

$$rK + wL = Q$$

where r and w are the marginal products of capital and labour, respectively.

From setting the total differential of the production function equal to zero we can obtain the marginal rate of substitution. Formally:

$$dQ = F_K dK + F_L dL = 0$$

The marginal rate of substitution $R = - \frac{dK}{dL}$ can be clearly seen to be

$$R = - \frac{dK}{dL} = \frac{F_L}{F_K}$$

The elasticity of substitution, σ, measures the ease of substitution between factors; it is defined as the proportionate change in factor input ratio consequent upon a proportionate change in the marginal rate of substitution between inputs. This is written as:

$$\sigma = \frac{d\left[\text{Ln } (K/L)\right]}{d\left[\text{Ln } (F_L/F_K)\right]} \qquad 0 \leq \sigma \leq \infty$$

When $\sigma = 0$, no substitution is possible and factors must be combined in fixed proportions (fixed coefficients production function); and when $\sigma = \infty$, there are perfect substitution possibilities (linear production function).

A special case of the neo-classical production function is the Cobb-Douglas production function. This function is to be employed in this study and has been adopted because of the ease of estimation. Specifically, it can be transformed into a linear form by taking logarithms. Moreover, there is no need to estimate the elasticity of substitution. By comparison the Constant Elasticity of Substitution production function, although theoretically appealing, is more complex, and it would seem reasonable to adopt the relatively simpler Cobb-Douglas form rather than the Constant Elasticity of Substitution production function in a first study of this type.[48d] Nevertheless, it is important to emphasize that the choice of a Cobb-Douglas production function is an arbitrary one and that within neoclassical production theory it is but one explanation of the growth process [48e].

3.2.3 THE ECONOMIC MODEL

Generally, the two factor inputs Cobb-Douglas production function takes the form

$$Q = A K^{\alpha} L^{\beta}$$

where

Q stands for real output, A is the constant efficiency or shift parameter, K is capital and L stands for labour. For each production function there are several features or characteristics of importance and we can discuss briefly each one in turn.

[48d] The elasticity of substitution of unity is not a serious deficiency since work on the Constant Elasticity of Substitution production function has shown the elasticity to be near one.

[48e] Nelson, R. R. Recent Exercises in Growth Accounting: New Understanding or Dead End? Amer. Econ. Rev. June 1973.

The efficiency parameter, A, determines the position of the function, as it reflects the level of technology. The more advanced the technology the greater the level of output per unit of total inputs and when expressed graphically, the closer will a production function of a given value lie to the origin. Shifts in the production function towards the origin are implied by all forms of technical progress disembodied or embodied, such as better organisation and efficiency in the use of capital and labour. Thus A captures the notion of technical change embodied and disembodied. This implies that changes in A are exogenous and independent of changes in factor inputs and that the effect of technical progress is neutral on the factor intensity of production. We can note that this is a deficiency in the Cobb-Douglas production function and we would clearly prefer a production function that could handle more general forms of technical change.

The parameters α and β are the partial elasticities of output with respect to capital and labour, respectively. The production function could exhibit increasing, constant or decreasing returns to scale according as

$$\alpha + \beta \gtreqless 1$$

Of course, since we are concerned with a long run competitive equilibrium, emphasis will be placed upon $\alpha + \beta = 1$. The marginal product of each of the factors is obtained by partial differentiation, hence,

$$F_K = \frac{\partial Q}{\partial K} = \alpha A K^{\alpha - 1} L^{\beta} = \alpha \left(\frac{Q}{K}\right)$$

and

$$F_L = \frac{\partial Q}{\partial L} = \beta A K^{\alpha} L^{\beta - 1} = \beta \left(\frac{Q}{L}\right)$$

The Cobb-Douglas function has a constant elasticity of substitution of unity. This means that a 1.0% change in the factor's relative price will bring about a 1.0% change in factor proportions. The marginal rate of substitution (MRS) of K for L is

$$MRS = \frac{\partial Q}{\partial L} / \frac{\partial Q}{\partial K} = \frac{\beta}{\alpha} \frac{K}{L}$$

To derive the elasticity of substitution we can write this equation as

$$Ln\ (MRS) = Ln\ (\frac{\beta}{\alpha}) + Ln\ (\frac{K}{L})$$

so that

$$\sigma = \frac{d\ Ln\ (K/L)}{d\ Ln\ (MRS)} = 1$$

Perhaps of more importance is the question of identifiability of the Cobb-Douglas production function. In cross-section data there are difficulties in identifying it, but in time series provided that it is a long term production function and provided that there is a variability in capital and labour it is identifiable.[49] For this study, therefore, under-identification of the production function does not arise since we are considering a long-term production function and factor inputs adjust to changes in factor prices.

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(49) For a good discussion see Wallis, K. Topics in Applied Econometrics, Gray-Mills, 1973, Chapter 2, pp 25-62.

Written in log. form the two factor inputs Cobb-Douglas production function becomes

$$\text{Ln } Q_t = \text{Ln } A + \alpha \text{ Ln } K_t + \beta \text{ Ln } L_t$$

In addition to the two explanatory variables, that is, capital and labour , a third explanatory variable, namely agricultural land, N, will be introduced. The introduction of agricultural land as an independent variable is important in the sense that Iraq has been predominantly agricultural, which might mean that land could have played an important role in the production process. The economic model of the Cobb-Douglas production function with three independent variables becomes

$$Q_t = A K_t^{\alpha} L_t^{\beta} N_t^{\gamma}$$

Where

N = land, and where γ is the elasticity of output with respect to land.

This relationship does not, in any sense, incorporate education as an element in the production process, and the estimation of such a model will only serve as a platform for comparison with other models that include the educational service as a contributory factor. The flow of educational service could explicitly be introduced in the production function either as a separate factor input or as an average labour quality improvement variable. In the former case, where the educational service is treated as a separate explanatory variable the economic model is written as

$$Q_t = A K_t^{\alpha} L_t^{\beta} N_t^{\gamma} E_t^{\nu}$$

where E stands for the flow of educational services. The validity of this formulation is doubtful since education is embodied in the other inputs (that is, it is embodied technical change) and this leads us to consider E as a quality augmenting variable.

When we write $Q = f(K, L)$ K and L are stock variables and implicit in this formulation is a fixed relationship between the stock variables and their flows. However, we conventionally measure the stock L as man hours per period but over time as the effects of education become absorbed by labour the fixed relationship between the stock and the flow can be expected to break down; specifically we obtain more flow from the given measured stock. In order to maintain the fixed relationship we can weight the measured stock L by a weight that increases over time.

Formally we can write $L_t E_t$ where E_t is the weight in period t and where E_t is measured such that the stock variable for labour as measured maintains the fixed flow.

Thus for the Cobb-Douglas we have

$$Q_t = A\ K_t^{\alpha}\ (L_t E_t)^{\beta}\ N_t^{\gamma}$$

If we now take logs we have

$$\begin{aligned} \text{Ln}Q_t &= \text{Ln}A + \alpha\,\text{Ln}K_t + \beta\,\text{Ln}(L_t E_t) + \gamma\,\text{Ln}\,N_t \\ &= \text{Ln}A + \alpha\,\text{Ln}K_t + \beta\text{Ln}L_t + \beta\text{Ln}E_t + \gamma\,\text{Ln}N_t \end{aligned}$$

In this form we can combine LnA and $\beta\,\text{Ln}E_t$ which shows us that the quality improvement in labour is an embodied technical change that would exist in the A constant if we do not explicitly measure it.

3.2.4 THE STATISTICAL MODEL

When the two inputs model is adopted for statistical testing it becomes

$$Q_t = AK_t^{\alpha} L_t^{\beta} u_t$$

u lies on either side of one, so that $E(\text{Ln } u) = 0$

where u stands for the disturbance term which is added to account for variations in the data. In the above formulation, u can be interpreted as a measure of technical efficiency in the economy (knowledge, skill and locational advantage, for example.). The linear form of the Cobb-Douglas production function is written as

$$\text{Ln}Q_t = \text{Ln}A + \alpha \text{Ln}K_t + \beta \text{Ln}L_t + \text{Ln}u_t$$

The three factor inputs Cobb-Douglas production is formally written as

$$Q_t = A K_t^{\alpha} L_t^{\beta} N_t^{\gamma} u_t$$

The log form of the three factor inputs production function becomes

$$\text{Ln}Q_t = \text{Ln}A + \alpha \text{Ln}K_t + \beta \text{Ln}L_t + \gamma \text{Ln}N_t + \text{Ln}u_t$$

As for the four variables Cobb-Douglas production function, where E is treated as a separate factor input, the statistical model takes the following form:

$$Q_t = A K_t^{\alpha} L_t^{\beta} N_t^{\gamma} E_t^{\nu} u_t$$

The linear form of the above model is written as

$$LnQ_t = LnA + \alpha LnK_t + \beta LnL_t + \gamma LnN_t + \nu LnE_t + Lnu_t$$

Finally, when E, the educational services, is treated as a labour quality augmenting variable, the model takes the following form:

$$Q_t = A\ K_t^{\alpha}\ (L_tE_t)^{\beta}\ N_t^{\gamma}\ u_t$$

When the logarithms are taken the model becomes:

$$LnQ_t = LnA + \alpha LnK_t + \beta (LnL_t + LnE_t) + \gamma LnN_t + Ln\,u_t$$

However, the statistical model in this log-linear form is susceptible to the problem of multicollinearity. To reduce this problem the first log difference Cobb-Douglas production function will be employed. For the two explanatory variables this takes the following form:

$$\Delta LnQ_t = \alpha\Delta LnK_t + \beta\Delta LnL_t + \Delta Ln\,u_t$$

where

$$\Delta LnQ_t = LnQ_t - LnQ_{t-1} \quad \text{etc.}$$

Finally, since we are primarily interested in the long run competitive equilibrium we need to consider the estimates when the Cobb-Douglas is restricted by $\alpha + \beta = 1$. This produces the log ratio form

$$LnQ_t - LnL_t = LnA + \alpha (LnK_t - LnL_t) + u_t$$

The above log-ratio model reduces multicollinearity between LnK_t and LnL_t.

3.2.5 A SUMMARY OF SOME OF THE PREVIOUS STUDIES

The most widely quoted work which ascribes improvements in the average quality of the labour force to education was carried out by Denison [50]. In his study, Denison used an implicit production function to quantify the contribution of education to measured growth in the United States during the years 1929 - 1957. In measuring the growth of inputs he used factor shares as weights in accordance with the marginal productivity theory of income distribution. For the growth of output Denison used Net National Product (or National Income at factor cost). He also collected statistical information on the distribution of the labour force by amounts of schooling, which was then used as a weight to derive an index of the improvements in the average quality of the labour force due to formal education. This was done on the assumption that 60.0% of the differences in earnings were due to differences in the amounts of education. He estimated that the expansion of education in the United States over the period 1929-1957 raised the quality of labour by the quantity equivalent of 29.6%, that is, education caused labour input to grow at 0.93% per annum.

The results of Denison's estimation show a growth of real national income of 2.92% per year and a growth of total factor inputs of 2.0% per annum, which means that there was an increase in output per unit of inputs of approximately 0.93% p.a. Taking the annual

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[50] Denison, E.F., The Sources of Growth and the Alternatives Before Us. op cit.

growth rate of 2.93% and assuming an elasticity of output with respect to labour of 0.73, he obtained the contribution of education to measured growth as 23.0%, that is (0.73 x 0.93 /2.93 = 0.23). Thus, almost a quarter (0.67 out of 2.93% p.a.) of the growth in output between 1929 and 1957 in the United States was due to the increased education of the labour force. However, this figure is the minimum contribution of education to total growth rate if we consider items linked with education, such as research and development.

In his study on postwar growth in the Philippine, Williamson explicitly introduced improvements in the average quality of labour into the production function (51). He estimated the following model:

$$Q_t = AK_t^{\alpha} (L_t q_t)^{\beta} N_t^{(1-\alpha-\beta)} \qquad t = 1947 \ldots 1965$$

where Q_t is measured real output, K_t the capital stock, L_t labour and q_t the average improvements in the quality of labour due to formal schooling,and N_t, agricultural land. In the model above, A did not include the effects of education and q_t is a measure of such quality improvements in the labour force. Williamson then transformed the above relationship into rates of growth.

Hence:

$$\Delta Q_t/Q_t = \Delta A/A + \alpha(\Delta K_t/K_t) + \beta(\Delta L_t/L_t) + \beta(\Delta q_t/q_t) + (1-\alpha-\beta)(\Delta N_t/N_t)$$

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(51) Williamson, J.G. "Dimensions of Postwar Economic Progress in the Philippine." Quarterly Journal of Economics, 1969.

He estimated the educational attainments of the labour force through time and this shows that the Philippines have made considerable progress in increasing the educational inputs to the labour force. Finally, Williamson used reported earnings differentials by educational levels to derive the labour quality augmenting variable, q_t. His estimate shows that a male Philippine labourer with no formal education will, on average, earn only 19.0% p.a. of that of the elementary school graduate and that if the latter remains in school to complete university education he can expect to more than double his earnings. The differences in average earnings were combined with the average number of certificate and degree holders in order to estimate q_t.

Williamson found that education contributed significantly to postwar Philippine growth rates (the contribution was due to substantial investment rather than high marginal productivity). But, however, he concluded that this added factor does little to reduce or to eliminate the misallocation of resources in the Philippine economy.

Selowsky's study, on the other hand, analyses the contribution of education to growth in such countries as Chile, Mexico and India[52]. In that study he employed a two factor aggregate production function. He disaggregated the contribution of education into two main components, namely, the effects of the increases in the educational level of the labour force and the contribution that stems from maintaining the average level of schooling by the labour force. By drawing analogy to the concepts of capital, he termed the former "educational deepening" and the latter "educational widening".

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(52) Selowsky, M. "On the Measurement of Education's Contribution to Growth," Quarterly Journal of Economics, 1969, pp 449-463.

The results of his estimation show that education, as a quality augmenting variable, i.e. deepening, contributed substantially to the growth rates of national output in those countries during the years 1940-1965.

3.2.6 THE PROBLEM OF LARGE TOTAL FACTOR PRODUCTIVITY, A.

Previous works have found that output is not wholly explained by factor inputs and as a consequence there is a large "residual factor". However, Jorgenson and Grilliches have shown that if inputs and outputs are measured correctly, this residual becomes negligible. We should expect, therefore, in this study, to find a very small A [53].

The study by Abramovitz concluded that only a very small proportion of the long-term growth in American per capita output can be accounted for by an increasing quantity of capital and labour inputs [54]. Solow also found that a small proportion of economic growth in the United States can be explained in terms of increases in the quantities of capital and labour inputs [55]. Thus both authors were confronted with an extremely large "residual". But while Abramovitz termed

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[53] Jorgenson, D.W. and Grilliches, Z., "The Explanation of Productivity Change", Review of Economic Studies, July 1967.

[54] Abramovitz, M. "Resource and Output Trends in the United States since 1870". op cit.

[55] Solow, R.M. "Technical Change and the Aggregate Production Function". op cit.

the unexplained growth in resource productivity a "measure of our ignorance", Solow considered it as a "technological change".

In his work in the early 1960's Denison (see Section 3.2.5) examined the growth performance of the Americal national income between 1929 and 1957 and attempted to quantify the contribution of each of a number of variables to this growth[56]. In addition to his estimates of the contribution of changes in the quantities of capital and labour inputs, Denison attempted to adjust for quality changes in labour inputs, particularly those attributable to formal education.

The study by Jorgenson and Grilliches resolved the problem of the large "residual factor" by introducing various adjustments when measuring factor inputs[57]. Among the adjustments was their classification of the labour force by years of schooling which meant that they considered education as a quality augmenting variable.

Jorgenson and Grilliches suggested that there were several sources of errors that biased the estimation of total factor productivity upwards[58]. They argued that "within the framework of social accounting the hypothesis is that if real products and real factor inputs are accurately accounted for, the observed growth in total factor productivity is negligible". They tested their hypothesis after eliminating various statistical and aggregation errors in output and factor inputs as conventionally measured.

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[56] Denison, E.F. The Sources of Growth and the Alternatives Before Us. op cit. See also his article "United States Economic Growth", Journal of Business, April 1962, pp 109-22.

[57] Jorgenson, D. and Grilliches, Z. "The Explanation of Productivity Change". op cit.

[58] Jorgenson, D. and Grilliches, Z. "The Explanation of Productivity Change", op cit.

They emphasised the necessity of detailed inputs and output measurements derived from price and quantity data. In their analysis they adhered to the basic framework of social accounting. Thus all products were assumed to reflect private costs and benefits only and only market transactions and their counterparts were included. They also emphasised the importance of separating price and quantity changes. Using their own notations we could summarize their method as follows:

Y_i = quantity of the i^{th} output

X_j = quantity of the j^{th} input

q_i = price of the i^{th} output

p_j = price of the j^{th} input

There are m outputs and n inputs. The value of total output and total input is identical in each period.

$$q_1Y_1 + q_2Y_2 + \cdots\cdots + q_mY_m = p_1X_1 + p_2X_2 + \cdots\cdots + p_nX_n$$

Taking the time derivative and dividing both sides by corresponding total values, one gets an identity between the weighted average sum of the rate of growth of output prices and quantities and the weighted average sum of the rate of growth of inputs prices and quantities.

$$\Sigma\ W_i \left[\frac{\dot{q}_i}{q_i} + \frac{\dot{Y}_i}{Y_i} \right] = \Sigma\ V_j \left[\frac{\dot{p}_j}{p_j} + \frac{\dot{X}_j}{X_j} \right] \qquad (*)$$

Where

$$W_i = \frac{q_i Y_i}{\Sigma q_i Y_i} \quad , \qquad V_j = \frac{p_j X_j}{\Sigma p_j X_j}$$

i.e. W_i and V_j are relative shares of value of i^{th} output in total output and j^{th} input in total inputs respectively. Thus it is necessary that

$$W_i \geq 0, \quad i = 1, \ldots\ldots \quad m$$

$$V_j \geq 0, \quad j = 1, \ldots\ldots \quad n$$

$$\Sigma W_i = \Sigma V_j = 1$$

The growth of the quantity of total output equals the weighted average growth of individual output quantities. This follows from equation (*). This could be expressed as

$$\frac{\dot{Y}_i}{Y} = \Sigma W_i \frac{\dot{Y}_i}{Y}$$

Similarly for inputs

$$\frac{\dot{X}}{X} = \Sigma V_j \frac{X_j}{X}$$

Similarly for growth of output and input prices

$$\frac{\dot{q}}{q} = \Sigma W_i \frac{\dot{q}_i}{q_i} \quad \text{and} \quad \frac{\dot{p}}{p} = \Sigma V_j \frac{\dot{p}_j}{p_j}$$

These are known as the Divisia quantity and price indices and are central to the procedure of aggregation of outputs used by Jorgenson and Grilliches. In terms of these indices total factor productivity (p) is the relation of total output (Y) to total quantity of inputs (X). Thus

$$p = \frac{Y}{X}$$

Applying the Divisia indices, the rate of growth of total factor productivity may be expressed as follows:

$$\frac{\dot{p}}{p} = \frac{\dot{Y}}{Y} - \frac{\dot{X}}{X} = \Sigma W_i \frac{\dot{Y}}{Y_i} - \Sigma V_j \frac{\dot{X}_j}{X_j}$$

$$\frac{\dot{p}}{p} = \frac{\dot{p}}{p} - \frac{\dot{q}}{q} = \Sigma V_j \frac{\dot{p}_j}{p_j} - \Sigma W_i \frac{\dot{q}_i}{q_i}$$

These price and quantity indices are then integrated with the production function with constant returns to scale and the necessary conditions for producers equilibrium. The consequences of various errors of measurements for total factor productivity measurements are set out in detail. Their results are summarised in the following table.

Table 3.1

	R_o	R_{LK}	R_f	R_{LK}/R_o %
a	3.49	1.83	1.60	52.4
b	3.39	1.84	1.49	54.3
c	3.59	2.19	1.41	61.0
d	3.59	2.57	0.96	71.6
e	3.59	2.97	0.58	82.7
f	3.59	3.47	0.10	96.7

Source: Jorgenson, D.W. and Grilliches, Z. op cit. Tables I - IX

Where:

R_o = Rate of growth of total output (%)

R_{LK} = Rate of growth of total labour and capital inputs

R_f = Rate of growth of total factor productivity

R_{LK}/R_o denotes percentage of output growth accounted for by input growth.

Line a in the table shows the initial measurements with inputs measured at constant prices. Factor inputs are assumed proportional to factor stocks. Inputs as measured account for 52.4% of output growth, before any adjustments are made.

The first adjustment is for errors of aggregation when the constant prices measurement of inputs and outputs are replaced by Divisia indices. Inputs now account for 54.3% of output growth.

The second adjustment consisted of replacing input prices of investment goods industries by output prices of investment goods industries which tend to show a slower rise (due mainly to productivity increases in those industries). This implies a more rapid rise in real or quantity inputs of investment goods. Thus 61.0% of output growth is accounted for by inputs.

The third adjustment drops the assumption that the flow of inputs or factor sources is proportional to factor stocks, e.g. labour adjustments are made according to hours worked and the intensity of work. Thus input now accounts for 71.6% of output growth.

The fourth adjustment derives inputs of capital services from asset prices. The proportions between these are assumed to vary taxation rates and the rate of return on capital. The price and quantity calculations of capital services take account of these variations. Also, they use Divisia indices in order to avoid errors of aggregation; the result being that inputs account for 82.7% of total output growth.

The final adjustment concerns inputs of labour services. The original labour input index was simply the number of persons employed (this was subsequently adjusted for degree of utilizations). It is assumed that the number of hours worked followed a uniform trend for all categories of labour. The various categories were classified according to years of formal education completed by the male labour force and were aggregated according to hours worked

and relative prices, into a new index of labour input. The resulting increase in labour inputs mean that total inputs now account for 96.7% of the growth in total output.

They therefore conclude "not that advances in knowledge are negligible, but that the accumulation of knowledge is governed by the same economic laws as any other process of capital accumulation. The accumulation of knowledge would on this reckoning be embodied in the labour force and would appear as increased labour inputs". In other words, education is labour augmenting.

One other implication of their result is that it seems that private and social rates of return to investment are similar because observed or private returns account sufficiently for inputs. Otherwise (assuming private were less than social returns), the observed contribution of investment would be lowered and that of the residual would be raised.

As we shall see in Chapter 5, the shift parameter A for the Iraqi economy is very small, if not to say negligible.

