SECTORAL INTERDEPENDENCE

AND EGYPT'S INVESTMENT STRATEGY

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BY

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ABSTRACT

Egypt's first Five-Year Plan 1960/61 - 1964/65 charted a program for economic development based on industrialization via import substitution and self-sufficiency. The Plan was not designed on the basis of a comprehensive model and therefore could not take account of many interdependencies, nor was it possible to determine if the Plan was consistent with resource supplies. Unfortunately such aspects were considered only in a piecemeal fashion. Moreover, the selection of investment projects was based on the assumption that labour is abundantly available. The Plan envisaged an overall growth in value added of 40 percent during the 5-year period and an equilibrium in the balance of trade by the terminal-year. Although the growth target was nearly achieved, the trade deficit increased instead of disappearing.

This study represents an endeavour to remedy the shortcomings of the Egyptian planning practice as represented by the country's first Five-Year Plan in two ways. First, a comprehensive linear programming model was developed to assist in the choice of industries where capacity can be expanded to the optimum advantage. Second, alternate assumptions were introduced with regard to labour based on the observable fact that although unskilled labour is abundantly available, only skilled labour is required for an overall effort of economic development. Thus, a set of labour constraints by industry was incorporated into the model. This implies a given and well-defined pattern of skill requirements by industry.

Simulations based on the linear programming model indicated that the neglect of labour leads to a bias in project selection in favour of investments with a relatively high foreign-exchange content. Some of these simulations also resulted in a pattern of expansion stressing agriculture, food processing and fertilizers in contrast with the Plan's emphasis on metals, machinery and chemicals.

The study also analyzes the interdependencies in the Egyptian structure of production. One of the conclusions of the analysis in this context is that agriculture occupies a very central place in the economy, and in fact constitutes a bottleneck industry. The finding that agriculture is very important contrasts sharply with the secondary place it occupies in the country's priorities, judged from its first Five-Year Plan. Two consistency tests were performed, one to check the compatibility of the individual sectoral output targets and the other to check the consistency of the overall-growth and the balance-of-trade targets. The individual industry output targets turned out to be inconsistent, which seems to suggest that indirect relationships between the different industries were not carefully considered. The overall-growth target and the balance-of-trade target appeared inconsistent, which seems to suggest either that the planners neglected indirect import requirements or that they over-estimated the economy's capacity to replace about one-third of the target-year imports.

Two other aspects of the Egyptian structure of production were also examined utilizing input-output data for 1954 and 1963/64. One is to determine if that structure exhibits any recursivity. This was done by triangularizing the input-output coefficient matrix, and revealed that indeed there is a discernible hierarchy in the system of production. The other aspect examined was the degree of dependence, in production, on the rest of the world. The analysis here entailed deriving numerical values for the direct, indirect and total (direct plus indirect) import coefficients. The numerical results indicate clearly that the industries heavily stressed in Egypt's first Five-Year Plan (metals, machinery and chemicals) are heavily dependent on imports for their current production requirements. If, to this, imported investment requirements for capacity expansion are added, we can then determine one of the important reasons why the balance-of-trade equilibrium was not achieved.

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LIST OF ABBREVIATIONS

A.E.A.	American Economic Association
AER	American Economic Review
CAPMS	Central Agency for Public Mobilization and Statistics
E.A.I.S.R.	East African Institute of Social Research.
ECAFE	Economic Commission for Asia and the Far East
Econ. Intern.	Economia Internazionale
GATT	General Agreement on Tariffs and Trade
Gen. Org. for Gov. Pub.	General Organization for Government Publications
GIIS	Graduate Institute of International Studies.
IBRD	International Bank for Reconstruction and Development
I.I.E.P.	International Institute of Educational Planning.
Intern. Econ. Rev.	International Economic Review
I.N.P.	Institute of National Planning
JDS	Journal of Development Studies
JPE	Journal of Political Economy
LE	Egyptian Pound
N.B.E.R.	National Bureau of Economic Research
OECD	Organization for Economic Cooperation and Development
QJE	Quarterly Journal of Economics
Rev. Econ. Stat.	Review of Economics and Statistics
R.E.S.	Royal Economic Society
UN	United Nations

UNCTAD United Nations Conference on Trade and Development

UNESCO United Nations Educational Scientific and Cultural Organization.

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CHAPTER I

INTRODUCTION

In this introduction we define the problem to be studied, the method of approach to be used, and the general organization of the dissertation.

1. Definition of the Problem

Industrialization is the basic feature of Egypt's strategy for economic development. The leit-motif for Egyptian industrialization is import substitution. This is borne out by the first Five-Year Plan for the economic development of the country (1960/61 - 1964/65). The following table illustrates this point. The table indicates quite clearly

Table 1.1

Main Targets of the First Five-Year Plan for Egypt 1960/61 - 1964/65

(LE million at 1959/60 factor prices)

	1959/60	1964/65	% change
Value added (total)	1282	1795	+ 40
" " in agriculture	400	512	+ 25
" " in electricity and manufacturing	273	540	+ 100
" " in construction and building	52	51	- 2
" " in infrastructure sectors	261	316	+ 12

Table 1.1 (Continued)

Main Targets of the First Five-year Plan
for Egypt 1959/60 - 1964/65

(LE million at 1959/60 factor prices)

	1959/60	1964/65	% change
Value added in commerce	127	162	+ 28
" " in services	169	214	+ 27
Exports	158.3	214.7	+ 36
Imports	229.2	214.9	- 6

Source: U.A.R. (Egypt), National Planning Committee, Frame of the General Plan for Economic and Social Development for the Five Years July 1960 - June 1965 (Arabic) (Cairo: Gen. Org. for Gov. Pub., 1960), p. 14 and pp. 68-69, henceforth Plan Frame.

that the growth of electricity and manufacturing was expected to be the prime mover in the general growth of income. It also shows an absolute decrease in the value of imports over the Plan period, which is a clear-cut case of import substitution.