The Screening Hypothesis and the Contribution of Education to Economic Growth

In this work we are concerned with the contribution of education to economic growth. However, there is a hypothesis in the literature that argues that education is a screening device (the Screening Hypothesis)[58A]. According to this hypothesis education serves, not as a productivity enhancing, but as a screening device for signaling pre-existing ability differences. This suggests that the earnings differentials associated with education do not mainly reflect improvements in individuals' productive capacity caused by education, but rather employers' use of education to screen pre-existing differences in talents. The hypothesis is based on the assumption that the individual's attributes cannot be known with certainty at the time of hiring, i.e. the employer makes decisions under conditions of uncertainty. Thus, given the difficulties of accurately predicting the future performance of job applicants, the employer is tempted to treat educational qualifications as a screening device to distinguish new workers in terms of ability, trainability and other attributes.

If so, the observed correlation between earnings and length of schooling which figures largely in the human capital theory disguises a more fundamental correlation between schooling and the attributes that characterises trainability. The contribution of education to economic growth, therefore, is merely that of providing a selection device to

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[58A] See Arrow, K.J., "Higher Education as a Filter", Journal of Public Economics, July 1973, pp 193-216.

employers. The implication of this hypothesis is that education expansion is not likely to have much impact on earnings differentials and hence has no effect on economic growth. This is because an increased flow of college graduates will promote upgrading of hiring standards, e.g. college graduates constitute a perfect substitute for high school graduates and so on, which means that earnings differentials remain more or less the same. However, upgrading cannot go on indefinitely and hence there will be some variations in earnings differentials and this will generate a demand for various levels of schooling. This would imply that the marginal product of educated individuals is higher than the marginal product of individuals with no education.

Secondly, although ability could not be measured, it could be argued that not only do schools primarily identify pre-existing abilities but develop skills. In other words, there is a distinction between raw inborn abilities and developed abilities (cognitive skills). This means that there is an interaction between native ability on the one hand and schooling on the other. Accordingly, schooling has a productivity enhancing effect and is therefore likely to be an important source of economic growth.

Finally, the empirical work by Layard and Psacharopoulos showed that some of the predictions of the screening hypothesis are not in fact borne out [58B]. In particular, the prediction that private excess returns to education fall with work experience. The authors tested whether the effect of education on earnings declines with experience, either absolutely or relatively. They showed that the educational effect (as the earnings of

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[58B] Layard, R. and Psacharopoulos, G. "The Screening Hypothesis and the Returns to Education", Journal of Political Economy, Sept. - Oct. 1974, vol 82, pp. 985-98.

those with each level of post high school) rises both proportionately and relatively. Moreover, Layard and Psacharopoulos concluded that "if screening is the main function of education, it could probably be done more cheaply by testing and other means, and agencies would have developed to reap the very large profits that could be made by doing this"[58C].

We conclude, therefore, that the human capital explanation of earnings differentials still stands and that education is expected to act as a quality or productivity augmenting variable.

[58C] Layard, R. and Psacharopoulos, G. "The Screening Hypothesis and the returns to Education". Journal of Political Economy, Sept-Oct. 1974, Vol. 82, pp. 985-98.

CHAPTER 4

OUTPUT AND INPUTS

4.1 REAL OUTPUT

The major hypothesis underlying this study is that aggregate output is explained by capital, labour, land and human capital generated by the output of the educational system. The latter takes the form of quality improvement in the labour force due to the accumulation of skills and knowledge during the years of formal schooling[59]. Output of goods and services is a flow variable produced by a flow of services of capital, labour, land and quality improvement in the labour force, which are fundamentally stock variables.

Output is defined as the value, in real terms, of goods and services produced by the various inputs during a specific period of time, usually a year. This implies that goods and services of various types, of various qualities and of various durabilities have been aggregated, in value terms, to form what is termed as "aggregate output". In order to emphasise the quantitative changes in output the real rather than the money value of the output will be considered in this study. The basic assumption of the analysis is that higher real output implies higher present consumption and/or higher investment which leads to higher consumption of goods and services in the future.

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[59] It should be pointed out that formal schooling is not the only source of human capital formation. Other sources include on the job training and learning by doing.

In Chapter 1 (Section 1.3) economic growth was defined in terms of the growth of real GNP and real GDP (excluding crude oil). Although neither of these indices take into account the rapid increase in population over the period, it is clear that these had risen at a faster rate than population. This meant an improvement in the standard of living of the inhabitants, given the distribution of income. Since growth in aggregate real output was thoroughly dealt with in Chapter 1, let us now turn to describe the methods by which factor inputs were measured and provide a measurement of each of the inputs of capital, labour, land and quality improvement in the labour force, respectively.

4.2 THE VALUE OF THE CAPITAL STOCK

The capital variable in the production function should ideally be a measure of the flow of capital services over the relevant time period. Since this is impossible to measure it is commonly assumed that this flow is highly positively correlated with the value of the capital stock. The capital stock can be measured in at least two ways:

A. The Perpetual Inventory Method

A widely used variant of the perpetual inventory method is the following:

$$\sum_{i=1}^{t} I_i (1 - d)^{t - i}$$

I = gross capital formation in real terms

d = a rate of depreciation directly related to the length of life of the capital assets assumed constant

The above formula involves building up capital stock by accumulating current investments at constant prices, year by year, over the lengths of life of the assets and estimating capital consumption by operating a depreciation scheme over the life duration of these assets. Although the method may be more applicable at micro than at macro level, it lacks a base year in that it assumes that the capital stock in the first year (that is, at time t = 1), is equal to zero. Consequently, capital stock figures obtained according to this formula would, undoubtedly, exhibit serious downward bias, unless and until very long series are resorted to in the computation. This implies that the method is sensitive to the number of observations used. Thus, for Iraq, as for a large number of underdeveloped countries that lack long series of capital formation, this method is likely to produce a biased estimate of the capital stock.

B. The Capital-Output Ratio Method (60)

The capital-output ratio method goes a long way to avoid the problems that the previous method was fraught with. Its primary aim is to determine a base year value of the capital stock. To derive this the incremental capital-output ratio concept is considered as the starting point. Thus if we define

$$k = K/Q \qquad (1)$$

then

$$K = k \cdot Q \qquad (2)$$

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(60) This section draws heavily on the paper which Mr. K. Ahmed and myself presented to the Staff Seminar at the University of Newcastle in February 1976.

Where

k = the capital-output ratio

K = the capital stock in value terms

Q = the level of output in value terms

Assume, for the sake of deriving k, that T stands for the whole period during which capital accumulation has been taking place, and that t refers to the period for which real output and real capital formation data are available. Hence we can write

$$K_T = \sum_{i=1}^{T} I_i (1 - d)^{T-i} = \sum_{i=1}^{t} I_i (1 - d)^{T-i} + \sum_{j=t+1}^{T} I_j (1-d)^{T-j} \qquad (3)$$

and

$$K_t = \sum_{i=1}^{t} I_i (1 - d)^{t-i} \qquad (4)$$

Where

K_T = the capital stock at time T

K_t = the capital stock at time t

Dividing equations (3) and (4) by Q_T and Q_t respectively we get the following

$$\frac{\sum_{i=1}^{T} I_i (1 - d)^{T-i}}{Q_T} = \frac{\sum_{i=1}^{t} I_i (1 - d)^{T-i} + \sum_{j=t+1}^{T} I_j (1 - d)^{T-j}}{Q_T} = k_T \qquad (5)$$

and

$$\frac{\sum_{i=1}^{t} I_i (1 - d)^{t-i}}{Q_t} = k_t \qquad (6)$$

where

k_T = the capital-output ratio at time T

k_t = the capital-output ratio at time t

If we assume that the capital-output ratio is the same at the start and the end of the period, that is, at times T and t, then

$$k_T = k_t \qquad (7)$$

This can be rewritten as:

$$\frac{\sum_{i=1}^{t} I_i (1 - d)^{T-i} + \sum_{j=t+1}^{T} I_j (1 - d)^{T-j}}{Q_T} = \frac{\sum_{i=1}^{t} I_i (1 - d)^{t-i}}{Q_t} \qquad (8)$$

which becomes

$$Q_T \sum_{i=1}^{t} I_i (1 - d)^{t-i} = Q_t \left(\sum_{i=1}^{t} I_i (1 - d)^{T-i} + \sum_{j=t+1}^{T} I_j (1 - d)^{T-j} \right) \qquad (9)$$

In equation (9) the term $\sum_{i=1}^{t} I_i (1-d)^{t-i}$ represents the capital stock at time t, whereas $\sum_{i=1}^{t} I_i (1-d)^{T-i}$ represents the capital stock at time t expressed in terms of time T. Finally, the term

$\sum_{j=t+1}^{T} I_j(1-d)^{T-j}$ denotes the sum of capital formation during the period (t+1, t+2, ..., T) for which statistical data are available..

Denoting expressions

$\sum_{i=1}^{t} I_i(1-d)^{t-i}$ and $\sum_{i=1}^{t} I_i(1-d)^{T-i}$ by

K_t and $K_T{}^t$ respectively, then equation (9) could be rewritten as follows:

$$Q_T K_t = Q_t K_T{}^t + Q_t \sum_{j=t+1}^{T} I_j(1-d)^{T-j} \qquad (10)$$

Clearly;

$$K_T{}^t = K_t(1-d)^{T-t} \qquad (11)$$

Substituting equation (11) into (10) we get

$$Q_T K_t = Q_t K_t(1-d)^{T-t} + Q_t \sum_{j=t+1}^{T} I_j(1-d)^{T-j} \qquad (12)$$

Consequently

$$K_t = \frac{Q_t}{Q_T - Q_t(1-d)^{T-t}} \cdot \sum_{j=t+1}^{T} I_j(1-d)^{T-j} \qquad (13)$$

Following the same procedure the capital stock at time T, that is K_T, could be derived and could be written as

$$K_T = \frac{Q_T}{Q_T - Q_t(1 - d)^{T-t}} \cdot \sum_{j=t+1}^{T} I_j(1 - d)^{T-j} \qquad (14)$$

Either of the equations above,(13) and (14), yield the capital-output ratio k_t and k_T, when we divide through by their corresponding levels of output, that is

$$k_t = K_t / Q_t \quad = \quad k_T \quad = K_T / Q_T \qquad (15)$$

Referring back to our definitional equation (2), a series of alternative base year values of the capital stock could be arrived at, depending on the yearly level of output in period t, through to T. These serve to form the diagonal of a matrix A of order n. n, where $n = T - (t-1)$.

$$[A]_{ij} = \begin{vmatrix} kQ_1 & \cdots & kQ_n(1 - d)^{1-n} - \sum_{j=2}^{n}(1 - d)^{1-j} I_j \\ kQ(1 - d) + I_2 & & \\ & & \\ & & \\ & & \\ kQ_1(1 - d)^{n-1} + \sum_{j=2}^{n}(1 - d)^{n-j} I_j & \cdots & (kQ_n - I_{n-1})(1 - d)^{-1} \\ & & kQ_n \end{vmatrix}$$

By using peak year levels of output at times t and T, that is, Q_t and Q_T are peak year values, then either of the years could serve as a base year value of the capital stock. The rationale for choosing peak year levels of output is that the capital stock is fully utilised. The rest of the observations for period (t, t + 1, ... T) could be computed as follows:

$$K_j, i = K_{j-1, i}(1 - d) + I_j \qquad \text{for } j > i \tag{16}$$

$$K_j, i = (K_{j+1, i} - I_{j+1}) \cdot (1 - d)^{-1} \qquad \text{for } j < i \tag{17}$$

Equation (16) means deflating the base year value of the capital stock, K_{j-1}, by the depreciation rate (1 - d), following which gross capital formation for the subsequent period, I_j, must be added to the net to yield the value of the capital stock K_j. Similarly, deflating K_j by (1 - d) and adding I_{j+1} to the net gives the value of the capital stock, K_{j+1}. Hence, by a repetition of the procedure over and over a vector of the capital stock values could be obtained for the entire period. Equation (17), on the other hand, says subtract gross capital formation I_{j+1} from the base year value of the capital stock, K_{j+1}, and multiply by the inverse of the depreciation rate $(1 - d)^{-1}$ to get the capital stock value, K_j. In the same manner, a vector of the capital stock values could be obtained for the period as a whole.

In this study it was decided to adopt the capital-output ratio method, largely because of the lack of reliability of the capital formation data, especially that for the inter war years. In addition, the capital stock and its rate of growth are far less sensitive to the number of observations employed.

4.2.1 MEASUREMENT OF THE CAPITAL STOCK, 1953-74

Since output was at its peak during 1953 and 1972, the period 1953-72 was selected for the computation of the capital-output ratio. To compute this, data on real GNP and gross capital formation at constant prices were used. The result showed that this stood at 2.32 in 1953 and in 1972, when a depreciation rate of 3.0% was assumed. Estimates of the capital stock featured an increase from I.D. 694.77 million in 1953 to I.D. 2288.48 million in 1972 and to I.D. 2663.43 million in 1974 (see Table 4.1, column 1). The increase had been steady and continuous amounting to 6.6% p.a. during the entire period. Thus there was a steady and continuous movement along the production surface, since other factor inputs were also increasing at the same time.

As for the capital stock (excluding crude oil extraction), data on gross capital formation at constant prices and real GDP (excluding crude oil extraction) were employed in the computation of the capital-output ratio. This, as our calculation showed, was 2.85 in 1953 and in 1972. According to our estimation the value of the capital stock had risen from I.D. 624.21 million in 1953 to I.D. 2248.93 million in 1972 and to I.D. 2626.21 million in 1974 (see Table 4.1, column 2). The annual average growth rate amounted to 7.1% over the twenty two years period.

Table 4.1

The Capital Stock, The Capital Stock (Excluding Crude Oil), and Percentage Rate of Growth, 1953-74.

(1962 = 100)

	1.		2.	
Year	The Capital Stock at Constant 1962 Prices (Million I.D.)	Percentage Rate of Growth	The Capital Stock (Excluding Crude Oil Extraction) at Constant 1962 Prices (Million I.D.)	Percentage Rate of Growth
1953	694.77	-	624.21	-
1954	774.09	11.4	705.64	13.0
1955	846.90	9.4	780.50	10.6
1956	919.21	8.5	854.81	9.5
1957	1005.87	9.4	943.41	10.4
1958	1082.12	7.6	1021.54	8.3
1959	1153.88	6.6	1095.11	7.2
1960	1237.11	7.2	1180.11	7.8
1961	1336.46	8.0	1281.17	8.6
1962	1415.60	5.9	1361.96	6.3
1963	1480.94	4.6	1428.91	4.9
1964	1554.30	5.0	1503.83	5.2
1965	1633.63	5.1	1584.68	5.4
1966	1724.77	5.6	1677.29	5.8
1967	1805.07	4.7	1759.01	4.9
1968	1880.53	4.2	1853.85	5.4
1969	1965.09	4.5	1921.75	3.7
1970	2067.07	5.2	2025.03	5.4
1971	2169.85	5.0	2129.07	5.1
1972	2288.48	5.5	2248.93	5.6
1973	2430.74	6.2	2392.37	6.4
1974	2663.43	9.6	2626.21	9.8

4.3 LABOUR - AGGREGATE MAN-HOURS WORKED, 1953-74

Earlier, it was stated that the primary objective of this study was to investigate whether or not quality improvement in the labour force brought about by the increased output of the educational system had any impact on aggregate real output. To achieve this we need to separate the two components of labour input, namely, quantity and quality. However, a problem arises as to how to measure labour quantity since a proper measure should be defined in terms of work effort. This, of course, is impossible to measure and as a consequence two approximations are frequently used; man-hours per period or men per period.

Now, either of these measures could be weighted for quality improvement, but for this study it was decided to adopt man-hours per period rather than men because over the period there was a significant shift from the land into industry which entailed working longer hours per day. Hence, if we were to measure quantity by number of men we may have an upward bias in the quality variable because this was picking up in addition to quality improvement increases in output from the redistribution of labour.

The estimate of aggregate annual man-hours shows that this had risen from 2,256,425 thousand hours in 1953 to 4,225,006 thousand hours in 1974, that is, an increase of 87.2% (see table 4.4). The increase had been steady and gradual amounting to an annual average of approximately 4.2%. This would imply that there had been steady and continuous movement along the production surface throughout the period, given that other inputs were increasing simultaneously.

In view of the vast inter-sectoral differences in the number of daily hours worked and in the number of days of work per year the computation of the aggregate man-hours series involved two stages. Firstly, a table of total annual employment classified by the agricultural, services and industrial sectors was constructed for the years 1953-74. Secondly, the average number of hours per day and the number of days of work per year specific to each of those sectors were combined with the respective sectoral employment to yield sectoral man-hours for each year over the whole period. These were finally aggregated to give the man-hours series for the years 1953-74.

Data on total annual employment and its distribution according to major sectors of the economy for the period 1960-74 were taken from the study undertaken by the U.N. Manpower Expert, Nils Strom(61). In his computation, he relied on the 1957 and 1965 Censuses of Population and on the demographic data and projections produced by the U.N. Demographer, Kozo Ueda, which covered the years 1957-80(62).

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(61) See Memorandum No. 163, Social and Cultural Department, Ministry of Planning, Baghdad, 22nd July 1972. This memorandum incorporated the first estimate of manpower in Iraq undertaken by Nils Strom which covered the period 1960-80.

(62) Ueda, Kozo, U.N. Demographer. "Report on Revised Projections of Population in Iraq by Sex and Age Groups for 1957-80". Baghdad, 15th May, 1970.

Basically, Strom defined the economically active population to include every individual between the ages 15 - 59 years. In addition, he assumed the "Participation Ratio", that is, employment / total population, to range between 23.0 - 23.5%, and these were based on the 1957 and 1965 Censuses of Population respectively. The "Participation Ratio" included female participation rate, that is, female employment / total employment of 2.2%, which was recorded by the 1957 Population Census. To obtain employment and labour force data Strom assumed that these ratios had not changed throughout the years 1960-80. Accordingly, from his estimate of total employment he then derived employment classified according to major economic activities [63]. The procedure that he used could be summarised as follows:

$$P_t^* = \theta P_t \qquad (1)$$

Data for P_t were available

$$P_t^* = D_t + U_t \qquad (2)$$

$$D_t = aP_t \qquad (3)$$

Finally

$$e^g_t = D_t - e^s_t - e^i_t \qquad (4)$$

P^* = economically active population.

θ = every individual between ages 15-59 years

t = 1960 1980

U = Unemployment

D = Total employment

a ranged between 23.0 - 23.5% of total population.

e^g = employment in agriculture

e^s = employment in services

e^i = employment in industry

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[63] Strom, Nils. Manpower in Iraq: Revised Estimation of Manpower Supply and Requirements 1970-75, Report No. 3, November 1969, See the Introduction, pp 1-2.

Thus D_t was directly computed. For the year 1960 Strom assumed D_t = 23.0% P and for 1965 23.5% P, while for 1970 23.2% P. As for e^s and e^i, data were available for the years 1960-70. This meant that Strom obtained e^g as a residual. Data on θ were taken from the population data classified according to age groups. Hence from (2) above he derived the unemployment figures for the years 1960 - 80.

These figures were revised several months later. Strom justified the revision on two grounds. On the one hand, Kozo Ueda had made an upward revision of the rate of population growth during 1960 - 80; consequently total population was greater year by year of the period [64]. On the other hand, the various studies that were carried out in the second half of the 1960's showed a much greater number of females in total employment. One of these studies, for instance, was the one carried out by Strom in which he analysed the occupational structure and sex composition of the employed labour force in fifty industrial establishments[65]. He found that the number of females employed had risen substantially over the years. This evidence led to an upward revision of the estimates of e^i_t and e^s_t.

Finally, owing to the unavailability of data on agricultural employment Strom assumed that 55.0% of the economically active population worked in agriculture, and this was based on the 1957

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(64) Ueda Kozo, op cit., table (20), pp 30-31.

(65) Strom Nils, "Manpower in Iraq: Study of Selected Industries". Report No. 2., Baghdad, October 1969.

Population Census. As he put it, "There is no other way to make an estimation giving a somewhat reasonable result than to anticipate that the proportion has been and would be unchanged. This irrespective of the fact that migration from rural areas to urban ones has been very big during the period"[66]. Revision of the employment figures along the lines described above resulted in an upward adjustment of total employment, in particular, employment in the agricultural sector. Thus, while in 1960, the first estimate showed that employment in agriculture was 733,900 employees, the revised estimate showed that this stood at 1,030,160 employees in the same year, that is a rise of 40.4%. Similarly, in the previous estimate agricultural employment was 1,596,600 employees in 1974, compared with 1,770,400 employees in the revised estimate [67]. Thus from all revisions D_t was estimated. Formally:

$$D_t = e^{g}_t + e^{i}_t + e^{s}_t$$

However, in this study it was felt that 55.0% of the economically active population was an over estimate of employment in agriculture. There had been a large migration to urban areas drawn by the large income differentialsto be had in industry. Thus, it was decided to employ the arithmetic mean of Strom's widely divergent estimates of sectoral employment in total employment during the period 1960-74.

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(66) Strom Nils, Report No. 3., op cit, p 2.

(67) Strom Nils, Report No. 3. op cit. pp 7-9. See also Hashim J. and others. Assessing Economic Growth in Iraq, 1950-70. Table 12, p. 277.

The derived figures for D_t (see Table 4.2) showed that total employment had risen from 1,647,831 employees in 1960 to 2,787,300 employees in 1974.

To complete the series we required sectoral employment figures for the years 1953-59 inclusive. These figures were obtained by interpolating the figures for sectoral employment obtained from the Census data for the year 1947 and Strom's data for 1960 as obtained above[68]. To interpolate between 1960 and 1947 a compound annual rate of growth procedure was employed. As is shown in Table (4.2) total employment in 1953 was 1,456,098 employees which had risen to 2,787,300 employees in 1974. This represented an increase of 91.4% over the twenty two years period, that is, an annual average growth rate of 4.4%, which was higher than the rate of population growth during the same period.

The next step was the transformation of this annual employment series into an aggregate annual man-hours worked over the period. This task was complicated by the inter-sectoral variations in the average daily hours and the number of days worked by employees in each of the major sectors. Thus assumptions specific to each of those sectors were made to convert the employed manpower series into aggregate number of man-hours worked over the period.

In the industrial sector data on the total number of hours worked and the number of employees in the large industrial establishments, that is, those that employed ten persons and more, were published

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(68) Hasan, M.S., Economic Development in Iraq, 1864-1958, Asria' Publishing Press, Beirut, January 1965, pp 61-70.

Table 4.2

Gainfully Employed Population, 1953-74.

Year	(1) Agricultural Sector Working Population	% of Total	(2) Services Sector Working Population	% of Total	(3) Industrial Sector Working Population	% of Total	Total Number of Employees
1953	808.765	55.5	508.928	35.0	138.405	9.5	1456.098
1954	819.279	55.3	515.544	34.8	147.124	9.9	1481.947
1955	829.929	55.0	522.246	34.6	156.393	10.4	1508.568
1956	840.718	54.7	529.035	34.5	166.245	10.8	1535.998
1957	851.647	54.4	535.912	34.3	176.718	11.3	1564.277
1958	862.718	54.1	542.879	34.1	187.852	11.8	1593.449
1959	873.933	53.8	549.956	33.9	199.687	12.3	1623.576
1960	882.031	53.5	555.000	33.7	210.800	12.8	1647.831
1961	923.360	54.0	574.000	33.6	211.400	12.4	1708.760
1962	965.712	54.9	589.500	33.5	204.000	11.6	1759.212
1963	1008.952	55.5	611.000	33.7	197.600	10.8	1817.552
1964	1053.527	56.2	620.000	33.0	202.200	10.8	1875,727
1965	1118.783	56.5	639.000	32.3	221.700	11.2	1979.483
1966	1153.168	56.5	653.000	32.0	236.400	11.5	2042.568
1967	1258.380	58.2	677.000	31.3	226.200	10.5	2161.580
1968	1326.388	58.6	700.000	31.0	236.300	10.4	2262.688
1969	1378.112	59.1	718.000	30.8	235.400	10.1	2331.512
1970	1451.150	59.7	737.500	30.3	242.500	10.0	2431.150
1971	1499.900	59.7	759.000	30.1	255.400	10.2	2514.300
1972	1561.650	59.9	780.500	30.0	263.900	10.1	2606.050
1973	1621.250	60.2	801.000	29.7	272.300	10.1	2694.550
1974	1683.500	60.4	820.500	29.4	283.300	10.2	2787.300

in the Monthly and Annual Bulletin of Industrial Statistics for the period 1960-70[69]. Assuming that employees in the large industrial establishments worked an average of 301 days per year, that is 365 - 64 days (where the figure 64 included 52 Fridays and 12 National and Religious Holidays); we also assumed that employees in the small industrial plants, that is, the rest of the industrial sector, worked the same average daily hours and the same number of days per year as those in the large industrial establishments[70]. This assumption was premised on the fact that National and Religious holidays were the same for all employees. Finally, it was assumed that this pattern prevailed throughout the years 1953 - 74. Hence

$$H_t = B_t \cdot R_t \cdot N_t$$

t = the years 1953 ..... 74.

B = Average daily hours worked.

R = Number of days of work.

N = Number of employees

H = Total number of hours worked

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(69) Monthly and Annual Surveys of Industrial Statistics, Central Statistical Organisation, Ministry of Planning, Baghdad, Reports covering the years 1960-71.

(70) The use of average daily hours in the three major sectors resulted in smoothing out cyclical variations in the number of hours performed, which position was dictated by the unavailability of directly computed figures of man-hours worked in those sectors. Hence, while output continued to display cyclical fluctuations, variations in man-hours worked were eliminated.

The calculation showed that B was 8.6 (eight hours, thirty six minutes daily). Accordingly, aggregate annual man-hours worked in the industrial sectors were computed for the whole period, as shown in Column 3, Table 4.4.

In the services sector a total of 42 weekly hours was assumed and this was based on hours of work in the banking and insurance sectors, and this was regarded as typical of the services sector as a whole. But employees in the services sector were allowed an additional month as a holiday and sick leave annually. Hence

$$52 + 12 + 26 = 90$$

$$365 - 90 = 275$$

Therefore, assuming six days of work per week, 42 hours worked weekly, and 275 days of work annually, the aggregate annual man-hours worked in the services sector for the whole period were computed and are presented in Column 2, Table 4.4.

Finally, in order to estimate the total annual man-hours performed in the agricultural sector an average of four hours daily was assumed and 287 days of work per year, that is

$$365 - 78 = 287$$

where 78 consisted of 52 Fridays plus one month sickness absence due to the widespread diseases, such as bilharzia and tuberculosis in the rural areas of Iraq [71].

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[71] Al-Hassani, J. and others. The Agricultural Revolution in the Rural Areas of Iraq; A Survey preceding the Al-Mughaishi Project. Ministry of Planning Publication, Baghdad, 1971, Ch. 3 and 4.

The assumption of four hours of daily work could be justified on the grounds of the continual presence, throughout the period, of disguised as well as seasonal unemployment. Clawson, Landsberg and Alexander pointed out that in 1957 the farming population amounted to 3.2 million, but only 1.2 million were land-owners and tenants, the residual 2.0 million were landless farmers and their families. They stated that "a substantial number of these must have been unemployed, partially or totally; for statistics for 1959 put the agricultural labour force at 2.0 million with actual employment in agriculture at 80.0% of this. Since 70.0% of the labour force is estimated to have consisted of landowners and landholders and their families and since many of those can be assumed to work only sporadically, unemployment among the farming population would seem to be very high. F.A.O. in its Indicative World Plan, puts the number of gainfully occupied in agriculture at only slightly above one million in 1965. If this were so, then the number of those of the farming population who were not gainfully occupied must be very large indeed"[72]. They went on to state that "reportedly as much as 75.0% of the agricultural labour force is unemployed at seasonal troughs".

In addition, the study undertaken by the Hunting Technical Services, entitled Final Report to the Iraqi Government, Diyala and Middle Tigris Project, gave estimates of seasonal unemployment in those two regions. The estimates are presented in Table 4.3 below.

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[72] Clawson, M., Landsberg, H. and Alexander, L., The Agricultural Potential of the Middle East, Elsevier, New York, 1971, pp 52.

Table 4.3

An Estimate of the Utilisation of Labour in Agriculture as Percentage of Available Labour Supply.

Month	Middle Tigris	Diyala (Best Area)
January	22	24
February	23	27
March	23	26
April	35	39
May	70	92
June	72	94
July	56	76
August	60	76
September	52	43
October	53	45
November	54	52
December	25	35

Source:

Hunting Technical Services, Final Report to the Government of Iraq, Diyala and Middle Tigris Project. This reference was cited by Clark, C. and Haswell, M. The Economics of Subsistence Agriculture, Macmillan, St. Martin Press, 4th Edition, 1970, p. 95.

Table 4.3 shows that the average percentage utilisation of manpower throughout the year in Diyala best area amounted to 49.0% which gave support to the assumption of four hours of work daily; while the average percentage utilisation of manpower in the Middle Tigris area was 45.4%. The major factors accounting for this phenomenon had been the rapid rise in population - particularly in the rural areas and the spread of salination of agricultural land to wider areas. Clawson, Landsberg and Alexander stated that "This labour surplus is of considerable importance, because it could provide needed manpower once the land becomes desalinated and fit again to be cultivated"(73).

Thus multiplying the number of daily hours by the number of days worked and by the number of employed personnel during the period, the aggregate annual number of hours worked in this sector was computed for the entire period (see Column 1, Table 4.4). Finally, aggregating the yearly hours worked in the agricultural services and industrial sectors, an estimate of the total number of hours worked was arrived at for the years 1953-74. As is shown in Column 4, Table 4.4, these had increased continuously at a rate of 4.2% p.a., which was slightly less than the rate of growth of employment over the same period (74).

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(73) Clawson, M. and others. The Agricultural Potential of the Middle East. op cit. p 52.

(74) Although there was a slight difference in the rates of growth of man-hours worked and the number of employees they were found to be perfectly positively correlated. The calculation showed that the degree of correlation

$$r = \frac{5709303.21}{5710820.40} = 1$$

The underlying cause of this perfect collinearity had been the higher birth rate in rural areas, as compared with that in urban areas.

Table 4.4

Aggregate Number of Hours Worked Classified According to Major Sectors, 1953-74.

Year	Man-hours Worked in the: 1. Agricultural Sector '000'	2. Services Sector '000'	3. Industrial Sector '000'	4. Total number of hours worked '000'
1953	928462	979686	348277	2256425
1954	940532	992422	370217	2303171
1955	952759	1005324	393541	2351624
1956	965144	1018392	418332	2401868
1957	977691	1031631	444686	2454008
1958	990400	1045042	472703	2508145
1959	1003275	1058665	502484	2564424
1960	1012572	1068375	530449	2611396
1961	1060017	1104950	531959	2696926
1962	1108637	1134788	513337	2756762
1963	1158277	1176175	497233	2831685
1964	1209449	1193500	508808	2911757
1965	1284363	1230075	557877	3072315
1966	1323837	1257025	594868	3175730
1967	1444620	1303225	569201	3317046
1968	1522694	1347500	594616	3464810
1969	1582073	1382150	592351	3556574
1970	1665920	1419688	610217	3695825
1971	1721885	1461075	642678	3825638
1972	1792774	1502463	664067	3959304
1973	1861195	1541925	685205	4088325
1974	1932658	1579463	712885	4225006

4.4 LAND, 1953-74.

As was the case with other factor inputs, measurement problems arose when measuring land. These were the product of two main factors. Firstly, the system of land utilisation in Iraq had been peculiar in the sense that the quantity of land cultivated was not easy to define. On the one hand, fertile land ranged between 48.0 and 62.4 million donums, while agricultural land, as defined by the Food and Agriculture Organisation (F.A.O.) stood at 22.66 million donums in 1953, which had risen to 24.10 million donums in 1974. On the other hand, almost half of the agricultural lands were left temporarily fallow in order to enable those areas to regain natural fertility. For instance, in 1953 approximately 12.26 million donums were left temporarily fallow and this had decreased to 10.90 million donums in 1971. Secondly, water was available in sufficient quantities, and if used properly, it would have permitted the utilisation of larger tracts of lands and would have improved the quality of the soil.

In this study it was decided to adopt the F.A.O. definition of agricultural land which included lands under cultivation and those that were temporarily fallow. The term "temporarily fallow" was meant to imply one agricultural season, that is, less than one year. Measured as such (see Table 4.5), agricultural land was growing steadily until 1969, but in the next two years over one fifth was lost. This was equivalent to all the gains made in the previous years. During the final three years and owing to a rise in irrigated areas, agricultural land increased from 23.37 million donums in 1972 to 24.10 million donums in 1974. Over the entire period, however,

Table 4.5

Agricultural Lands, Temporarily Fallow Lands and Actually Cultivated Lands

Year	Agricultural Lands (Million Donums)	Temporary Fallow Lands (Million Donums)	Actually Cultivated Lands (Million Donums)
1953	22.66	12.26	10.40
1954	23.28		
1955	23.91		
1956	24.56		
1957	25.24		
1958	25.90	12.45	13.45
1959	26.01		
1960	26.19		
1961	26.33		
1962	26.48		
1963	26.62		
1964	26.77		
1965	26.89	10.78	16.11
1966	27.67		
1967	28.47		
1968	29.29		
1969	30.15	14.04	16.11
1970	26.29		
1971	22.93	10.90	12.03
1972	23.37		
1973	23.73		
1974	24.10		

agricultural land had risen from 22.66 to 24.10 million donums. This amounted to an increase of 1.1%, that is, an annual average increase of 0.05%. The above figures were based on the results of the Agricultural Censuses carried out in 1953, 1958, 1965 and 1971, while the 1969 figure was an estimate made by the Central Statistical Office(75). In between those years figures were interpolated by a compound rate of change formula, while figures for the years 1972-74 were extrapolated by using an overall average growth rate during the years 1953-71. Accordingly, a twenty-two years time series of agricultural land was arrived at, and as we see in Table 4.5 there was little variation in land utilisation and small variability in input variables creates statistical difficulties.

Iraq had been mostly arid and had a Mediterranean type of climate. That is to say, it had relatively mild temperatures, precipitation in the winter time and a hot, dry, rainless summer. The total area amounted to 173.6 million donums(76). Deserts and plains (including marshes and lakes) constituted 66.8 and 53.0 million donums respectively, while mountains and terrains measured 36.8 and 17.0 million donums respectively (77). As total population was relatively small, density per donum stood at 0.0562 in 1971, which meant that land per person was approximately 17.8 donums.

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(75) Statistical Pocketbook 1960-70, C.S.O., Baghdad 1972, p 71.

(76) This figure did not include territorial waters and half of the neutral zone. See Statistical Pocketbook 1974, C.S.O., Baghdad, 1974.

(77) Clawson, M. and others. The Agricultural Potential of the Middle East, op cit. pp 1-18.

Thus, compared with other Middle Eastern countries, Iraq had a higher average of land per head than the majority of those countries. But, as we saw earlier, fertile land ranged between 27.6 - 35.9% of the total area, while agricultural land constituted a much smaller percentage of total area.

4.4.1 WATER AND LAND UTILISATION, 1953-74.

The two major sources of water were rainfall and the abundant waters of the Tigris and Euphrates rivers and their tributaries. As far as the rainfed areas were concerned, the North Eastern part, where rainfall was as high as 50 inches annually, had abundant water provision. Hence, the valleys were used for crop production, both for rainfed winter crops and for irrigated summer crops. In addition, the Kirkuk-Erbil-Mosul areas also had adequate rainfall of 16 inches annually. Hence, these constituted the most important dry farm areas in Iraq. In total the rainfed areas amounted to over 12.0 million donums per year. Finally, there was the 14.4 million donums southward of the Kirkuk-Erbil-Mosul areas, where rainfall was less and more uncertain from year to year (the average rainfall was only 6 inches annually). This constituted the source of variations in the estimates of fertile land. Unless irrigation and desalination facilities were extended to these areas it was suggested that they better be converted to a permanent grazing zone.[78].

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[78] Clawson, M. and others. The Agricultural Potential of the Middle East. op cit. Chapters 1-5.

The Tigris and the Euphrates and their tributaries provided the second major and more certain source of water [79]. Of the Tigris river approximately 40.0% of the total water arose in Turkey and the rest predominantly from the high mountains on the northern border of Iraq and Iran. The development projects (that is, reservoirs, dams and barrages) on this river in Turkey were very limited. Also a number of very substantial tributaries entered the Tigris in Iraq. These facts made the Tigris a reliable and a more certain source of irrigation water. This river normally attained its peak flow in April of each year, following which its flow dropped to much lower levels particularly during the months of summer. These seasonal variations necessitated the construction of a number of water resource development projects for reducing flood hazards , for capturing seasonal peak flows for later seasonal use in irrigation, and for evening out supply from year to year. Few of these projects had already been completed while others were still under construction. As Table 4.6 shows, the total flow of the Tigris averaged 32.57 milliard cubic meters per year during the years 1960-74. But while the total flow in 1961 amounted to 22.64 milliard cubic meters it had risen to 48.69 milliards in 1969, following which it declined to 30.06 milliards in 1974.

The Euphrates had been smaller than the Tigris. It also arose in Turkey and flowed through Syria into Iraq; some of its waters being exploited in each of these countries. In terms of area, approximately 45% of the river basin of 44,000 km. were in Iraq,

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(79) In some years Iraq experienced drought, particularly during the years 1958-61, but this did not have significant impact on the amounts of land cultivated.

Table 4.6

Water Resources, 1960-74

(In milliard Cubic Meters/Year)

Year	Tigris	Euphrates
1960	26.01	30.80
1961	22.64	16.06
1962	29.73	24.28
1963	42.65	42.07
1964	35.23	25.43
1965	31.58	27.19
1966	30.58	36.45
1967	34.23	49.90
1968	37.63	54.01
1969	48.69	63.99
1970	30.45	27.99
1971	24.47	30.04
1972	37.85	30.43
1973	26.78	*15.27
1974	30.06	* 9.02

Source:

Annual Abstract of Statistics 1974, C.S.O., Ministry of Planning, Baghdad 1975, p. 130.

* Figures for the years 1973 and 1974 show substantial decrease in the flow of the Euphrates due to deliberate blockage by the Syrian Government.

(that is, 170,000 sq. miles)[80]. But, projects development possibilities on this river in Turkey and in Syria were considerable. In fact, two projects had already been completed, one of which was in Turkey and the other in Syria. Thus, planning water resource development projects on this river had had to carefully consider rival projects in both Turkey and Syria. As Table 4.6 shows, the total flow of the Euphrates averaged 32.20 milliard cubic meters per year during the period 1960-74. May of every year had been the month during which the flow of the river attained its seasonal peak.

Nonetheless, actual water utilisation constituted small percentages of the potential resources with which the country was endowed. For instance, in 1967 only 36.3% of the Tigris waters were utilised, while the percentage utilisation of the Euphrates waters was 52.1% in the same year[81]. Thus, inspite of the abundant water supply only 12.0 million donums were used for irrigated crop production, although considerable parts of the Mesopotamian Plain could have been irrigated from the Tigris and Euphrates and their tributaries at low or moderate cost[82]. The major impediment to

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(80) Soussa, A. The Floods of Baghdad in History, Al-Adib Press, Baghdad, 1965.

(81) Clawson, M. and others. The Agricultural Potential of the Middle East, op cit. Chapter 4, pp 26-38. These figures refer to 1967 only since data for previous or subsequent years were not available.

(82) Clawson, M. and others. The Agricultural Potential of the Middle East, op cit. Chapter 4, pp 26-38.

the better use of these basically good crops soils of the Mesopotamian Plains had been salt that had accumulated over the centuries. Most of these soils had been cultivated and abandoned more than once because of the chronic problem of salination.

Although waters of the Tigris - Euphrates rivers and their tributaries had very low soluble salt content, high evaporation had been the underlying cause of soils' salination. The relatively high temperatures, the high percentage of sunshine, the variability and general infrequency of precipitation and the sparseness of vegetation all contributed to make Iraq a country of high evaporation. This high natural evaporation had led to severe salt accumulation in the soil whenever water was applied and allowed to evaporate. Furthermore, hot drying winds were also common, especially in the spring, and this had exacerbated the problem.

The problem was diagnosed several decades earlier but little had been done to provide drainage facilities. This happened in spite of the rapid increase in demand for foodstuffs generated by the vast increase in population and the high income elasticity of demand for a large number of agricultural commodities. Consequently, prices of such commodities had risen sharply and imports of crops and other agricultural produce rose substantially. Investment in desalination projects was not forthcoming because of the relatively high cost of drainage compared to that of irrigation. In 1966, for instance, drainage was estimated to cost approximately $53.2 per donum. Hence, complete drainage of the Mesopotamian Plain alone, including conduits for conducting saline water to the sea, was estimated to cost approximately $1.5 billion [83]. Investments at such a large

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[83] Clawson, M. and others. The Agricultural Potential of the Middle East, op cit. p. 5.

scale had not been and could not be undertaken by a proprietor or a group of proprietors or co-operatives. Instead, investment was channelled to irrigation, but this proved to be a short-term measure of dealing with the problem. There was, thus, a clear case of market failure to allocate sufficient resources to investment in desalination projects, which would have permitted a better use of the available land and water resources. The absence of naturally adequate drainage facilities meant enormous areas - as much as 60% of the cultivable land, according to one estimate - had gone out of cultivation(84). Under these circumstances government intervention was called for to provide sufficient investment expenditures to overcome this immense problem.

The question of land and water utilisation in Iraq was summed up by Clawson, Landsberg and Alexander as follows: "The present use of Iraq's soil and water resources is highly unsatisfactory and that for this reason the country has the greatest unrealised agricultural production potential of any of the countries of the Middle East".(85) They also highlighted the importance of substantial investment in drainage and in the modernisation of agriculture in general. As they put it, "The Israeli agricultural experiments - and similar ones in Mexico and Pakistan - direct attention not only to the similarities in climate and other natural resources but also to the levels of capital investments in agriculture ..... and other factors and

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(84) Warriner, D. "Employment and Income Aspects of Recent Agrarian Reforms in the Middle East". International Labour Review, 1970, pp 605-625.

(85) Clawson, M. and others. The Agricultural Potential of the Middle East. op cit. p 38.

perhaps foremost of all, the express design on the part of the society and government to carve out a dominant role in agriculture"[86]. Finally, Clawson, Landsberg and Alexander concluded that, "If sufficient investments in efficient drainage were undertaken the crop-fallow system on irrigated lands could have been dropped entirely; not only could a crop of wheat have been harvested each year but a good crop of sorghum or corn could have been harvested from the same land later in the season. Other irrigated lands could have grown summer crops such as cotton"[87].

Thus, there was a wide discrepancy between actual and potential use of this input.

4.5 THE EDUCATIONAL INPUT

Education can be considered as a separate factor input in the production process or alternatively as a quality improvement variable to labour. Several economists have introduced education as a labour quality improvement variable in estimates of the production function. The productive value of education has its roots in two distinct phenomena. Increased education may permit a worker to accomplish more with the resources at hand. This "worker effect" is the marginal product of education as marginal product is normally defined, that is, it is the increased output per unit change in education,

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(86) Clawson, M. and others. The Agricultural Potential in the Middle East. op cit. p. 7.

(87) Clawson, M. and others. The Agricultural Potential in the Middle East, op cit. p. 5.

holding other factor quantities constant. On the other hand, increased education may enhance a worker's ability to acquire and decode information about costs and productive characteristics of other inputs. This information effect is assuming greater and greater importance, especially at micro level. As such, a change in education results in a change in other inputs including, perhaps, the use of some new factor inputs that otherwise would not be used. The return to education is therefore considered as consisting of two effects, a "worker effect" and an "allocative effect".

As a factor of production, education helps develop complementary resources for factors which are relatively plentiful, and substitutes for comparatively scarce factors. Land, for instance, is an abundant resource in Iraq, and if vocational education - particularly agricultural education - is extended, it will lead to a better use of this factor. The increase in knowledge will not only reduce the burden of diminishing returns to land but may help to raise the marginal productivity of this factor. If the scarce resource is unskilled or skilled labour, education helps train for research, innovation and management people who can be allocated toward the development and introduction of labour-saving equipments and procedures. At the same time by qualitative improvements of workmen education supplies a substitute for lack of quantity. Textiles, for instance, can be produced with more or less education-intensive technology; higher degrees of skills being substituted for more capital equipment or unskilled labour, just as the technology may be more or less labour intensive. Hence, in choosing the product mix (the amount of goods and services to be produced) and in choosing the appropriate technology for producing each good and service in the product mix, educational input would be considered along with other

factors of production. In other words, human skills would be considered together with inputs of labour, and capital equipment in the production of other goods and services.

Analogous to other factor inputs, measurement problems arise. Two different approaches have been devised to measure the educational input, namely, the cost and the income approaches. As for the former, in principle, no serious problems arise with regard to measuring the costs of education. Teachers' salaries, supplies, equipment, etc. can be included as costs in terms of actual expenditures. Serious difficulties arise, however, in determining the opportunity cost of keeping children in school rather than releasing them to the labour force. For secondary and higher education in the United States, Schultz' estimate of earnings foregone was 60.0% of the total cost of education(88). Rudolph Blitz' preliminary calculations for Mexico in 1957 gave figures of 61.0% for secondary education and 59.0% for higher education. For Chile in 1959 the estimates were 74.0% and 46.0% respectively(89). The validity of such calculations for countries with substantial unemployment and underemployment is doubtful, especially where educated unemployed are already a problem. Vaizey casts serious doubts on employing the procedure for advanced countries similarly. As he put it, "It is doubtful whether this exercise is justified. The inclusion of income foregone opens the gate to a flood of approximations which would take the concept of national income

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(88) Schultz, T.W. as quoted by Higgins, B. Economic Development, Revised Edition, Norton and Co., New York, 1968. p. 413.

(89) Blitz, R. as quoted by Higgins, B. Economic Development, Revised Edition, Norton and Co., New York, 1968, p. 413.

away from its origin as an estimation of the measurable flows of the economy; if income foregone is added to education costs it must also be added to other sectors of the economy (notably housewives, mothers, unpaid sitters-in, voluntary work of all sorts); and it is doubtful if any more useful purpose is served by a statistical exercise of this kind, than could be achieved by observing the numbers of people engaged in education"(90).

The alternative approach assumes that differences in personal incomes provide a sufficiently close approximation to differences in individual contributions to gross national social product and correlates personal incomes with the amount of education received by individuals. Critics argue that income does not constitute a perfect measure of contribution to total output, since problems of monopoly power and special privileges arise. These, presumably, affect income directly, and since they are also associated with the amount of education received, they raise average returns to education above marginal returns. Critics also argue that differences in personal incomes are attributable to educational background of the parents as well as other factors, such as native intelligence, motivation, etc.

Nevertheless, there is no theoretically feasible argument to support the view that market imperfections have a systematic influence on income differentials; market imperfections could increase as well as decrease individual earnings differentials. As to social and special privileges, the study of Professor Chipman shows that standardisation of incomes for fathers' occupation (an approximation of social

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(90) Vaizey, J. The Economics of Education, London, 1962, p. 43.

privileges) left 93.0% of the income differentials between high school graduates and college graduates, and 90.0% of the differentials between high school graduates and those with "some-college" education, in Minnesota, to be attributed to "education and inter-related factors". (91) The same study shows that standardisation for IQ left 97.0% of the differentials between high school and college graduates and 102.0% of the difference between high school and "some-college" groups (implying that a higher IQ slightly reduced incomes of those with "some-college", to be explained by the level of education alone). In addition, the study by Martin Carnoy on Mexican data provides evidence that coming from a family of high occupational status reduces rather than increases the effects on income of a given amount of education (92). These data raise questions as to whether or not it is true that social privilege affects incomes - apart, that is, from the effect of social privilege on the amount of education particular individuals receive. Because of the ambiguity in the evidence the total income differential can be attributed to education.

Assuming that wages and salaries individuals receive reflect their marginal product, then the income approach provides a better approximation of the contribution of education to national output than the cost approach. This is so, in spite of the conceptual difficulties

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(91) Chipman, as quoted in the Appendix to Edward Denison's "Reply", in John Vaizey, the Residual Factor and Economic Growth, OECD, Paris, 1964. pp 92-95.

(92) Carnoy, M. The Costs and Returns to Schooling in Mexico, Unpublished Ph.D. Thesis, University of Chicago, 1964, Table 26, p. 64.

of measuring the marginal product of education, as education affects both labour and capital inputs positively[93].

4.5.1 MEASUREMENT OF THE EDUCATIONAL INPUT

The computational procedure employed is defined as follows:

$$E_t = a_{1t}(w_1 - w_0) + a_{2t}(w_2 - w_1) + \ldots\ldots\ldots + a_{6t}(w_6 - w_5)$$

where $t = (1953 \ldots\ldots 1974)$

E = the Educational Input.

a_1 = the number of primary school leavers in the employed labour force.

a_2 = the number of intermediate school leavers in the employed labour force

a_3 = the number of secondary school leavers in the employed labour force

a_4 = the number of B.Sc. holders in the employed labour force

a_5 = the number of M.Sc. holders in the employed labour force

a_6 = the number of Ph.D. holders in the employed labour force

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(93) In general

$Q = Q(K, L. \ )$ Q = Output

where K = Capital

$K = K(E)$ L = Labour

$L = L(E)$

E = Education

$$\therefore \frac{dQ}{dE} = \frac{\partial Q}{\partial K} \cdot \frac{dK}{dE} + \frac{\partial Q}{\partial L} \cdot \frac{dL}{dE}$$

Treating education as a labour quality improvement variable therefore, represents an underestimate of the impact of education on gross national social output.

and

w_0 = the arithmetic mean of incomes of employees in 1970 with no education.

w_1 = the arithmetic mean of incomes of employees in 1970 with primary education.

w_2 = the arithmetic mean of incomes of employees in 1970 with intermediate education

w_3 = the arithmetic mean of incomes of employees in 1970 with secondary education.

w_4 = the arithmetic mean of incomes of employees in 1970 with B.Sc. degree.

w_5 = the arithmetic mean of incomes of employees in 1970 with M.Sc. degree

w_6 = the arithmetic mean of incomes of employees in 1970 with Ph.D. degree.

This definition required estimates of the parameters a_i where ($i = 1 \ldots\ldots 6$), which in aggregate we can refer to as the net educational stock in the labour force. These estimates (as shown in Table 4.7) were obtained from the Results of the Comprehensive Survey of Government Employees which was carried out in May 1972[94]. The survey covered 385,978 employees and dealt with age distribution, year of appointment, income, educational attainment, female participation etc. But instead of relying on the general results of

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(94) The Results of the Comprehensive Survey of Government Employees, Ministry of Planning, Baghdad, 1972.

the survey a small sample of the survey was selected, namely, the Department of Municipalities, because it was felt that this was much more representative of the educational content of the labour force(95).

Thus, the proportions of employees with various educational grades to total employment in this sector, in 1953, were extended to the employed work force. Further, the assumption was made that the ratios of employees with different educational attainments were the same in 1974 as in 1972, and these were generated to the whole labour force in 1974. By using 1953 and 1974 as benchmark years and interpolating in between, a time series of the number of employees with the various educational qualifications was obtained for the entire period. Finally, in order to allow for such factors as retirement, death, emigration etc. a depreciation rate of 3.0% was applied. Table 4.7 shows that a_1, a_2, a_3, a_4, a_5 and a_6 had increased from 119477, 32127, 36881, 15254, 1413 and 212 in 1953 to 415826, 120585, 147080, 81110, 6759 and 805 in 1974, respectively. The composite annual growth rate stood at 19.9% during the period compared with 4.4% annual increase in the employed labour force. This meant a significant increase in the net educational stock during the twenty-two year period.

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(95) The reason for selecting the Ministry of Municipalities rather than using the results of the general survey is to avoid an upward bias in the educational stock in the labour force. There was a large concentration of municipal workers in the Department of Municipalities with relatively low educational qualifications, and in a country which had been preponderantly agricultural, this sample was regarded as fairly representative.

Table 4.7

Net Educational Stock, 1953-74.

(Depreciation Rate = 3.0%)

Year	Ph. D. Holders	M. Sc. and Diploma Holders	B. Sc. and lower Diploma Holders	Secondary School Leavers	Intermediate School Leavers	Primary School Leavers
1953	212	1413	15254	36881	32127	119477
1954	226	1522	16505	39389	34215	126765
1955	241	1639	17858	42067	36439	134498
1956	257	1765	19322	44928	38808	142702
1957	274	1901	20906	47983	41331	151407
1958	292	2047	22620	51246	44018	160643
1959	311	2205	24475	54731	46879	170442
1960	332	2375	26482	58453	49926	180839
1961	354	2558	28654	62428	53171	191870
1962	377	2755	31004	66673	56627	203574
1963	402	2967	33546	71207	60308	215992
1964	429	3195	36297	76049	64228	229168
1965	457	3441	39273	81220	68403	243147
1966	487	3706	42493	86743	72849	257979
1967	519	3991	45977	92642	77584	273716
1968	553	4298	49747	98942	82627	290413
1969	590	4629	53826	105670	87998	308128
1970	629	4985	58240	112856	93718	326924
1971	671	5369	63016	120530	99810	346866
1972	715	5782	68183	128726	106299	368025
1973	762	6227	73774	137479	113208	390475
1974	805	6759	81110	147080	120585	415826

Finally, these figures were combined with the mean of money income differentials, (w_1-w_0), (w_2-w_1) ..., as reported by the ILO Report on Wage Determination in Iraq in 1970, which is shown below, in Table 4.8.

Table 4.8

Monthly Payments of Employees According to Educational Attainments 1970. (I.D.)

Educational Attainments	Monthly Payments (I.D.)
Illiterates	12.00
Primary School Leavers	20.00
Intermediate School Leavers	23.00
Secondary School Leavers	28.00
B.Sc. Holders	37.00
M.Sc. Holders	52.00
Ph.D. Holders	70.00

Source:

Wage Determination in Iraq: A Report to the Iraqi Government, The Technical Aid Programme, I.L.O. Geneva 1971, Translated to Arabic by Al-Imam, S. and Al-Asadi, H., Ministry of Planning Publication, Baghdad, p. 17.

The assumption was made that these differentials persisted throughout the period. This had the implication that the elasticity of substitution among all pairs of labour inputs - with different educational grades - was infinite. In other words, the marginal rate of substitution was unaffected by changes in relative factor quantities. However, a subsequent study by Samuel Bowles in which he experimented with an alternative specification of labour inputs, classified by n different levels of schooling and variable relative earnings, produced results that were marginally different from those based on the assumption of constancy when applied to data from twelve countries. He therefore concluded that "The assumption of constant relative earnings of labour in the study of both planning and growth is supported as a rough working generalisation".(96) For Iraq, where particular skills were in short supply, for instance engineers, geologists, physicians etc., earnings differentials had increased over time. But, due to the absence of frequent statistical surveys on age, income and educational attainment in the labour force, there was no option but to use constant relative earnings in the computation.

Measured as such the educational input during the years 1953-74 had increased substantially from I.D. 16.79 million to I.D. 63.24 million, that is, a rise of 17.9% per annum (see Table 4.9). These figures were finally deflated by the price level to obtain the educational input in 1962 prices.

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(96) Bowles, S. "Aggregation of Labour Inputs in the Economics of Growth and Planning: Experiments with a Two-level CES Function", The Journal of Political Economy, 1970, pp. 68-81.

Table 4.9

The Educational Input in Money Terms, 1953-74

Year	Ph. D. I. D.	MSc + H Diploma I. D.	BSc + L Diploma I. D.	Second-ary I. D.	Inter-mediate I. D.	Primary I. D.	Total I. D.
1953	45792	254340	1647432	2212860	1156572	11469792	16786788
1954	48816	273960	1782540	2363340	1231740	12169440	17869836
1955	52056	295020	1928664	2524020	1311804	12911808	19023372
1956	55512	317700	2086776	2695680	1397088	13699392	20252148
1957	59184	342180	2257848	2878980	1487916	14535072	21561180
1958	63072	368460	2442960	3074760	1584648	15421728	22955628
1959	67176	396900	2643300	3283860	1687644	16362432	24441312
1960	71712	427500	2860056	3507180	1797336	17360544	26024328
1961	76464	460440	3094632	3745680	1914156	18419520	27710892
1962	81432	495900	3348432	4000380	2038572	19543104	29507820
1963	86832	534060	3622968	4272420	2171088	20735232	31422600
1964	92664	575100	3920076	4562940	2312208	22000128	33463116
1965	98712	619380	4241484	4873200	2462508	23342112	35637396
1966	105192	667080	4589244	5204580	2622564	24765984	37954644
1967	112104	718380	4965516	5558520	2793024	26276736	40424280
1968	119448	773640	5372676	5936520	2974572	27879648	43056504
1969	127440	833220	5813208	6340200	3167928	29580288	45862284
1970	135864	897300	6289920	6771360	3373848	31384704	48852996
1971	144936	966420	6805728	7231800	3593160	33299136	52041180
1972	154440	1040760	7363764	7723560	3826764	35330400	55439688
1973	164592	1120860	7967592	8248740	4075488	37485600	59062872
1974	173880	1216620	8759880	8824800	4341060	39919296	63235536

Table 4.10

Value of Educational Input at Constant Prices. (1962 = 100)

Year	Price level (1962 = 1.0)	Educational input at constant prices (Million I.D.)
1953	.86530	19.40368
1954	.89230	20.02690
1955	.94430	20.14190
1956	1.00490	20.15126
1957	1.02670	20.99932
1958	.99860	22.99219
1959	.94530	25.85423
1960	.97820	26.59988
1961	.99430	27.86885
1962	1.00800	29.51000
1963	1.03950	30.22607
1964	1.02700	32.58033
1965	1.02180	34.87962
1966	1.04260	36.39939
1967	1.07690	37.53366
1968	1.10080	39.11701
1969	1.16320	39.42572
1970	1.21410	40.23557
1971	1.25780	41.37383
1972	1.32330	41.89526
1973	1.38770	42.55963
1974	1.50310	42.07305

Sources:

1. Central Bank of Iraq Bulletin, 1955, 1957, 1962, 1967, 1972, 1973, 1974, Research and Statistics Dept., Central Bank of Iraq, Baghdad, Iraq.
2. Annual Abstract of Statistics, 1962, 1968, 1973 and 1974. C.S.O. Ministry of Planning, Baghdad.

CHAPTER 5

INTERPRETATION OF THE REGRESSION RESULTS

In Chapter 3 (Section 3.2.4) the various statistical models to be estimated were specified; namely the three explanatory variables model, the four explanatory variables model and the model in which education acts so as to improve the quality of the labour force. The present Chapter provides analyses of the results of the estimation for the years 1953-74. The bulk of the analyses will be concerned with the models in which Q is defined as real GDP (excluding crude oil), while minor attention will be given to the models where the dependent variable is defined as real GNP [97]. We begin by considering the results for the unrestricted Cobb-Douglas production function. This is done purely for comparative purposes. Nevertheless the Chapter emphasises the conclusion to be drawn from the restricted form, that is the conclusion in a long run competitive equilibrium. Finally, natural logarithms will be used, that is Ln, hence Q becomes Ln Q.

5.1 THE THREE EXPLANATORY VARIABLES MODEL

For the three independent variables relationship (that is, Capital K, Labour L, and land, N) the estimation results are as follows:

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[97] It should be made clear at the outset that when real GDP (excluding crude oil) is considered the capital stock figures used are net of capital investment in the oil sector. Whereas in the case of real GNP, the capital stock figures will include capital investment in the oil sector.

$$\text{Ln GDP} = \text{Ln Q} = -8.47 + 0.39\ \text{LnK} + 1.34\ \text{LnL} + 0.32\ \text{LnN} \qquad (5.1)$$

$$(-4.35)\quad (2.37)\qquad (4.07)\qquad (1.49)\qquad t$$

$R^2 = 0.9842$ $\qquad$ $\bar{R}^2 = 0.9815$

$F(3,\ 18) = 372.9$

$DW = 2.15$

$SSR = 0.064$

$SER = 0.0596$

$r^2_{KL} = 0.96$ $\qquad$ $r^2_{KN} = 0.41$ $\qquad$ $r^2_{LN} = 0.37$

The predicted value of the shift parameter (Ln A) appears with a negative sign but when the exponential of Ln A is taken the coefficient becomes 0.0002, which is positive but very small. This means that output per unit of total inputs is rather small, that is, output is almost entirely explained by the explanatory variables. The t-test shows that the coefficient is statistically significant, as it is significantly different from zero.

The coefficient on capital, α , is positive which means that the marginal product of capital $(\frac{\partial Q}{\partial K}) = \alpha\ (\frac{Q}{K})$ is positive. In 1953 the marginal product of capital amounted to 0.137, and this increased to 0.151 by 1974, expressing a rise of 10.0% over the period. The coefficient is statistically significant as the t-statistic shows. We therefore conclude that capital has acted as one of the important explanatory variables.

As far as the coefficient of labour, β , is concerned it is both positive and substantial which means that the marginal product of labour (that is $\frac{\partial Q}{\partial L} = \beta \left(\frac{Q}{L}\right)$) is positive. The marginal product of labour increased from 0.130 in 1953 to 0.322 in 1974. By itself, β exhibits increasing returns to scale as $\beta = 1.34 \text{ Ln } L$, and the coefficient is statistically significant as the t-statistic shows.

Estimate of the parameter of land, γ , is positive but smaller than α and β . The marginal product of land, (that is $\frac{\partial Q}{\partial N} = \gamma \left(\frac{Q}{N}\right)$), is positive amounting to 3.093 in 1953 which increased to 13.478 in 1974. However, the coefficient γ is statistically insignificant as a t - test. The t-statistic is much lower than 2.10 which is the acceptable limit for a sample size of ($n > 8$). On statistical criteria, therefore, we cannot support land and we conclude that land did not constitute an important explanatory variable. There are several factors which could explain this conclusion. On the one hand, there was a lack of variability in the land input data, as the rate of growth of land was much smaller than the growth rates of such inputs as capital and labour. Over the entire period, the rate of growth of the land input was 0.05% per year. In addition, there was a steady but small increase in the amounts of agricultural land between the years 1953-69, but almost all of the increase was lost during the subsequent two years. Finally, a possible reason for the low and statistically insignificant coefficient on land is that much (if not most) of the agricultural produce is not distributed (that is, bought and sold) in formal markets. This is particularly true in underdeveloped countries like Iraq. Therefore, since much of the agricultural products will be sold unofficially under conditions almost of barter, their value will not enter into the GDP measure and their true effect will be very difficult to estimate. It is

accordingly, not surprising that the contribution of agricultural land is largely under-estimated when we estimate the production function.

The R^2, which is a first order test to judge the goodness of the fit of the regression plane, shows that the percentage of the total variation of the dependent variable that can be explained by the explanatory variables is 0.9842. This means that the explained variations are just under 0.985, leaving 1.5% as unexplained variations. On the other hand, $\bar{R}^2$ which is the coefficient of multiple determination adjusted to take account of degrees of freedom, is slightly lower than R^2. This is estimated to be 0.9815.

The F-statistic was also used to test the overall significance of the regression, and this shows that the equation is significant when all the variables are taken together (or equivalently, the R^2 is high and the standard error of regression is low).

The Durbin-Watson test (d-statistic) which is a first order test for the presence of positive autocorrelation in the time series shows that $d^* > d_L$, that is (2.15 > 1.80) for this sample size of 22 observations and four degrees of freedom. This indicates that $\rho = 0$, that is, there is no positive autocorrelation in the time series.

One further indication that the results are satisfactory is shown by the low sum of squares of the residuals, that is, Σe^2, and by the low standard error of the regression.

However, the correlation matrix between the explanatory variables shows that there is a very strong multicollinearity between labour and capital ($r^2_{KL} = 0.96$). A possible effect of this is to raise the standard error of estimates and to make the coefficient of Ln N

insignificant as a t-test. The high multicollinearity between labour and capital could be due to at least two factors. Firstly, in many countries capital investment generates employment which implies that the two variables move in the same direction. Secondly, there is the possibility that both labour and capital are influenced by a third factor, such as education, and once this factor becomes operative the explanatory variables show the same broad pattern of behaviour over time. The correlation matrix also shows that there was some multicollinearity between capital and land ($r^2_{KN} = 0.41$) and between labour and land ($r^2_{LN} = 0.37$). But these are not strong since some degree of collinearity, as some writers argue, should be tolerated.

In order to test if the strong multicollinearity between capital and labour rendered the coefficient of Ln N insignificant as a t-test, a zero restriction was imposed on the parameter of land (that is $\gamma = 0$, so that $\gamma \text{ LnN} = 0$). This also enables us to examine whether there has been a significant change in the estimates of the coefficients α and β. Thus, when a zero restriction is imposed on the parameter of land, we have the results in equation (5.1.1):

$$\text{Ln GDP} = \text{Ln Q} = -6.20 + 0.55\ \text{Ln K} + 1.04\ \text{Ln L} \qquad (5.1.1)$$
$$(-4.95)\quad (4.19)\qquad (3.87)\qquad t$$

$R^2 = 0.9822$ $\qquad$ $\bar{R}^2 = 0.9803$

$F\ (2,\ 19) = 524.8$

$DW = 1.94$

$SSR = 0.0719$

$SER = 0.0615$

$r^2_{KL} = 0.94$

The imposition of zero restriction on the parameter of land has altered the parameter estimates. For example, that of capital stands at 0.55 compared to 0.39 in equation (5.1), while β stands at 1.04 in equation (5.1.1) compared to 1.34 in equation (5.1). The coefficients of Ln A, Ln K, and Ln L are statistically significant as the respective t-tests show. These are (-4.95), (4.19) and (3.87). Since the t-statistic and the standard error of estimates are inversely related we can conclude that strong multicollinearity between labour and capital has not systematically raised the standard error of estimates. We can also conclude that the high multicollinearity between labour and capital was not the cause of insignificance of the coefficient of land in equation (5.1) as the t-statistic shows. However, since the standard error of regression is higher in equation (5.1.1), and the R^2 is lower than in equation (5.1), we conclude that equation (5.1) provides better specification than equation (5.1.1). In addition, we can make more use of the information in equation (5.1) than in equation (5.1.1).

Finally, in equation (5.1) we find that the degree of homogeneity is equal to 2.05 which means that if we double inputs, output will more than quadruple. Equation (5.1) could alternatively be written as:

$$GDP = Q = A K^{0.39} L^{1.34} N^{0.32}$$

However, for the sake of reducing the degree of multicollinearity between capital and labour, an alternative specification of the Cobb-Douglas production function using the first difference of the logarithms was estimated. But this produced very unsatisfactory results. For despite the fall in the degree of multicollinearity between K and L, this form proved to be highly unsuccessful with very low explanatory power (that is, $R^2 = 0.15$ and $\bar{R}^2 = 0.061$).

In addition, the t-tests show that each coefficient taken separately was insignificant, and also the F-test shows that when all the coefficients were jointly tested they were insignificantly different from zero. (Note that the shift parameter A disappears in this form of the Cobb-Douglas function.)

An alternative specification of the Cobb-Douglas function was estimated, namely, the log-ratio form defined as

$$\text{Ln } Q - \text{Ln } L = \text{Ln } A + \alpha(\text{Ln } K - \text{Ln } L) + \gamma\ (\text{Ln } N - \text{Ln } L)$$

In the above relation β L was constrained to be

$$\beta L = (1 - \alpha K - \gamma N)$$

that is, constant returns to scale.

The results of the estimation are set out in equation (5.1.2) as follows:

$$\text{Ln GDP} = \text{Ln } Q - \text{Ln } L = \underset{t}{\underset{(-4.52)}{-2.59} + \underset{(8.37)}{0.84}\text{Ln}(K/L) - \underset{(-2.67)}{0.29}\text{Ln}(N/L)} \qquad (5.1.2)$$

Thus

$\alpha = 0.84$

$\gamma = -0.29$

$\beta = 0.45$

Thus: $0.84 - 0.29 + 0.45 = 1$

$R^2 = 0.9208$ $\quad\quad$ $\bar{R}^2 = 0.9125$

$F(2, 19) = 110.5$

$DW = 1.50$

$SSR = 0.098$

$SER = 0.072$

$r^2_{\frac{K}{L}\,\frac{N}{L}} = 0.51$

When a constant return to scale is imposed as in equation (5.1.2) we find that the predicted value of Ln A increases substantially to 0.1, compared to the estimated value of Ln A in equation (5.1), but that it is still very small[98]. The coefficient is statistically significant as the t-statistic shows. The coefficient of capital α is much higher in equation (5.1.2) than in equation (5.1). As a t-test the coefficient is also statistically significant. On the other hand β, the coefficient of labour is considerably lower in equation (5.1.2) than in equation (5.1). It is also statistically different from zero. However, the coefficient on land, γ, changes sign and becomes negative in equation (5.1.2) which implies that the marginal product of land, in the constant returns to scale case, is zero. Yet, the t-test shows that the coefficient is statistically significant.

Both R^2 and $\bar{R}^2$ are lower in equation (5.1.2) than in equation (5.1). This is due to the constant returns to scale restriction imposed in equation (5.1.2).. The F-statistic, as a test of the overall

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[98] This very small value of the efficiency parameter, Ln A, is the same as that obtained by Jorgenson and Grilliches (see Table 3.1).

significance of the regression, is also lower in equation (5. 1. 2) compared to that in equation (5. 1). The reasons behind the lower F-statistic are the lower R^2 and higher standard error of regression. The d-statistic shows that there is no first-order positive auto-correlation in the error terms. However, the correlation matrix shows a slight increase in the degree of multicollinearity between capital and land (as $r^2_{\frac{K}{L}\,\frac{N}{L}} = 0.51$).

In order to test the validity of the constant returns to scale restrictions we use the F-statistic as follows:

$$F = \frac{0.098 - 0.060}{0.060 \;/\; 17} = 10.77$$

$$> F^{1}_{17}(0.95) = 4.45$$

Accordingly, we conclude that the sum of the squares of the residuals are significantly different and the restriction of constant returns to scale is rejected.(99). Finally, although multicollinearity between labour and capital was reduced in equation (5. 1. 2) both R^2 and $\bar{R}^2$ are lower and the standard error of regression is higher. We therefore conclude that equation (5. 1. 2) offers poorer specification than equation (5. 1). In other words, the log-linear form (equation 5. 1) offers better results than all of the other forms estimated.

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(99) Johnston, J. Econometric Methods, Second Edition, McGraw-Hill, 1972, p. 135.

5.2 EMPIRICAL EVIDENCE FOR THE COBB-DOUGLAS PRODUCTION FUNCTION WITH EDUCATION AS A SEPARATE FACTOR INPUT

For the case of four explanatory variables (capital, K, labour, L, land, N and real educational input (1962 = 100), E.) we have the following results:

$$\text{Ln GDP} = \text{LnQ} = -9.24 + 0.45\text{LnK} + 1.43\text{LnL} + 0.38\ \text{LnN} - 0.14\text{LnE}$$
$$(-3.65)\quad (2.24)\qquad (3.77)\qquad (1.51)\qquad (-0.49)\qquad t \tag{5.2}$$

$R^2 = 0.9844$ $\qquad \bar{R}^2 = 0.9807$

$F\ (4, 17) = 267.99$

$DW = 2.12$

$SSR = 0.0631$

$SER = 0.0609$

$r^2_{KL} = 0.253$ $\qquad r^2_{KN} = 0.053$ $\qquad r^2_{KE} = 0.271$

$r^2_{LN} = 0.480$ $\qquad r^2_{LE} = 0.212$ $\qquad r^2_{NE} = 0.230$

In equation (5.2) above as in equation (5.1), the shift parameter Ln A appears with a negative sign and when the exponential of (-9.24) is obtained, A becomes positive but very very small, that is, 0.00001 compared to 0.0002 in equation (5.1). This suggests that output is almost entirely explained by inputs. In fact the predicted value of A

is much smaller than that found by Jorgenson and Grilliches[100]. The coefficient of LnA is also significant as the t-statistic shows.

The coefficient on capital, α , is higher in equation (5.2) than in equation (5.1) indicating that the marginal product of capital is higher than that found in equation (5.1). The t-statistic shows that the coefficient is significantly different from zero. Similarly, the coefficient for labour, β , is also higher in (5.2), suggesting higher marginal product of labour. It is also statistically significant as the t-test shows. The coefficient of land, γ , is also higher than that in equation (5.1), but it is statistically insignificant ($1.51 < 2.10$) for a sample of this size. The estimated parameter, ν , appears with an incorrect sign, implying that the marginal product of the educational input (LnE) is zero. However, it is insignificant as the t-statistic shows. A possible explanation of this phenomenon is that education largely affects the quality of the labour force which could mean that the impact of education is picked up by the coefficient of Ln A.

The explanatory power of the regression equation (5.2) is slightly higher than in equation (5.1) as $R^2 = 0.9844$. On the other hand, the coefficient of multiple determination corrected for degrees of freedom is slightly lower ($\bar{R}^2 = 0.9807$). The F-statistic shows that the equation is significant when all the variables are taken together. In addition, there appears to have been a remarkable fall

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(100) Jorgenson, D.W. and Grilliches, The Explanation of Productivity Change. op cit.

in the degree of multicollinearity between labour and capital as $r^2_{KL} = 0.253$. The d-statistic shows no presence of first order positive autocorrelation between the successive values of the error terms.

To conclude, the coefficient of land is found to be statistically insignificant and also the coefficient of real educational input as well as being significant has the incorrect sign in the sense that the contribution to national social output appears to be nil. Thus, the addition of the variable LnE, while raising R^2, lowers $\bar{R}^2$ and raises slightly the standard error of regression when compared to equation (5.1).

A zero restriction was imposed on the parameter of land, hence γ was set = 0, and the land variable was removed from the equation. This was done to test if the equation without the land variable, N, provides a better specification. The results obtained are presented in equation (5.2.1) below:

$$\text{LnGDP} = \text{LnQ} = -6.04 + 0.52\text{LnK} + 1.03\text{LnL} + 0.07\ \text{LnE} \qquad (5.2.1)$$

$$(-4.19)\quad (2.57)\qquad (3.64)\qquad (0.26)\qquad t$$

$R^2 = 0.9823$ $\qquad$ $\bar{R}^2 = 0.9793$

$F(3, 18) = 332.66$

$DW = 1.97$

$SSR = 0.0716$

$SER = 0.0631$

$r^2_{KL} = 0.241$ $\qquad$ $r^2_{KE} = 0.544$ $\qquad$ $r^2_{LE} = 0.041$

In equation (5.2.1) the predicted value of the shift parameter Ln A has become higher, that is, -6.04, compared to -9.24 in equation (5.2). As a t-test this has also become more significant, or put differently, the standard error of estimate has become smaller. The zero restriction on the parameter of land has altered the parameters estimates, that is to say, α is higher, while β is lower when compared with equation (5.2). Both α and β are statistically significant as they are significantly different from zero. However, the coefficient on Ln E has become positive but statistically insignificant as a t-test.

The F-statistic shows that the equation is significant when all the coefficients are considered jointly. The d-statistic shows that there is no positive serial correlation in the error terms. However, the degree of multicollinearity between capital and education is higher in equation (5.2.1) than in equation (5.2), as the correlation matrix shows that $r^2_{KE} = 0.544$. Some writers argue that some degree of multicollinearity should be tolerated and suggest that if the degree multicollinearity is lower than R^2 it should be tolerated [101]. But since the standard error of regression is higher and both R^2 and $\bar{R}^2$ are lower than in equation (5.2) we reject this specification in favour of equation (5.2).

Once again, the first log difference of the Cobb-Douglas production function produced highly unsatisfactory results, in the sense that all the parameters estimates are statistically insignificant. In addition

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[101] Koutsoyiannis, A., The Theory of Econometrics, Macmillan, 1973, p 229.

the explanatory power of the equation is very poor as $R^2 = 0.189$ and $\overline{R}^2 = 0.045$, while the standard error of regression is much higher than that in equation (5.2). We therefore conclude that this specification of the production function is unsuccessful.

As for the log-ratio form of the Cobb-Douglas function with four explanatory variables (with constant returns to scale) we have the following results in equation (5.2.2) below:

$$\underset{\substack{(-1.78)\\ t}}{\text{Ln}(GDP/L) = \text{Ln}(Q/L) = -2.16} + \underset{(3.81)}{0.77\text{Ln}(K/L)} \underset{(-2.47)}{- 0.31\text{Ln}(N/L)} + \underset{(0.40)}{0.13\text{Ln}(E/L)} \qquad (5.2.2)$$

$R^2 = 0.9216$ $\qquad$ $\overline{R}^2 = 0.9085$

$F(3, 18) = 70.48$

$DW = 1.56$

$SSR = 0.0975$

$SER = 0.0736$

$r^2_{\frac{K}{L}\frac{N}{L}} = 0.544$ $\qquad$ $r^2_{\frac{K}{L}\frac{E}{L}} = 0.742$ $\qquad$ $r^2_{\frac{N}{L}\frac{E}{L}} = 0.240$

$\alpha = 0.77$

$\beta = 0.41$

$\gamma = -0.31$

$\nu = 0.13$

When comparing the above results with those in equation (5.2) we find that the coefficient of the shift parameter is higher, that is, -2.16, and when the exponential of this is taken it becomes positive and equal to 0.1, which is the same as that found by Jorgenson and

Grilliches. However, the t-test throws some doubt on the statistical significance of the coefficient since 1.78 < 2.10, as 2.10 is the acceptable limit for a sample size of twenty two observations. The coefficient of capital, α , is higher than in equation (5.2) and is also statistically significant, while β is lower than in equation (5.2). The estimated parameter of land γ appears with a negative sign, indicating a zero marginal product of land. The t-statistic shows that γ is statistically different from zero. The coefficient for the educational input LnE is positive and the highest so far obtained (that is, 0.13), but it is statistically unreliable as it is not significantly different from zero.

The F-statistic shows that when all the explanatory variables are taken jointly, the relationship is significant. The d-statistic is at the upper end of the so-called "indeterminate range", (the approximate upper limit for four regressors and a sample size of twenty two is 1.55), so that we can be fairly confident that positive autocorrelation is not present. However, there is a strong multicollinearity between $\frac{K}{L}$ $\frac{E}{L}$ and the degree of correlation being 0.742, but it is lower than R^2. Finally, when compared with equation (5.2) we find that both R^2 and $\overline{R}^2$ are lower, the sum of the squares of the residuals much higher and the standard error of regression is also higher. We therefore conclude that equation (5.2) provides a better specification than the alternative (equation 5.2.2), which includes the educational input as an explanatory variable in the relationship.

In conclusion, as far as the main point of the exercise is concerned, namely, the measurement of the contribution of real educational input per man-hour to some measure of aggregate output (namely GDP

excluding crude oil extraction), the results were, as expected, that education is not significant as a separate variable. The educational variable did not prove to be a significant variable in explaining the overall level of output, and its contribution to the change in output per man-hour during the period 1953-74 was found to be merely about 1.0% of the total change [102].

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[102] While the educational input in real terms increased continually during the period 1953-74 (except for 1974 itself - see Table 5.1 below) the ratio of real educational input to real output fell by more than half during this period.

Table 5.1

Real GDP, Real Educational Input and the Ratio of Real Educational Input to Real GDP, 1953 and 1974.

	1953	1974
Real GDP	219.02	1015.09
Real Educational Input (E)	19.40	42.07
E/GDP	0.089	0.042

As the table above shows the educational input fell from 8.9% of the GDP in 1953 to 4.2% in 1974. It is, therefore, hardly surprising that the explanatory power of the educational input is so low. In order for the ratio to have been constant the educational input should have been approximately I.D. 90.0 million.

5.3 EMPIRICAL EVIDENCE FOR THE PRODUCTION FUNCTION WITH EDUCATION AS A LABOUR QUALITY AUGMENTING VARIABLE.

In this section, we treat education not as a separate factor of production, but as a quality improvement variable; that is to say, education acts so as to improve the quality of the labour force and therefore does not enter independently into the production function. This essentially means that we add an additional set of restrictions to the production function that we have already estimated.

The Cobb-Douglas production function in its most general and unrestricted form is written as

$$Q = A K^{\alpha} L^{\beta} N^{\gamma} E^{\nu}$$

Where the real educational input E, enters independently as a separate factor of production. For E to enter the Cobb-Douglas production function as a variable which improves the quality or productivity of labour we must impose the restriction that $\beta = \nu$, so that the production function becomes

$$Q = A K^{\alpha} N^{\gamma} (LE)^{\beta}$$

The log-linear form of the above model is written as

$$\text{Ln } Q = \text{Ln } A + {}_{\alpha} \text{Ln } K + \gamma \text{Ln } N + \beta (\text{Ln } L + \text{Ln } E)$$

$$= \text{Ln } A + \alpha \text{ Ln } K + \gamma \text{ Ln } N + \beta \text{ Ln } L + \beta \text{ Ln } E$$

We can also impose the further restriction of constant returns to scale, that is, $\alpha + \gamma + \beta = 1$, by modifying the above equation as follows:

$$\text{Ln}\,Q - \text{Ln}\,L = \text{Ln}\,A + \alpha\,(\text{Ln}\,K - \text{Ln}\,L) + \gamma\,(\text{Ln}\,N - \text{Ln}\,L) + \beta\,[(\text{LnL} + \text{LnE}) - \text{LnL}]$$

and this gives the estimating equation as

$$\text{Ln}\,(Q/L) = \text{Ln}\,A + \alpha\,[\text{Ln}\,(K/L)] + \gamma\,[\text{Ln}\,(N/L)] + \beta\,\text{Ln}\,E$$

For the Cobb-Douglas function with three independent variables (capital, K, land, N, and quality adjusted labour, L) we have the following results:

$$\text{LnGDP} = \text{LNQ} = -2.64 + 0.49\,\text{LnK} - 0.10\,\text{LnN} + 0.49(\text{LnL} + \text{LnE}) \qquad (5.3)$$

$$\begin{array}{llll} (0.97) & (0.23) & (0.21) & (0.20) \quad \text{S.E.} \\ (-2.73) & (2.10) & (-0.50) & (2.50) \quad \text{t} \end{array}$$

$R^2 = 0.9774 \qquad \bar{R}^2 = 0.9736$

$F(3, 18) = 259.61$

$DW = 1.74$

$SSR = 0.0913$

$SER = 0.712$

$r^2_{KL} = r^2_{KE} = 0.971$

$r^2_{NL} = r^2_{NE} = 0.041$

$r^2_{KN} = 0.061$

As for the case of the two explanatory variables (Capital, K, and quality adjusted labour, L), that is, with land excluded from the equation we have the following results in equation (5.3.1).

$$\text{LnGDP} = \text{LnQ} = -3.00 + 0.46\ \text{LnK} + 0.51\ (\text{LnL} + \text{LnE}) \qquad (5.3.1)$$

$$(0.64)\quad (0.22)\qquad (0.19)\qquad\qquad \text{S.E.}$$

$$(-4.73)\quad (2.28)\qquad (2.71)\qquad\qquad \text{t}$$

$R^2 = 0.9771$ $\qquad$ $\bar{R}^2 = 0.9742$

$F(2, 19) = 405.25$

$DW = 1.70$

$SSR = 0.926$

$SER = 0.698$

$r^2_{KL} = r^2_{KE} = 0.972$

The first step is to compare equations (5.3) and (5.3.1) to select the GDP equation best suited for further analysis. An examination of the t-statistic for each coefficient in both equations, and the standard error of estimates in both equations, suggest that equation (5.3.1) provides a better specification. In this equation the coefficient of Ln A also appears with negative sign (that is, -3.00) but when the exponential of Ln A is obtained we get 0.05 which is very small. But as the t-test shows it is statistically significant. The coefficient for capital, α, is positive and equal to 0.46. As a t-test the coefficient is significantly different from zero. Similarly, the coefficient for labour, β, is slightly higher than α and is also significantly different from zero.

Finally, the coefficient of the educational variable is positive and equal to 0.51 which suggests that the marginal product of this variable is positive. It is also significantly different from zero as the t-test shows.

Both R^2 and $\bar{R}^2$ are slightly lower in equation (5.3.1) compared to those in equation (5.3). But the F-statistic as a test for the overall significance of the regression is much higher in equation (5.3.1) than in equation (5.3), suggesting that when all the coefficients are considered together the equation is more significant. In addition, the standard error of regression is lower in equation (5.3.1) than in equation (5.3). The first order test for the presence of positive autocorrelation shows that there is no autocorrelation in either of the equations. However, in both equations there is a very high degree of multicollinearity between education and capital (later when we examine the log-ratio form of the Cobb-Douglas production function with constant returns to scale we shall see whether this form does help to reduce the degree of multicollinearity). Meanwhile, it suffices to point out that the standard error of estimates of Ln K and Ln L are very small (that is, 0.22 and 0.19 respectively) which means that multicollinearity did not result in high standard error of estimates.

However, what is very interesting is that by imposing the restriction on the educational variable (namely, that it is a quality augmenting variable so that $\beta = \nu$), the coefficient on real educational input is positive and highly significant. We can test the

restriction by comparing the GDP equation (5.3.1) and that in equation (5.2.1). We shall use the F-statistic to test this restriction[103].

Thus:

$$F = \frac{0.0926 - 0.0716}{0.0716 \;/\; 17} = 4.986 \qquad T = 22 \qquad K = 4$$

noting that $F^{1}_{17}(0.95) = 4.45$ and

$$F^{1}_{17}(0.99) = 8.4$$

From above we see that H_o is accepted at the 99.0% level but rejected at the 95.0% level of significance, that is, the restriction is accepted at the former but rejected at the latter level of significance. Thus, we shall use equation (5.3.1) and proceed to calculate the characteristics of the production function.

Firstly, the degree of homogeneity shows increasing returns to scale as this is equal to 1.48.

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[103] The test statistic is defined as:

$$F = \frac{SSR\ (restricted) - SSR\ (unrestricted)}{SSR\ (unrestricted) \;/\; T - K - 1}$$

$\sim F^{1}_{T-K-1}$ if H_o is true

Where H_o : SSR (restricted) = SSR (unrestricted).

See Johnston, J. Econometric Methods, Second Edition, McGraw-Hill, 1972, p. 135.

Secondly, the marginal products of the respective factors are as follows:

	F_K	F_L	F_E
1953	0.161	0.050	5.758
1974	0.178	0.123	12.306

From the above figures we find that the rise in the marginal productivity of capital is approximately 10.0% over the period, while the increase in the marginal productivity of labour is about 146.0%. Finally, the increase in the marginal product of education is about 113.0% over the twenty two years period.

Thirdly, each of the coefficients is, of course, the elasticity of output with respect to the respective input variable.

Likewise, for the first log-difference case of the production function there was a fall in the degree of collinearity between K and L, but despite that, this form proved rather unsuccessful with very low explanatory power in each case. In addition, the t-test shows that the coefficient for each variable taken separately is insignificant and also the F-test shows that when all the coefficients are tested jointly they prove to be insignificantly different from zero.

THE LOG-RATIO COBB-DOUGLAS PRODUCTION FUNCTION WITH CONSTANT RETURNS TO SCALE.

Given the Cobb-Douglas production function of the form

$$\text{Ln } Q = \text{Ln } A + \alpha \text{ Ln } K + \gamma \text{ Ln } N + \beta (\text{Ln } L + \text{Ln } E)$$

we can impose the constant returns to scale as follows:

$$Ln(Q/L) = Ln\ A + \alpha \left[Ln\,(K/L) \right] + \gamma \left[Ln\,(N/L) \right] + \beta\ Ln\ E$$

so that the coefficient for labour is constrained to be β and $(\alpha + \gamma + 2\beta)$ should not be significantly different from unity. The test for this is defined as follows [104]:

$$H_o : \quad \alpha + \gamma + 2\beta = 1$$

When H_o is true then

$$t = \frac{\alpha + \gamma + 2\beta - 1}{SE (\alpha + \gamma + 2\beta)} \qquad t_{N-K}$$

N = sample size

K = the number of parameters = 4

where

$$var (\alpha + \gamma + 2\beta) = 1^2 var\ \alpha + 1^2 var\ \gamma + 2^2 var\ \beta$$

$$+ (1)(1)\ cov(\alpha, \gamma) + (1)(2)\ cov(\alpha, \beta) + (1)(2)\ cov(\gamma, \beta)$$

$$= var(\alpha) + var(\gamma) + 4var(\beta) + cov(\alpha, \gamma) + 2cov(\alpha, \beta) + 2cov(\gamma\beta)$$

Thus, for the four explanatory variables case (that is capital, K, land, N, labour, L, and Education, E) the estimation results are presented in equation (5.3.2) below:

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(104) Johnston, J. Econometric Methods, Second Edition, 1972, pp. 135-136.

$$\text{Ln}(GDP/L) = \text{Ln}(Q/L) = -3.435 + 0.49\,\text{Ln}(K/L) - 0.147\,\text{Ln}(N/L) + 0.367\,\text{Ln}E$$

(0.73) (0.22) (0.13) (0.21) SE

(-4.73) (2.20) (-1.12) (1.76) t

(5.3.2)

$R^2 = 0.9325$ $\quad \bar{R}^2 = 0.9212$

$F(3, 18) = 82.85$

$DW = 1.85$

$SSR = 0.084$

$SER = 0.0682$

$r^2_{\frac{K}{L}\frac{N}{L}} = 0.10$ $\quad r^2_{\frac{K}{L}E} = 0.81$ $\quad r^2_{\frac{N}{L}E} = 0.383$

From the above we find that $\alpha + \gamma + 2\beta = 1077$

and

$$\text{var}(\alpha + \gamma + 2\beta) = 0.0494 + 0.0171 + 4(0.04358) - 0.00923 - 2(0.0419 - 2(0.01686)$$

$$= 0.1141$$

$$SE(\alpha + \gamma + 2\beta) = 0.3377$$

Thus

$$t = \frac{1.077 - 1}{0.3377} = 0.228$$

$$< \quad 2.101 \quad = \quad t_{18}(0.95)$$

Therefore, the constant returns to scale restrictions cannot be rejected.

Let us now consider the three explanatory variables relation (that is, capital, K, labour, L, and education, E). The estimation results of this relation are presented in equation (5.3.3) below:

$$\text{Ln}(GDP/L) = \text{Ln}(Q/L) = -3.29 + 0.41\text{Ln}(K/L) + 0.51\text{LnE} \qquad (5.3.3)$$

$$\begin{matrix} & (0.72) & (0.21) & & (0.51) & \text{SE} \\ & (-4.58) & (1.93) & & (3.10) & \text{t} \end{matrix}$$

$R^2 = 0.9277$ $\qquad$ $\bar{R}^2 = 0.9201$

$F(2, 19) = 121.94$

$DW = 1.76$

$SSR = 0.0899$

$SER = 0.0688$

$r^2_{\frac{K}{L}E} = 0.899$

Thus

$\alpha K = 0.41$

$\beta E = 0.513$

$\beta L = 0.513$

$\alpha + 2\beta = 1.567$

$\text{var}(\alpha + 2\beta) = 0.04502 + 4(0.02729) - 2(0.03323)$

$= 0.0877$

$SE(\alpha + 2\beta) = 0.2962$

Thus

$$t = \frac{1.567 - 1}{0.2962} = 1.912 < 2.093 = t_{19}(0.95)$$

Here again, the constant returns to scale restriction cannot be rejected.

The task is to select the equation best suited for further examination. By laying particular emphasis on the degree of significance of the coefficient of the real educational input variable, we choose the equation without the land variable, namely equation (5.3.3) and this choice is made at the expense of some small increase in the sum of the squares of the residuals.

In equation (5.3.3) the coefficient of the shift parameter Ln A is negative but if we take the exponential of the coefficient we get a positive but small value, 0.04. The coefficient is also significantly different from zero as the t-statistic shows. The parameter of capital, α , is smaller than that in equation (5.3.1) and the standard error of estimates is smaller than that for the coefficient in equation (5.3.1), but as a t-test the coefficient in equation (5.3.3) is slightly below the acceptable limit of 2.10 for a sample size of ($n > 8$). As for the coefficient of the educational input, it is of exactly the same magnitude as that in equation (5.3.1), thus in both equations the coefficient = 0.51. As a t-test the coefficient is significant as it is significantly different from zero.

In equation (5.3.3) both R^2 and $\bar{R}^2$ are high. Moreover, the F-statistic shows that the equation is significant when all the included variables are taken together. The d-statistic shows no presence of positive autocorrelation. However, there is still a high degree of collinearity between capital and labour, although the degree of collinearity is lower than for the log-linear case of the Cobb-Douglas function (see equation 5.3.1). But since the standard error of estimates is low we could conclude that multicollinearity had little or no effect on the statistical significance of the coefficients. In addition, the degree of multicollinearity is smaller than R^2.

We can test the restriction on real educational input (namely, that it is a quality augmenting variable for labour, that is, $\beta = \nu$), by comparing equation (5.3.3) with equation (5.2.2). In other words, we are testing two restrictions, namely the coefficient on real educational input is equal to the coefficient for labour and the coefficient on land is zero. Thus:

$$F = \frac{0.0899 - 0.0975}{0.0975 \;/\; 17} = 1.499$$

$$< \quad 8.4 \quad = \quad F^{1}_{17}(0.99)$$

so that the two joint restrictions are accepted at the 99.0% level of confidence. We shall, therefore, proceed to calculate the characteristics of equation (5.3.3).

Firstly, the marginal products of the respective factors are:

	F_K	F_L	F_E
1953	0.144	0.050	5.792
1974	0.158	0.123	12.378

As shown above the marginal productivity of capital increased by about 10.1% over the period, while that of labour rose by approximately 146.0%, and finally, the marginal productivity of the educational input increased by 113.7% during the entire period. There is a great similarity between the marginal products of labour and education as well as the percentage rates of increase in each of equations (5.3.3) and (5.3.1).

Secondly, each of the coefficients is, of course, the elasticity of output with respect to the respective factor input.

Thirdly, the degree of homogeneity in this equation is 1.436 compared to 1.480 in equation (5.3.1).

Conclusion.

We can conclude that the restriction imposed on educational input to be a quality or productivity augmenting component of labour expressed in man-hours proved, in general, to be quite successful. For the two models tested (see equations 5.3.3 and 5.3.1) the coefficient on educational input is positive, high in absolute value and highly significant as a t-test when compared with the unrestricted case. In addition, this improvement occurred at the expense of only a small (and statistically insignificant) increase in the standard error of regression.

As far as the contribution of education to the increase in output per man is concerned we record again that under the GDP (excluding crude oil) measure of output the contribution due to education is 6.3%.[104A]

[104A] The procedure of deriving the contribution of the educational input involved dividing GDP/L (which had risen from 0.097 in 1953 to 0.239 in 1974) into its constituent components, namely K/L, technical change(the rate of which was 0.021 per year) and finally the educational input. The latter was estimated as a net residual by decomposing LnA at the end of the period. Our calculations showed that GDP per man-hour increased from 0.097 to 0.141 as a result of the increase in K/L, and to 0.151 as a result of the improvements in the quality of labour and finally to 0.239 as a result of technical change.

5.4 EMPIRICAL EVIDENCE OF THE COBB-DOUGLAS PRODUCTION FUNCTION (WITH Q, DEFINED AS REAL GNP AND THE CAPITAL STOCK FIGURES INCLUDE CAPITAL INVESTMENT IN THE OIL SECTOR).

The same procedure followed in the previous sections of this chapter was adopted when output, Q, is measured as real GNP and the capital stock is inclusive of the oil sector.

For the three explanatory variables relation (namely, capital, labour and land) the results obtained are comparable with those in equation (5.1). The coefficient of Ln A is negative but it is significantly different from zero. The parameters estimates of capital and labour are positive and large as well as being significantly different from zero. The coefficient for land is negative and statistically insignificant. Both R^2 and $\bar{R}^2$ are high and the F-statistic shows that the relationship is significant when all the coefficients are jointly tested. The d-statistic shows no presence of positive first order autocorrelation in the time series. However, there is a very high degree of multicollinearity between labour and capital as $r^2_{KL} = 0.963$.

The imposition of zero restriction on Ln N has not significantly altered the parameters estimates in the GNP equation, suggesting that multicollinearity has not been the cause of large standard error of γ . The first log-difference form of the Cobb-Douglas production function gave very unsatisfactory results, despite the fall in the degree of multicollinearity between labour and capital.

In the log-ratio form (where the coefficients were constrained to add to unity) both R^2 and $\bar{R}^2$ are lower and the standard error of regression is higher compared to the unconstrained log-linear specification. Thus, on the whole, the log-linear form offers better results than the other forms tried.

When the real educational input variable was introduced the result shows a substantial reduction in the degree of multicollinearity between labour and capital. However, the coefficient on land is negative and statistically insignificant. Similarly, the coefficient of the educational variable, as well as being insignificant, has the incorrect sign in the sense that the contribution of education to real GNP appears to be negative. When the land variable was removed from the equation, the result had not changed significantly.

The log-ratio form (with constant returns to scale) shows that the coefficient of the educational variable is positive but very small (only 0.07) but not significantly different from zero. In addition, R^2, $\bar{R}^2$ and the F-statistic are lower and the standard error of regression higher compared to those in equation (5.1.2).

As for the three independent variables case (that is capital, land and quality augmented labour) the result obtained shows that the parameter estimate of the educational variable is positive and statistically significant as a t-test. The parameter estimates for capital and labour are positive and significantly different from zero. The efficiency parameter Ln A appears with a negative sign but the t-test shows that it is significantly different from zero (although t is slightly lower than 2.10). Both R^2 and $\bar{R}^2$ are high (R^2 = 0.9791

and $\overline{R}^2 = 0.9756$). The F-statistic shows that the relationship is significant when all the coefficients are taken together. The standard error of regression is low. However, there is a very strong degree of multicollinearity between capital and labour. Moreover, the d-statistic is in the indeterminate range, indicating that it is possible that first-order autocorrelation might be present.

On the other hand, estimation of the log-ratio form (with constant returns to scale) shows that multicollinearity between capital and labour is avoided. But the coefficient on education is small and insignificantly different from zero. The d-statistic also shows that positive serial correlation might be present.

Thus, in general, we could conclude that the GDP equations gave better results than the GNP equations.

CONCLUDING REMARKS

Real GDP (Excluding Crude Oil Extraction) had, over the twenty-two years period, increased from I.D. 219.02 million to I.D. 1015.09 million (see Table 1.4), that is, growth during the entire period amounted to 363.5%. This meant an average annual growth rate of 16.5%. Our analysis in Section 5.3 shows that education explains 6.3% of the GDP (Excluding Crude Oil). The implication is that education does contribute just over one percentage point (1.03) to the average growth rate per annum. Thus, treated as a quality augmenting variable to the labour force, we found that education adds substantially to the growth rate of the GDP. This contribution stems from a positive, high and increasing marginal product to the educational variable. In conclusion, therefore, our results tend to confirm the hypothesis that through improving the average quality of the labour force, education constitutes an important instrument for promoting higher growth rates of the national social output. This contribution is the minimum since education improves not only the quality of the labour force but also the quality of capital and that of agricultural land.[104B]

The policy implication that emerges from this study is that in order to promote and sustain higher growth rates in the GDP the country should continue to expand the educational system, via allocating substantial resources to this vital sector which had proved to be a valuable and significant source of growth in national social output.

[104B] See Nelson, R.R. " Recent Exercises in Growth Accounting: New Understanding or Dead End?" 1973 op cit.

Caveats

The analysis carried out in this study is beset by a number of limitations, theoretical and empirical. Among these are the following:

Firstly, the concept of the production function implies a maximum amount of output obtainable from a given set of inputs. However, the time series data used in this study are actual rather than potential, thus the use of actual observed data involves the implicit assumption that the potential and the actual data are one and the same and that there has not been any divergence between the two over the period.

Secondly, the use of the aggregate production function involves another limitation that relates to the aggregation of heterogeneous outputs and inputs. For instance, how are capital goods, built at different times, at different costs with varying marginal productivities to be equated in an aggregate measure of capital?

Thirdly, the Cobb-Douglas production function cannot represent a change in the ease of substitution because of its restrictive property of elasticity of substitution equal to unity. This is serious if the elasticity of substitution is significantly less than unity and capital grows faster than labour, as this will result in overestimation of the contribution of capital to growth and a resulting underestimate of the role of other factors[105]. The smaller the elasticity of substitution the more difficult it is to obtain increased output just by

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[105] For Iraq the marginal rate of substitution between each pair of factor inputs was found to be slightly lower than unity.

increasing one factor because diminishing returns set in. If the elasticity of substitution is greater than unity then diminishing returns are not a problem and if both capital and labour grow at the same rate then growth is independent of the elasticity of substitution.

Fourthly, the production function method does not indicate which level of the educational system contributes most in the growth process. Nor does it tell us which of the specialisations constitutes a major source of growth. Thus, the method does not help with regards to the allocation of investment in the educational system.

Finally, the method employed ignores quality improvements in the output of the educational system. Clearly, this involves over-simplification as it is widely recognised that school leavers or graduates at the end of the period are more competent than school leavers and graduates of the same level twenty years earlier. However, if adequate statistical data reflecting improvements in the quality of education were available the production function would have captured the impact of this quality improvements element.

Nevertheless, and despite the limitations cited above, the production function approach has much to offer as it permits an enquiry into the entire growth process.

S T A T I S T I C A L

A P P E N D I X

Table 1

Population of Iraq, 1953 - 74.

Year	Population '000'	% Increase over preceding year	Birth rate per '000'	Death rate per '000'
1953	5676.3	-		
1954	5835.4	2.80		
1955	6001.2	2.84		
1956	6175.5	2.90		
1957	6298.9	1.99	48.6	21.0
1958	6487.9	3.00	48.7	20.0
1959	6682.0	2.99	48.8	19.6
1960	6885.2	3.04	48.9	19.2
1961	7098.0	3.09	48.9	18.8
1962	7320.8	3.14	49.0	18.3
1963	7554.0	3.19	49.0	17.9
1964	7798.1	3.23	48.9	17.4
1965	8047.5	3.20	48.9	17.8
1966	8308.4	3.24	48.6	16.6
1967	8579.9	3.27	48.3	16.5
1968	8860.0	3.26	48.0	16.2
1969	9148.8	3.26	47.7	16.0
1970	9440.1	3.18	47.5	16.4
1971	9749.6	3.28	47.6	15.4
1972	10074.2	3.33	47.7	15.2
1973	10412.6	3.36	47.7	15.0
1974	10765.4	3.39	47.8	14.8

Sources:

1. Haseeb, K. The National Income of Iraq, 1953-1961, Talia Publishing Press, Beirut, 1964, p. 39.
2. Ueda Kozo, U.N. Demographic Expert, Report on Revised Projections of Population in Iraq by Sex and Age Group for 1957-1980, Baghdad, May 1970, p. 26 (table 18); as quoted by K.A. Al-Khalidi, The Role of Supply and Demand for Labour in the Economic Development of Iraq, 1957-80, Unpublished M.Sc. Dissertation, University of Baghdad, May 1975, p. 33 (table 3).

Table 2

GDP and Net National Income at Current Prices

1953 - 74.

(Million I. D.)

	Sector / Year	1953	1954	1955	1956	1957	1958	1959	1960
1-	Agriculture	71.50	84.73	65.33	89.23	111.57	92.76	82.01	97.84
2-	Industrial Sector	149.54	172.34	189.64	186.16	150.09	214.07	236.64	264.15
a-	Oil extraction	128.91	149.53	161.16	152.45	113.10	175.43	190.00	208.07
b-	Others	20.63	22.81	28.48	33.71	36.99	38.64	46.64	56.08
3-	Building and Construction	11.27	17.21	21.29	24.83	27.68	29.83	28.72	23.08
4-	Electricity, Water and Gas	1.46	1.78	2.17	2.53	2.68	2.78	2.97	3.62
	Total Commodity Sectors	233.77	276.06	278.43	302.75	292.02	339.44	350.34	388.69
5-	Transport, Communication & Storage	21.37	22.06	24.56	27.05	29.92	30.61	34.29	39.72
6-	Wholesale & Retail Trade	17.85	20.67	21.48	26.90	29.67	27.52	26.23	32.55
7-	Banking, Insurance & Real Estate	3.23	3.63	4.49	6.38	6.60	7.40	8.20	8.69
	Total Distribution Sectors	42.45	46.36	50.53	60.33	66.19	65.53	68.72	80.96
8-	Ownership of Dwellings	11.61	11.90	12.20	12.47	12.80	12.51	11.58	11.89
9-	Pub. Adm. & Defence	18.29	20.80	24.34	28.52	32.06	37.57	45.65	45.71
10-	Services	16.83	19.25	21.26	24.83	26.99	29.65	33.33	38.11
	Total Services Sector	46.73	51.95	57.80	65.82	71.85	79.73	90.56	95.71
	GDP at factor cost	322.95	374.37	386.76	428.90	430.06	484.70	509.62	565.36
	Net Factor payments abroad	57.63	67.66	71.24	65.49	46.40	78.45	85.73	95.33
	GNP	265.32	306.71	315.52	363.41	383.66	406.25	423.89	470.03
	Capital Consumption	21.37	22.69	26.24	28.65	30.94	32.21	32.27	32.90
	Net National Income at factor cost	243.95	284.02	289.28	334.76	352.72	374.04	391.62	437.13

Table 2 (Con't)

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974 *
116.98	140.38	109.30	133.30	153.20	163.40	187.80	196.00	191.00	206.90	212.50	269.40	225.90	284.00
270.69	277.17	308.60	338.80	355.30	378.90	354.00	435.60	446.20	486.50	631.40	547.30	731.90	2301.30
209.03	210.23	242.50	270.90	281.10	298.50	265.20	334.60	335.90	362.60	507.80	400.00	563.40	2123.00
61.66	66.94	66.10	67.90	74.20	80.40	88.80	101.00	110.30	123.90	118.50	140.00	157.60	165.60
23.88	19.64	20.30	26.70	30.50	34.50	32.80	36.80	38.50	40.60	43.60	45.20	57.60	126.80
4.96	5.54	5.20	11.10	12.00	12.60	12.80	14.90	16.80	17.80	11.90	13.70	16.00	13.70
416.51	442.73	443.40	509.90	551.00	589.40	587.40	683.30	692.50	751.80	899.40	875.60	1031.40	2725.80
45.95	47.02	48.80	45.50	58.20	63.20	64.00	65.80	69.10	71.20	79.70	85.90	88.50	99.60
36.58	38.56	35.90	62.10	69.80	74.70	79.70	86.90	90.10	98.60	94.40	102.60	115.20	156.00
11.06	11.38	12.80	8.00	9.50	12.40	12.30	13.10	15.50	18.60	20.60	20.00	20.50	44.10
93.59	96.96	97.50	115.60	137.50	150.30	156.00	165.80	174.70	188.40	194.70	208.50	224.20	299.70
12.13	12.45	12.40	29.20	30.20	39.00	32.40	37.90	44.70	51.00	54.50	56.30	58.80	62.20
51.46	59.76	67.40	85.40	89.00	94.10	98.20	104.60	117.80	124.30	131.70	136.00	154.50	282.00
41.37	46.52	49.90	53.60	59.90	65.20	67.90	75.40	80.00	86.90	94.70	112.40	118.60	165.70
104.96	118.73	129.70	168.20	179.10	198.30	198.50	217.90	242.50	262.20	280.90	304.70	331.90	509.90
615.06	658.42	670.60	793.70	867.60	938.00	941.90	1067.00	1109.70	1202.40	1375.00	1388.80	1587.50	3535.40
94.20	93.87	108.10	118.30	129.40	138.60	122.60	156.80	154.70	166.00	214.90	136.50	82.00	211.00
520.86	564.55	562.50	675.40	738.20	799.40	819.30	910.20	955.00	1036.40	1160.10	1252.30	1505.50	3324.40
36.62	38.06	37.20	50.50	53.70	57.70	60.90	65.20	69.90	74.40				
484.24	526.49	525.30	624.90	684.50	741.70	758.40	845.00	885.10	962.00				

Table 2 (Con't)

Sources:

1. 1953-63 figures were taken from The National Income of Iraq 1965-69, The National Accounts Department, Central Statistical Office (C.S.O.), Ministry of Planning, Baghdad

2. 1964-70 figures were taken from The National Income of Iraq 1964-71, The National Accounts Department, C.S.O., Ministry of Planning, Baghdad, December 1973.

3. 1971-74 figures were taken from The GDP and National Income of Iraq 1964-74, The National Accounts Department, C.S.O., Ministry of Planning, Baghdad, April 1976.

* 1974 figures are provisional.

Table 3.

GDP and Net National Income at Constant Price (1962 = 100)

1953 - 74.

(Million I.D.)

	Sector / Year	1953	1954	1955	1956	1957	1958	1959	1960
1-	Agriculture	80.70	100.79	70.70	93.48	115.47	94.35	80.89	96.71
2-	Industrial Sector	168.79	205.03	205.24	195.01	155.34	217.75	233.45	261.11
a-	Oil Extraction	145.50	177.89	174.42	159.70	117.06	178.43	187.43	205.68
b-	Others	23.29	27.14	30.82	35.31	38.28	39.32	46.02	55.43
3-	Building and Construction	12.72	20.47	23.04	26.01	28.65	30.34	28.33	22.81
4-	Electricity, Water and Gas	1.65	2.12	2.35	2.65	2.77	2.83	2.93	3.58
	Total Commodity Sectors	263.86	328.41	301.33	317.15	302.23	345.27	345.60	384.21
5-	Transport, Communication & Storage	24.12	26.24	26.58	28.87	30.97	31.14	33.83	39.26
6-	Wholesale & Retail Trade	20.15	24.60	23.25	28.18	30.71	27.99	25.87	32.18
7-	Banking, Insurance & Real Estate	3.65	4.32	4.87	6.58	6.83	7.53	8.09	8.59
	Total Distribution Sectors	47.92	55.16	54.70	63.63	68.51	66.66	67.79	80.03
8-	Ownership of Dwellings	13.09	14.15	13.20	13.06	13.25	12.72	11.42	11.75
9-	Pub. Adm. & Defence	20.65	24.75	26.35	29.45	33.19	38.21	45.03	45.19
10-	Services	19.00	22.90	23.01	26.01	27.94	30.15	32.88	37.67
	Total Services Sector	52.74	61.80	62.56	68.52	74.38	81.08	89.33	94.61
	GDP at factor cost	364.52	445.37	418.59	449.30	445.12	493.01	502.72	558.85
	Net Factor payments abroad	65.05	80.50	77.11	68.60	48.02	79.80	84.57	94.24
	GNP	299.47	364.87	341.48	380.70	397.10	413.21	418.15	464.61
	Capital Consumption	24.12	16.99	28.39	29.96	32.02	32.77	31.83	32.52
	Net National Income at factor cost	275.35	337.88	313.09	350.74	365.08	380.44	386.32	432.09

Table 3 (Con't)

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974*
118.61	140.38	105.72	126.23	142.61	141.95	153.22	168.85	167.43	167.05	157.52	200.39	158.23	172.60
274.46	277.17	298.52	320.85	336.66	358.44	331.55	401.82	410.24	432.69	460.08	413.48	543.94	544.06
211.93	210.23	234.57	256.54	266.10	282.67	248.77	308.34	309.28	324.34	347.95	300.35	412.59	403.38
62.53	66.94	63.95	64.31	70.56	75.77	82.78	93.48	100.96	108.35	112.13	113.13	131.35	140.68
24.21	19.64	19.64	25.28	28.50	31.06	28.22	30.68	30.78	31.34	31.98	33.82	40.85	67.56
5.03	5.54	5.03	10.51	11.36	11.93	12.12	14.11	15.91	16.86	11.27	12.97	15.15	17.61
422.31	442.73	428.91	482.87	519.13	543.38	525.11	615.46	624.46	647.94	660.85	660.66	758.17	801.83
46.59	47.02	47.21	43.09	55.97	60.23	59.38	58.43	59.66	60.52	65.44	65.44	64.06	71.83
37.08	38.56	34.72	58.81	68.18	73.29	72.92	83.43	84.18	86.74	81.56	84.18	90.16	112.77
11.21	11.38	12.37	7.57	8.99	11.55	11.08	11.55	12.97	14.86	15.40	14.73	14.39	28.53
94.88	96.96	94.30	109.47	133.14	145.07	143.38	153.41	156.81	162.12	162.40	164.35	168.61	213.13
12.30	12.45	11.99	27.65	28.59	29.07	30.39	31.24	32.00	32.85	36.37	37.37	38.44	38.94
52.17	59.76	65.21	80.88	84.29	89.12	92.91	99.06	111.47	117.53	124.24	128.31	145.82	221.99
41.95	46.52	48.27	50.76	56.84	61.46	63.45	70.00	73.21	78.61	83.73	99.75	105.61	142.58
106.42	118.73	125.47	159.29	169.72	179.65	186.75	200.30	216.68	228.99	244.34	265.43	289.87	403.51
623.61	658.42	648.68	751.63	821.99	868.10	855.24	969.17	997.85	1039.05	1067.59	1090.44	1216.65	1418.47
95.51	93.87	104.56	112.03	122.55	131.26	114.97	144.33	142.43	148.40	147.25	102.50	60.05	40.09
528.10	564.55	544.12	639.60	699.44	736.84	740.27	824.84	955.42	890.65	920.34	987.94	1156.60	1378.38
37.13	38.06	35.99	47.82	50.85	53.41	54.55	59.00	62.88	64.30				
490.97	526.49	508.13	591.78	648.59	683.43	685.72	765.84	792.54	826.35				

Table 3 (Con't)

Sources:

1. 1953-63 figures were taken from The National Income of Iraq 1965-69, The National Accounts Department, Central Statistical Office (C.S.O.), Ministry of Planning, Baghdad

2. 1964-70 figures were taken from The National Income of Iraq 1964-71, The National Accounts Department, C.S.O., Ministry of Planning, Baghdad, December 1973.

3. 1971-74 figures were taken from the GDP and National Income of Iraq 1964-74, The National Accounts Department, C.S.O., Ministry of Planning, Baghdad, April 1976.

* 1974 figures are provisional.

Table 4

GNP at Current and Constant Prices, Percentage Change and GNP per capita, 1953-74.

Year	Current Prices			Constant Prices		
	GNP (Million I.D.)	% Change	per capita GNP (I.D.)	GNP (Million I.D.)	% Change	per capita GNP (I.D.)
1953	265.32	-	46.8	299.47	-	52.8
1954	306.71	15.6	52.6	364.87	21.8	62.6
1955	315.52	2.9	52.6	341.48	- 6.4	56.9
1956	363.41	15.2	58.9	380.70	11.5	61.7
1957	383.66	5.6	60.9	397.10	4.3	63.1
1958	406.25	5.9	62.7	413.21	4.1	63.7
1959	423.89	4.4	63.5	418.15	1.2	62.6
1960	470.03	10.9	68.3	464.61	11.1	67.5
1961	520.86	10.8	73.4	528.10	13.7	74.4
1962	564.55	8.4	77.2	564.55	6.9	77.2
1963	562.50	-0.4	74.5	544.12	-3.6	72.1
1964	675.40	20.1	86.7	639.60	17.6	82;1
1965	738.20	9.3	91.8	699.44	9.4	87.0
1966	799.40	8.3	96.3	736.84	5.4	88.7
1967	819.30	2.5	95.5	740.27	0.5	86.3
1968	910.20	11.1	102.8	824.84	11.4	93.1
1969	955.00	4.9	104.4	855.42	3.7	93.5
1970	1036.40	8.5	109.8	890.65	4.1	94.4
1971	1160.10	11.9	119.0	920.34	3.3	94.4
1972	1252.30	7.9	124.3	987.94	7.4	98.1
1973	1505.50	20.2	144.6	1156.60	17.1	111.1
1974	*3324.40	120.8	308.8	*1378.38	19.2	128.0

* Provisional figures.

Table 5

Gross Domestic Product (Excluding Crude Oil) at Current and Constant Prices, Percentage Change and per capita GDP, 1953 - 74.

Year	Current Prices			Constant Prices		
	GDP (Excluding oil) (Million I.D.)	% Change	per capita GDP (I.D.)	GDP (Excluding oil) (Million I.D.)	% Change	per capita GDP (I.D.)
1953	194.04	-	34.2	219.02	-	38.6
1954	224.84	15.9	38.5	267.48	22.1	45.8
1955	225.60	0.3	37.6	244.17	-8.7	40.7
1956	276.45	22.5	44.8	289.60	18.6	46.9
1957	316.96	14.7	50.3	328.06	13.3	52.1
1958	309.27	-2.4	47.7	314.58	-4.1	48.5
1959	319.62	3.3	47.8	315.29	0.2	47.2
1960	357.29	11.8	51.9	353.17	12.0	51.3
1961	406.03	13.6	57.2	411.68	16.6	58.0
1962	448.19	10.4	61.2	448.19	8.9	61.2
1963	428.10	-4.5	56.7	414.11	-7.6	54.8
1964	522.80	22.1	67.0	495.09	19.6	63.5
1965	586.50	12.2	72.9	555.89	12.3	69.1
1966	639.50	9.0	77.0	585.43	5.3	70.5
1967	676.70	5.8	78.9	606.47	3.6	70.7
1968	732.40	8.2	82.7	660.83	9.0	74.6
1969	773.80	5.7	84.6	688.57	4.2	75.3
1970	839.80	8.5	89.0	714.71	3.8	75.7
1971	867.20	3.3	88.9	719.64	0.7	73.8
1972	988.20	14.0	98.2	790.09	9.8	78.4
1973	1024.10	3.6	98.4	804.06	1.8	77.2
1974	*1412.40	37.9	131.2	1015.09	26.2	94.3

* Provisional figures

Table 6

Agricultural Output, Percentage Change, Output per capita and Share in the GDP, 1953 - 74.

Year	Current Prices				Constant Prices			
	Agricultural output (Million I.D.)	% change	per capita Agricultural output (I.D.)	share in GDP %	Agricultural output (Million I.D.	% change	per capita Agricultural output (I.D.)	share in GDP %
1953	71.50	-	12.6	22.1	80.70	-	14.2	22.1
1954	84.73	18.5	14.5	22.6	100.79	24.9	17.3	22.6
1955	65.33	-22.9	10.9	16.9	70.70	-29.8	11.8	16.9
1956	89.23	36.6	14.4	20.8	93.48	32.3	15.1	20.8
1957	111.57	25.1	17.7	25.9	115.47	23.6	18.3	25.9
1958	92.76	-16.8	14.3	19.1	94.35	-18.3	14.5	19.1
1959	82.01	-11.5	12.3	16.1	80.89	-14.2	12.1	16.1
1960	97.84	19.3	14.2	17.3	96.71	19.6	14.0	17.3
1961	116.98	19.6	16.5	19.0	118.61	22.7	16.7	19.0
1962	140.38	20.0	19.2	21.3	140.38	18.4	19.2	21.3
1963	109.30	-22.1	14.5	16.3	105.72	-24.7	14.0	16.3
1964	133.30	22.0	17.1	16.8	126.23	19.4	16.2	16.8
1965	153.20	15.0	19.0	17.7	142.61	13.0	17.7	17.3
1966	163.40	6.7	19.7	17.4	141.95	- 0.4	17.1	16.3
1967	187.80	15.0	21.9	19.9	153.22	8.0	17.9	17.9
1968	196.00	4.4	22.1	18.4	168.85	10.2	19.1	17.4
1969	191.00	- 2.5	20.9	17.2	167.43	- 0.8	18.3	16.8
1970	206.90	8.4	21.9	17.2	167.05	- 0.2	17.7	16.1
1971	212.50	2.7	21.8	15.5	157.52	- 5.7	16.2	14.8
1972	269.40	26.8	26.7	19.4	200.39	27.2	19.9	18.4
1973	225.90	-16.1	21.7	14.2	158.23	-21.0	15.2	13.0
* 1974	284.00	25.7	26.4	8.0	172.60	9.1	16.0	12.2

* Provisional figures

Table 7

Manufacturing Output, Percentage Change, Output per capita and Share in the GDP, 1953 - 74.

Year	Current Prices				Constant Prices			
	M. output (Million I.D.)	% Change	per capita M. output (I.D.)	Share in GDP %	M. output (Million I.D.)	% Change	per capita M. output (I.D.)	Share in GDP %
1953	20.63	-	3.6	6.4	23.29	-	4.1	6.4
1954	22.81	10.6	3.9	6.1	27.14	16.6	4.7	6.1
1955	28.48	24.9	4.7	7.4	30.82	13.6	5.1	7.4
1956	33.71	18.4	5.5	7.9	35.31	14.6	5.7	7.9
1957	36.99	9.8	5.9	8.6	38.28	8.5	6.1	8.6
1958	38.64	4.5	6.0	8.0	39.32	2.8	6.1	8.0
1959	48.64	20.7	7.0	9.2	46.02	17.1	6.9	9.2
1960	56.08	20.2	8.1	9.9	55.43	20.5	8.1	9.9
1961	61.66	10.0	8.7	10.0	62.53	12.8	8.8	10.0
1962	66.94	8.6	9.1	10.2	66.94	7.1	9.1	10.2
1963	66.10	-1.2	8.8	9.9	63.95	-4.4	8.5	9.9
1964	67.90	2.8	8.7	8.6	64.31	0.6	8.2	8.6
1965	74.20	9.3	9.2	8.6	70.56	9.8	8.8	8.6
1966	80.40	8.4	9.7	8.6	75.77	7.4	9.1	8.7
1967	88.80	10.5	10.3	9.4	82.78	9.3	9.6	9.7
1968	101.00	13.8	11.4	9.5	93.48	13.0	10.6	9.6
1969	110.30	9.2	12.1	9.9	100.96	8.0	11.0	10.1
1970	123.90	12.4	13.1	10.3	108.35	7.4	11.5	10.4
1971	118.50	-4.4	12.2	8.6	112.13	3.5	11.5	10.5
1972	140.00	18.1	13.9	10.1	113.13	0.9	11.2	10.4
1973	157.60	12.6	15.1	10.0	131.35	16.1	12.6	10.8
*1974	165.60	5.1	15.4	4.7	140.68	7.1	13.1	9.9

* Provisional figures.

Table 8

Industrial Output (Excluding Crude Oil), Percentage Change, Output per capita and Share in the GDP, 1953 - 74.

Year	Current Prices				Constant Prices			
	Ind. output (Million I.D.)	% Change	per capita Ind. output (I.D.)	Share in GDP %	Ind. output (Million I.D.)	% Change	per capita Ind. output (I.D.)	Share in GDP %
1953	33.36	-	5.9	10.3	37.66	-	6.6	10.3
1954	41.80	25.3	7.2	11.2	49.73	32.1	8.5	11.2
1955	51.94	24.3	8.7	13.4	56.21	13.1	9.4	13.4
1956	61.07	17.6	9.9	14.2	63.97	13.8	10.4	14.2
1957	67.35	10.3	10.7	15.7	69.70	9.0	11.1	15.7
1958	71.25	5.8	11.0	14.7	72.49	4.0	11.2	14.7
1959	78.33	9.9	11.7	15.4	77.28	6.6	11.6	15.4
1960	82.78	12.9	12.0	14.6	81.82	5.9	11.9	14.6
1961	90.50	9.4	12.8	14.7	91.77	12.2	12.9	14.7
1962	92.12	1.8	12.6	14.0	92.12	0.4	12.6	14.0
1963	91.60	-0.5	12.1	13.7	88.62	-3.8	11.7	13.7
1964	105.70	15.4	13.6	13.3	100.10	13.0	12.8	13.3
1965	116.70	10.4	14.5	13.5	110.42	10.3	13.7	13.4
1966	127.50	9.3	15.3	13.6	118.76	7.6	14.3	13.7
1967	134.40	5.5	15.7	14.3	123.12	3.7	14.3	14.4
1968	152.70	13.7	17.2	14.3	138.27	12.3	15.6	14.3
1969	165.60	8.5	18.1	14.9	147.65	6.8	16.1	14.8
1970	182.30	10.1	19.3	15.2	156.55	6.1	16.6	15.1
1971	173.90	-4.6	17.8	12.6	155.38	-0.7	15.9	14.6
1972	198.90	14.4	19.7	14.3	159.92	2.9	15.9	14.7
1973	231.20	16.2	22.2	14.6	187.35	17.2	18.0	15.4
1974*	306.10	32.4	28.4	8.7	225.85	20.5	20.1	15.9

* Provisional figures

Table 9

Crude Oil Output, Percentage Change, Output per capita and Share in the GDP, 1953 - 74.

Year	Current Prices				Constant Prices			
	Crude Oil output (Million I.D.)	% Change	per capita Crude Oil output (I.D.)	Share in GDP %	Crude Oil output (Million I.D.)	% Change	per capita Crude Oil output (I.D.)	Share in GDP %
1953	128.91	-	22.7	39.9	145.50	-	25.6	39.9
1954	149.53	16.0	25.6	39.9	177.89	22.3	30.5	39.9
1955	161.16	7.8	26.9	41.7	174.42	-1.9	29.1	41.7
1956	152.45	-5.4	24.7	35.5	159.70	-8.4	25.9	35.5
1957	113.10	-25.8	18.0	26.3	117.06	-26.7	18.6	26.3
1958	175.43	55.2	27.0	36.2	178.43	52.5	27.5	36.2
1959	190.00	8.3	28.4	37.3	187.43	5.1	28.0	37.2
1960	208.07	9.5	30.2	36.8	205.68	9.8	29.9	36.8
1961	209.03	0.5	29.4	34.0	211.93	3.1	29.9	34.0
1962	210.23	0.6	28.7	31.9	210.23	-0.8	28.7	31.9
1963	242.50	15.4	32.1	36.2	234.57	11.6	31.1	36.2
1964	270.90	11.8	34.7	34.1	256.54	9.4	32.9	34.1
1965	281.10	3.8	34.9	32.4	266.10	3.8	33.1	32.4
1966	298.50	6.2	35.9	31.8	282.67	6.3	34.0	32.6
1967	265.20	-11.1	30.9	28.2	248.77	-12.0	29.0	29.1
1968	334.60	26.2	37.8	31.4	308.34	24.0	34.8	31.8
1969	335.90	0.4	36.7	30.3	309.28	0.3	33.8	31.0
1970	362.60	8.0	38.4	30.2	324.34	4.9	34.4	31.2
1971	507.80	40.0	52.1	36.9	347.95	7.3	35.7	32.6
1972	400.00	-21.2	39.7	28.8	300.35	-13.7	29.8	27.5
1973	563.40	40.9	54.1	35.5	412.59	37.4	39.6	33.9
*1974	2123.00	276.8	197.2	60.0	403.38	-2.2	37.5	28.4

* Provisional figures

Table 10

Value Added Transport, Communication and Storage, Percentage Change, Value Added per capita and Share in the GDP, 1953-74.

Year	Current Prices				Constant Prices			
	(Million I.D.)	% Change	per capita (I.D.)	Share in GDP %	(Million I.D.)	% Change	per capita (I.D.)	Share in GDP %
1953	21.37	-	3.8	6.6	24.12	-	4.2	6.6
1954	22.06	3.2	3.8	5.9	26.24	8.8	4.5	5.9
1955	24.56	11.3	4.1	6.4	26.58	1.3	4.4	6.3
1956	27.05	10.1	4.4	6.3	28.87	8.6	4.7	6.4
1957	29.92	10.6	4.8	7.0	30.97	7.3	4.9	7.0
1958	30.61	2.3	4.7	6.3	31.14	0.5	4.8	6.3
1959	34.29	12.0	5.1	6.7	33.83	8.6	5.1	6.7
1960	39.72	15.8	5.8	7.0	39.26	16.1	5.7	7.0
1961	45.95	15.7	6.5	7.5	46.59	18.7	6.6	7.5
1962	47.02	2.3	6.4	7.1	47.02	0.9	6.4	7.1
1963	48.80	3.8	6.5	7.3	47.21	0.4	6.2	7.3
1964	45.50	-6.8	5.8	5.7	43.09	-8.7	5.5	5.7
1965	58.20	27.9	7.2	6.7	55.97	29.9	7.0	6.8
1966	63.20	8.6	7.6	6.7	60.23	7.6	7.2	6.9
1967	64.00	1.3	7.5	6.8	59.38	-1.4	6.9	6.9
1968	65.80	2.8	7.4	6.2	58.43	-1.6	6.6	6.0
1969	69.10	5.0	7.6	6.2	59.66	2.1	6.5	6.0
1970	71.20	3.0	7.5	5.9	60.52	1.4	6.4	5.8
1971	79.70	11.9	8.2	5.8	65.44	8.1	6.7	6.1
1972	85.90	7.8	8.5	6.2	65.44	0.0	6.5	6.0
1973	88.50	3.0	8.5	5.8	64.06	-2.2	6.2	5.3
1974 *	99.60	12.5	9.3	2.8	71.83	12.1	6.7	5.1

* Provisional figures

Table 11

Value Added Wholesale and Retail Trade, Percentage Change, Value Added per capita and Share in the GDP, 1953-74.

Year	Current Prices				Constant Prices			
	(Million I.D.)	% Change	per capita (I.D.)	Share in GDP %	(Million I.D.)	% Change	per capita (I.D.)	Share in GDP %
1953	17.85	-	3.1	5.5	20.15	-	3.5	5.5
1954	20.67	15.8	3.5	5.5	24.60	22.1	4.2	5.5
1955	21.48	3.9	3.6	5.6	23.25	-5.5	3.9	5.6
1956	26.90	25.2	4.4	6.3	28.18	21.2	4.6	6.3
1957	29.67	10.3	4.7	6.9	30.71	9.0	4.9	6.9
1958	27.52	-7.2	4.2	5.7	27.99	-8.9	4.3	5.7
1959	26.23	-4.7	3.9	5.1	25.87	-7.6	3.9	5.1
1960	32.55	24.1	4.7	5.8	32.18	24.4	4.7	5.8
1961	36.58	12.4	5.2	5.9	37.08	15.2	5.2	5.9
1962	38.56	5.4	5.3	5.9	38.56	4.0	5.3	5.9
1963	35.90	6.9	4.8	5.4	34.72	10.0	4.6	5.4
1964	62.10	73.0	8.0	7.8	58.81	69.4	7.5	7.8
1965	69.80	12.4	8.7	8.0	68.18	15.9	8.5	8.3
1966	74.70	7.0	9.0	8.0	73.29	7.5	8.8	8.4
1967	79.90	6.7	9.3	8.5	72.92	-0.5	8.5	8.5
1968	86.90	9.0	9.8	8.1	83.43	14.4	9.4	8.6
1969	90.10	3.7	9.8	8.1	84.18	0.9	9.2	8.4
1970	98.60	9.4	10.4	8.2	86.74	3.0	9.2	8.3
1971	94.40	-4.3	9.7	6.9	81.56	-6.0	8.4	7.6
1972	102.60	8.7	10.2	7.4	84.18	3.2	8.4	7.7
1973	115.20	12.3	11.1	7.3	90.16	7.1	8.7	7.4
1974*	156.00	35.4	14.5	4.4	112.77	25.1	10.5	8.0

* Provisional figures

Table 12

Value Added Public Administration and Defence, Percentage Change, Value Added per capita and Share in the GDP, 1953-74.

Year	Current Prices				Constant Prices			
	(Million I.D.)	% Change	per capita (I.D.)	Share in GDP %	(Million I.D.)	% Change	per capita (I.D.)	Share in GDP %
1953	18.29	-	3.2	5.7	20.65	-	3.6	5.7
1954	20.80	13.7	3.6	5.6	24.75	19.9	4.2	5.6
1955	24.34	17.0	4.1	6.3	26.35	6.5	4.4	6.3
1956	28.52	17.2	4.6	6.6	29.45	11.8	4.8	6.6
1957	32.06	12.4	5.1	7.5	33.19	12.7	5.3	7.5
1958	37.57	17.2	5.8	7.8	38.21	15.1	5.9	7.8
1959	45.65	21.5	6.8	9.0	45.03	17.8	6.7	9.0
1960	45.71	0.1	6.6	8.1	45.19	0.4	6.6	8.1
1961	51.46	12.6	7.2	8.4	52.17	15.4	7.3	8.4
1962	59.76	16.1	8.2	9.1	59.76	14.5	8.2	9.1
1963	67.40	12.8	8.9	10.1	65.21	9.1	8.6	10.1
1964	85.40	26.7	11.0	10.8	80.88	24.0	10.4	10.8
1965	89.00	4.2	11.1	10.3	84.29	4.2	10.5	10.3
1966	94.10	5.7	11.3	10.0	89.12	5.7	10.7	10.3
1967	98.20	4.4	11.4	10.4	92.91	4.3	10.8	10.9
1968	104.60	6.5	11.8	9.8	99.06	6.6	11.2	10.2
1969	117.80	12.6	12.9	10.6	111.47	12.5	12.2	11.2
1970	124.30	5.5	13.2	10.3	117.53	5.4	12.5	11.3
1971	131.70	6.0	13.5	9.6	124.24	5.7	12.7	11.6
1972	136.00	3.3	13.5	9.8	128.31	3.3	12.7	11.8
1973	154.50	13.6	14.8	9.7	145.82	13.6	14.0	12.0
1974*	282.00	82.5	26.2	8.0	221.99	52.2	20.6	15.6

* Provisional figures

Table 13

Oil Revenues, Percentage Change, as a Proportion of the GNP, Oil Revenues per capita, 1953-74.

Year	Total Revenues (Million I.D.)	% Change	Per capita oil revenue (I.D.)	As proportion of the GNP %
1953	57.75	-	10.2	21.8
1954	68.52	18.6	11.7	22.4
1955	74.00	8.0	12.3	23.5
1956	69.17	-6.5	11.2	19.1
1957	49.03	-29.1	7.8	12.8
1958	80.10	63.4	12.3	19.8
1959	86.82	8.4	13.0	20.5
1960	95.36	9.8	13.8	20.3
1961	94.83	-0.6	13.4	18.2
1962	95.12	0.3	13.0	16.9
1963	110.05	15.7	14.6	19.6
1964	126.08	14.6	16.2	18.7
1965	113.38	-10.1	14.1	15.4
1966	140.80	24.2	26.9	17.7
1967	131.67	-6.5	15.3	16.1
1968	158.90	20.7	17.9	17.5
1969	160.90	1.3	17.6	16.9
1970	172.70	7.3	18.3	16.7
1971	270.30	56.5	27.7	23.3
1972	251.60	-6.9	25.0	20.1
1973	519.30	106.4	49.9	34.5
1974	-	-	-	-

Sources:

1. Hashim, J. Fixed Capital Formation in Iraq, 1957-70, Arab Bureau for Studies and Publication, Beirut, 1974.

2. Central Bank of Iraq Bulletin, 1971, 1972, 1973, 1974. Central Bank of Iraq, Statistics and Research Department, Baghdad.

Table 14

Revenues of the Ordinary Budget, Percentage Change, as a Proportion of the GNP and per capita Revenues, 1953-74.

Year	Revenues (Million I.D.)	% Change	Revenues as a proportion of the GNP %	Revenues per capita (I.D.)
1953	47.721	-	18.0	8.4
1954	52.179	9.3	17.0	8.9
1955	65.287	25.1	20.7	10.9
1956	62.713	-3.9	17.3	10.2
1957	61.851	-1.4	16.1	9.8
1958	75.572	22.2	18.6	11.6
1959	89.724	18.7	21.2	13.4
1960	103.614	15.5	22.0	15.0
1961	120.700	16.5	23.2	17.0
1962	114.708	-5.0	20.3	15.7
1963	126.773	10.5	22.5	16.8
1964	145.965	15.1	21.6	18.7
1965	179.131	22.7	24.3	22.3
1966	158.648	-11.4	19.8	19.1
1967	210.361	32.6	25.7	24.5
1968	220.419	4.8	24.2	24.9
1969	250.599	13.7	26.2	27.4
1970	292.562	16.7	28.2	31.0
1971	344.805	17.9	29.2	35.4
1972	270.530	-21.5	20.8	26.9
1973	382.005	41.2	25.4	36.7
1974	-	-	-	-

Sources:

1. Central Bank of Iraq Bulletin, 1972, 1973, 1974, Central Bank of Iraq, Statistics and Research Department, Baghdad.

Table 15

Expenditures of the Ordinary Budget, Percentage Change, as a Proportion of the GNP, per capita Expenditures, 1953-74.

Year	Expenditures (Million I.D.)	% Change	Expenditures as proportion of the GNP %	per capita expenditures (I.D.)
1953	50.157	-	18.9	8.8
1954	53.798	7.3	17.5	9.2
1955	55.279	2.8	17.5	9.2
1956	70.276	27.1	19.3	11.4
1957	73.821	5.0	19.2	11.7
1958	79.207	7.3	19.5	12.2
1959	100.167	26.5	23.6	15.0
1960	114.286	14.1	24.3	16.6
1961	119.188	4.3	22.9	16.8
1962	128.401	7.7	22.7	17.5
1963	149.025	16.1	26.5	19.7
1964	180.125	20.9	26.7	23.1
1965	187.534	4.1	25.4	23.3
1966	192.427	2.6	24.1	23.2
1967	205.506	6.8	25.1	24.0
1968	241.934	17.7	26.6	27.3
1969	289.249	19.6	30.3	31.6
1970	303.425	4.9	29.3	32.1
1971	341.412	12.5	28.9	35.0
1972	345.359	1.2	26.6	34.3
1973	454.900	47.7	33.9	43.7
1974*	1358.500	198.6	40.9	126.3

Sources:

1. Central Bank of Iraq Bulletin, 1972, 1973, 1974, Central Bank of Iraq, Statistics and Research Department, Baghdad.

* The figure for the year 1974 is a provisional estimate. See Expenditures on Health and Education in Iraq, 1960-75, National Accounts Dept., CSO, Ministry of Planning, Baghdad, April 1976 (Table 1).

Table 16

Revenues of the Development Board, Ministry of Development and National Development Plan, Percentage Change, as a Proportion of the GNP and per capita Revenues, 1953-74.

Year	Revenues (Million I.D.)	% Change	Revenues as proportion of the GNP %	per capita Revenues (I.D.)
1953	35.28	-	13.3	6.3
1954	40.73	15.4	13.3	7.0
1955	60.76	49.2	19.3	10.1
1956	51.13	-15.8	14.1	8.3
1957	35.87	-29.8	9.4	5.7
1958	61.74	72.1	15.2	9.5
1959	43.57	-29.4	10.3	6.5
1960	47.68	9.4	10.2	6.9
1961	66.68	39.8	12.8	9.4
1962	70.03	5.0	12.4	9.6
1963	67.60	-3.5	12.1	8.9
1964	76.47	13.1	11.4	9.8
1965	75.03	-1.9	10.2	9.3
1966	70.80	-5.6	8.9	8.5
1967	81.80	15.5	10.0	9.5
1968	88.52	8.2	9.8	10.0
1969	90.83	2.6	9.6	9.9
1970	111.17	22.4	10.8	11.8
1971	189.28	70.3	16.0	19.4
1972	135.88	-28.2	10.5	13.5
1973	-	-	-	-
1974	-	-	-	-

Sources:

1. Central Bank of Iraq Bulletin, 1972, 1973 and 1974, Central Bank of Iraq, Statistics and Research Dept., Baghdad.

Table 17

Expenditures of the Development Board, Ministry of Development and National Development Plan, Percentage Change, as a Proportion of the GNP and per capita Expenditures, 1953-74.

Year	Expenditures (Million I.D.)	% Change	Expenditures as proportion of the GNP %	per capita Expenditures (I.D.)
1953	12.26	-	4.6	2.2
1954	20.87	70.2	6.8	3.6
1955	34.03	63.1	10.8	5.7
1956	43.04	26.5	11.9	7.0
1957	57.42	33.4	15.0	9.2
1958	52.22	-9.1	12.9	8.1
1959	103.31	-4.5	11.8	7.5
1960	47.57	-4.7	10.2	6.9
1961	66.92	40.7	12.9	9.5
1962	59.30	-11.4	10.5	8.1
1963	54.26	-8.5	9.7	7.2
1964	75.28	38.7	11.2	9.7
1965	59.83	-20.5	8.1	7.5
1966	82.76	38.3	10.4	10.0
1967	68.92	-16.7	8.5	8.1
1968	64.41	-6.5	7.1	7.3
1969	170.75	27.8	8.7	9.0
1970	78.05	-5.2	7.6	8.3
1971	153.78	97.0	13.0	15.8
1972	128.53	-16.4	9.9	12.8
1973	-	-	-	-
1974	-	-	-	-

Sources:

1. Central Bank of Iraq Bulletin, 1972, 1973 and 1974, Central Bank of Iraq, Statistics and Research Dept., Baghdad.

Table 18

Expenditures on Defence and Security in the Ordinary Budget, Percentage Change, as a Proportion of Budgetary Expenditures and GNP and per capita Expenditures, 1953-73.

Year	Defence Expenditures (Million I.D.)	% Change	As proportion of total Budgetary expenditures %	As proportion of the GNP %	per capita Defence expenditures (I.D.)
1953	15.89	-	31.7	6.0	2.8
1954	17.12	7.7	31.8	5.6	2.9
1955	14.94	-12.7	27.0	4.7	2.5
1956	23.17	55.1	33.0	6.4	3.8
1957	24.14	4.2	32.7	6.3	3.8
1958	31.25	29.5	39.5	7.7	4.8
1959	37.28	19.3	37.2	8.8	5.6
1960	44.11	18.3	38.6	9.4	6.4
1961	45.05	2.1	37.8	8.6	6.3
1962	49.30	9.4	38.4	8.7	6.7
1963	61.29	24.3	41.1	10.9	8.1
1964	67.76	10.6	37.6	10.0	8.7
1965	84.91	25.3	45.3	11.5	10.6
1966	83.60	-1.5	43.4	10.5	10.1
1967	83.82	0.3	40.8	10.2	9.8
1968	110.98	32.4	45.9	12.2	12.5
1969	142.10	28.0	49.1	14.9	15.5
1970	143.61	1.1	47.3	13.9	15.2
1971	153.17	6.7	44.9	13.0	15.7
1972	153.38	0.1	44.4	11.8	15.2
1973*	246.30	60.6	48.3	16.4	23.7

Sources:

1. Central Bank of Iraq Bulletin, 1955, 1957, 1960, 1962, 1964, 1967, 1970, 1972, 1973, 1974. Central Bank of Iraq, Statistics and Research Dept. Baghdad.

* The 1973 figure is a "revised estimate".

Table 19

Expenditures on Education in the Ordinary Budget, Percentage Change, as a Proportion of Budgetary Expenditures and GNP, and per capita Expenditures, 1953-74.

Year	Education expenditures (Million I.D.)	% Change	As proportion of budgetary expenditures %	As proportion of the GNP %	per capita education expenditures (I.D.)	Expenditures[2] on education by the various economic plans. (Million I.D.)
1953	8.21	-	16.4	3.1	1.4	
1954	8.19	-0.2	15.2	2.7	1.4	
1955	9.43	15.1	17.1	3.0	1.6	
1956	10.11	7.2	14.4	2.8	1.6	
1957	11.24	11.2	15.2	2.9	1.8	
1958	14.38	27.9	18.2	3.5	2.2	
1959	20.25	40.8	20.2	4.8	3.0	
1960	24.55	21.2	21.5	5.2	3.6	2.24
1961	29.01	18.2	24.3	5.6	4.1	2.62
1962	32.43	11.8	25.3	5.7	4.4	1.54
1963	33.30	2.7	22.3	5.9	4.4	0.70
1964	37.85	13.7	21.0	5.6	4.9	3.67
1965	41.19	8.8	22.0	5.6	5.1	4.68
1966	47.27	14.8	24.6	5.9	5.7	2.19
1967	49.07	3.8	23.9	6.0	5.7	2.61
1968	51.48	4.9	21.3	5.7	5.8	2.77
1969	55.66	8.1	19.2	5.8	6.1	1.92
1970	59.55	7.0	19.6	5.7	6.3	2.14
1971	67.78	13.8	19.9	5.7	7.0	2.14
1972	71.45	5.4	20.7	5.5	7.1	3.50
1973*	80.69	12.9	17.7	5.4	7.7	4.61
1974*	132.09	63.7	9.7	4.0	12.3	10.06

Sources:

1. Central Bank of Iraq Bulletin, 1955, 1957, 1960, 1962, 1967, 1970, 1972, 1973 and 1974, Central Bank of Iraq, Statistics and Research Dept., Baghdad.
2. Expenditures on Health and Education in Iraq 1960-75, National Accounts Dept., CSO, Ministry of Planning, Baghdad, April 1976.

* The 1973 and 1974 figures are "revised estimates".

Table 20

Expenditures on Health in the Ordinary Budget, Percentage Change, as a Proportion of Budgetary Expenditures and GNP, and per capita Expenditures, 1953-74.

Year	Health expenditures (Million I.D.)	% change	As proportion of budgetary expenditures %	As proportion of the GNP %	per capita health expenditures (I.D.)
1953	2.79	-	5.6	1.1	0.5
1954	3.81	36.6	7.1	1.2	0.7
1955	4.09	7.3	7.4	1.3	0.7
1956	5.00	22.2	7.1	1.4	0.8
1957	4.86	-2.8	6.6	1.3	0.8
1958	4.90	0.8	6.2	1.2	0.8
1959	5.41	10.4	5.4	1.3	0.8
1960	6.17	14.0	5.4	1.3	0.9
1961	6.81	10.4	5.7	1.3	1.0
1962	7.45	9.4	5.8	1.3	1.0
1963	7.11	-4.6	4.8	1.3	0.9
1964	7.38	3.8	4.1	1.1	0.9
1965	8.61	16.7	4.6	1.2	1.1
1966	9.04	5.0	4.7	1.1	1.1
1967	9.99	10.5	4.9	1.2	1.2
1968	10.62	6.3	4.4	1.2	1.2
1969	11.81	11.2	4.1	1.2	1.3
1970	13.40	13.5	4.4	1.3	1.4
1971	15.98	19.3	4.7	1.4	1.6
1972	17.64	10.4	5.1	1.4	1.8
1973*	23.25	31.8	5.1	1.5	2.2
1974*	27.64	18.9	2.0	0.8	2.6

Sources:

1. Central Bank of Iraq Bulletin, 1955, 1957, 1960, 1962, 1964, 1967, 1970, 1972, 1973 and 1974, Central Bank of Iraq, Statistics and Research Dept., Baghdad.
2. Expenditures on Health and Education in Iraq 1960-75, National Accounts Dept., CSO, Ministry of Planning, Baghdad, April 1976.

* The 1973 and 1974 figures are "revised estimates".

Table 21

Gross Capital Formation at Current and Constant Prices

(1962 = 100), 1953-74.

(Million I.D.)

Year	Gross Capital Formation at Current Prices (Million I.D.)	Gross Capital Formation at Constant Prices (Million I.D.)
1953	82.2	89.6
1954	87.0	100.2
1955	91.8	96.0
1956	96.6	97.7
1957	106.3	114.2
1958	97.9	106.4
1959	103.6	104.2
1960	120.2	117.9
1961	137.2	136.5
1962	119.2	119.2
1963	107.3	107.8
1964	122.1	117.8
1965	129.8	126.0
1966	149.6	140.2
1967	143.6	132.0
1968	143.0	129.6
1969	157.2	141.0
1970	185.1	160.9
1971	194.7	164.8
1972	217.1	183.7
1973	253.1	210.9
1974	372.7	305.6

Sources:

1. Gross Capital Formation in Iraq, 1953-69; A Preliminary Report, The National AccountsDepartment, C.S.O., Ministry of Planning, Baghdad, 1970.
2. Hashim, J. Capital Formation in Iraq, 1957-70, Arab Bureau for Studies and Publications, Beirut, 1974.
3. Fixed Capital Formation in Iraq 1970-74, The National Accounts Department, C.S.O. Ministry of Planning, Baghdad, April 1975.

Table 22

Primary Education Statistics, 1930-73.

Year	No. of students enrolled	No. of Schools	No. of Teachers	Year	No. of students enrolled	No. of Schools	No. of Teachers
1930	34220	314	1325	1952	243755	1420	8660
1931	36850	331	1447	1953	280378	1549	9521
1932	43244	381	1611	1954	314909	1663	10272
1933	53393	451	1675	1955	353464	1826	11082
1934	63151	551	2011	1956	388065	1919	11853
1935	66650	580	2170	1957	430306	2083	12937
1936	73950	616	2418	1958	518021	2416	16069
1937	86373	726	2762	1959	642665	3223	20040
1938	92611	709	3025	1960	760463	3679	25130
1939	109437	791	3886	1961	816222	3987	27292
1940	110347	813	4133	1962	849682	4018	29325
1941	107996	838	4343	1963	867283	3943	31390
1942	105450	865	4511	1964	925943	4318	36871
1943	106431	917	4947	1965	964327	4544	44028
1944	116902	959	5098	1966	977582	4773	42478
1945	134281	990	5492	1967	990718	5035	45201
1946	143070	1057	5627	1968	1017050	5137	47058
1947	161380	1116	6096	1969	1039942	5173	48307
1948	174874	1150	6509	1970	1120213	5617	49565
1949	196334	1194	6749	1971	1200044	5918	54016
1950	203106	1229	7116	1972	1297756	6269	54979
1951	216885	1307	7873	1973	1408929	6731	58445

Sources:

1. World Survey of Education, Vol. 1, 2, 3, 4 and 5, UNESCO, Paris.

2. Annual Abstract of Statistics, 1962, 1968, 1973 and 1974, C.S.O., Ministry of Planning, Baghdad.

3. Statistical Data on the Development of the Education Sector in Iraq, 1965-72. The Educational Planning Section, Social and Cultural Department, Ministry of Planning, February 1973.

Table 23

Secondary Education Statistics, 1930-73.

Year	No. of students enrolled	No. of Schools	No. of Teachers	Year	No. of students enrolled	No. of Schools	No. of Teachers
1930	2082	-	-	1952	40567	-	-
1931	2828	-	-	1953	46463	197	2679
1932	3444	-	-	1954	53881	215	2877
1933	3791	-	-	1955	57453	205	2926
1934	4659	-	-	1956	62722	218	3193
1935	6138	-	-	1957	70272	245	3056
1936	7904	-	-	1958	93468	322	3084
1937	10755	-	-	1959	117730	358	3171
1938	13629	-	-	1960	139024	383	3715
1939	13959	-	-	1961	158857	412	4148
1940	13969	-	-	1962	172652	446	4562
1941	12926	-	-	1963	192803	506	4924
1942	11191	-	-	1964	214378	535	5754
1943	11128	-	-	1965	235810	585	7231
1944	11308	-	-	1966	243435	689	7948
1945	19929	-	-	1967	254033	757	8311
1946	20424	-	-	1968	285721	840	9428
1947	23047	-	-	1969	303050	860	10114
1948	26928	-	-	1970	304240	921	12309
1949	30300	-	-	1971	317106	995	13762
1950	32443	-	-	1972	353114	1033	14338
1951	33768	-	-	1973	388624	1093	14871

Sources:

1. World Survey of Education, Vol. 1, 2, 3, 4 and 5, UNESCO, Paris.

2. Annual Abstract of Statistics, 1962, 1968, 1973 and 1974. C.S.O., Ministry of Planning, Baghdad.

3. Statistical Data on the Development of the Education Sector in Iraq, 1965-72. The Educational Planning Section, Social and Cultural Department, Ministry of Planning, February, 1973.

Table 24

Summary Table of Teachers Training Education, 1942-72.

Year	No. of students enrolled	No. of Institutes	No. of Teachers	Year	No. of students enrolled	No. of Institutes	No. of Teachers
1942	1694	-	-	1958	11050	66	335
1943	1641	-	-	1959	10609	62	336
1944	1315	-	-	1960	8313	29	512
1945	1238	-	-	1961	7383	28	452
1946	1360	-	-	1962	7230	27	402
1947	1798	-	-	1963	8671	28	501
1948	1594	-	-	1964	6867	29	442
1949	1673	-	-	1965	4389	21	221
1950	1489	-	-	1966	8229	21	211
1951	1550	-	-	1967	6542	21	368
1952	1391	16	58	1968	5442	21	264
1953	2935	16	277	1969	3628	21	198
1954	2869	-	-	1970	-	-	-
1955	3027	-	-	1971	2785	3	48
1956	6096	-	245	1972	7405	4	120
1957	8220	46	216				

Sources:

1. World Survey of Education, Vol. 1, 2, 3, 4 and 5, UNESCO, Paris.

2. Annual Abstract of Statistics, 1962, 1968, 1973 and 1974. C.S.O. Ministry of Planning, Baghdad.

3. Statistical Data on the Development of the Education Sector in Iraq, 1965-72. The Educational Planning Section, Social and Cultural Department, Ministry of Planning, February 1973.

Table 25

Vocational Education Statistics, 1930-73

Year	No. of students enrolled	No. of Institutions	No. of Teachers	Year	No. of students enrolled	No. of Institutions	No. of Teachers
1930	120	-	-	1952	1192	15	338
1931	148	-	-	1953	1674	15	348
1932	241	-	-	1954	2205	10	-
1933	281	-	-	1955	2477	10	-
1934	253	-	-	1956	3154	22	225
1935	201	-	-	1957	11186	46	466
1936	256	-	-	1958	11918	39	449
1937	231	-	-	1959	9807	41	486
1938	243	-	-	1960	7975	44	765
1939	325	-	-	1961	8101	43	820
1940	464	-	-	1962	8044	43	869
1941	642	-	-	1963	7973	46	879
1942	804	-	-	1964	8011	45	865
1943	913	-	-	1965	7626	37	677
1944	790	-	-	1966	8694	36	784
1945	779	-	-	1967	10217	45	871
1946	584	-	-	1968	9753	43	1069
1947	662	-	-	1969	10053	46	1049
1948	656	-	-	1970	9929	47	1059
1949	832	-	-	1971	10143	52	1100
1950	1071	-	-	1972	11426	62	1130
1951	1066	-	-	1973	15639	64	1250

Sources:

1. World Survey of Education, Vol. 1, 2, 3, 4 and 5, UNESCO, Paris.

2. Annual Abstract of Statistics, 1962, 1968, 1973 and 1974. C.S.O. Ministry of Planning, Baghdad.

3. Statistical Data on the Development of the Education Sector in Iraq, 1965-72. The Educational Planning Section, Social and Cultural Department, Ministry of Planning, February, 1973.

Table 26

Higher Education Statistics, 1930-73

Year	No. of students	No. of Universities	No. of Teachers	Year	No. of students	No. of Universities	No. of Teachers
1930	119	-	-	1952	4851	-	-
1931	94	-	-	1953	5255	-	-
1932	115	-	-	1954	5490	-	-
1933	157	-	-	1955	5448	-	-
1934	206	-	-	1956	5360	-	377
1935	279	-	-	1957	5741	1	557
1936	613	-	-	1958	8732	1	628
1937	688	-	-	1959	12005	1	646
1938	887	-	-	1960	12260	2	1122
1939	904	-	-	1961	14516	2	1058
1940	1218	-	-	1962	14701	2	1312
1941	1197	-	-	1963	19811	3	1270
1942	1349	-	-	1964	24233	3	1352
1943	1562	-	-	1965	28377	5	1455
1944	1794	-	-	1966	34926	5	1619
1945	2146	-	-	1967	35361	5	1654
1946	3806	-	-	1968	41189	5	2068
1947	3613	-	-	1969	37290	5	2158
1948	4665	-	-	1970	43358	5	2353
1949	4753	-	-	1971	48141	5	2678
1950	4951	-	-	1972	49194	5	2108
1951	4957	-	-	1973	58351	5	2669

Sources:

1. World Survey of Education, Vol. 1, 2, 3, 4 and 5, UNESCO, Paris.

2. Annual Abstract of Statistics, 1962, 1968, 1973 and 1974. C.S.O. Ministry of Planning, Baghdad.

3. Statistical Data on the Development of the Education Sector in Iraq, 1965-72. The Educational Planning Section, Social and Cultural Department, Ministry of Planning, February 1973.

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