Two observations have to be made from the outset. One is that, judging from the Plan targets, the country has adopted a strategy of industrialization for economic development. The other is that within this broad strategy, an import-substitution policy was chosen. One may then conduct his evaluation of the Five-Year Plan, to be referred to henceforth as the Plan, on three levels: one, by examining the rationality of industrialization as a strategy; two, by accepting the latter and examining the appropriateness of the chosen policy, i.e., import substitution (in this case import substitution is to be compared with alternative policies such as export promotion); three, by taking both the strategy and the policy for granted and examining the particular choice of industries.

We shall be concerned mainly with the third level, i.e., examining the appropriateness of the choice of industries for import substitution. It should be pointed out, however, that this is not really independent from examining the export promotion policy. The crucial question is: Should the country secure any commodity directly by producing it domestically or indirectly through producing something else and trading it for that commodity on the world market?

The basis for the choice of industries for import substitution is not always clearly stated in the Plan. Although consideration has been given in some cases to comparative advantage, this is not always the case.[1] Thus, the Plan envisaged a rapid expansion in the production of cement, fertilizers and petroleum. These are industries in which Egypt appears to have a comparative advantage. On the other hand, the Plan document states that "...metals will play a basic role in our coming industrial revival".[2] Chemicals come high on the list but are second priority after metals. These are industries in which it is not readily demonstrable that Egypt has a comparative advantage.[3]

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[1] Bent Hansen and G. Marzouk, Development and Economic Policy in the U.A.R. (Egypt) (Amsterdam: North Holland Publishing Co., 1965), p. 306.

[2] The Plan Frame, p. 9.

[3] There may be some important noneconomic factors in the choice of such industries. Unfortunately, the Plan Frame does not mention anything about such factors. We are, therefore, forced to leave them out of account.

Unless careful scrutiny is practiced in the choice of industries for import substitution, the whole development effort may be frustrated. There is a growing wave of alarm against "too much import substitution", which suggests that there is a limit as to how far any country can proceed with import-substitution policy.[4] The Secretary General of the UNCTAD, Raul Prebisch, has succinctly portrayed the situation thus.

> The simple and relatively easy phase of import substitution has reached, or is reaching its limit in the countries where industrialization has made most progress. As it happens, the need arises for technically complex and difficult substitution activities, which usually require great capital intensity and very large markets if a reasonable degree of economic viability is to be attained. Thus, there are limits to import substitution in the developing countries which cannot be exceeded without a frequent and considerable waste of capital.[5]

As it is clear from the above quotation, reasons for such pessimism are many. For one thing, market limitations are bound to prevent a country adopting an import-substitution policy from realizing the potential economies of scale which are possible in many manufacturing industries. The result would be a high cost of production which, because of the fact that industries within an economy are interrelated, will "spill over" to other industries. Moreover, protection -which is generally the main vehicle for import substitution- once granted to an industry,

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[4] Cf. Wilfred Malenbaum, "Comparative Costs and Economic Development: the Experience of India", AER, LIV (May 1964); Santiago Macario, "Protectionism and Industrialization in Latin America", Economic Bulletin for Latin America (March, 1964); the report by the Secretary General of the UNCTAD, Raul Prebisch in U.N., Proceedings of the United Nations Conference on Trade and Development, (UNCTAD), vol. II; Policy Statements (New York, 1964) and I.M.D. Little, T. Scitovsky and M. Scott, Industry and Trade in Some Developing Countries (Oxford: O.E.C.D. Development Center, 1970).

[5] R. Prebisch, op. cit., p. 14.

becomes very difficult to remove. Finally, and more important, countries may be tempted, inter alia, by savings of foreign exchange when they resort to a policy of import substitution. But because of the neglect of the indirect import requirements most of them end up spending more foreign exchange for imports of intermediate goods.[6]

This last reason for pessimism about import substitution is the basis for the present work. The Egyptian Plan envisaged a change in the external position from a deficit in the balance of trade of LE 60.4 million for the base year 1959/60 to a virtual equilibrium in that balance by the end of the Plan period in 1964/65. However, instead of this projected equilibrium, there emerged a large deficit.[7] It will be maintained that, although many factors contributed to this unplanned outcome,[8] the choice of industries for import substitution, as reflected in the pattern of investment, is an important factor in this respect. It seems that the indirect import requirements implied by the investment program embodied in the Plàn were not carefully worked out.

The Plan suffered from two other major deficiencies. The planners based their calculations on the premise that labour is abundantly available and does not constitute a barrier to the growth of the economy. Hence,

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[6]This is often coupled with a change in the structure of imports towards more rigidity. See S. Macario, op. cit., p. 80. It is interesting that W. Malenbaum has noted in this regard that despite the restrictive import policy of India, this "has as yet not reduced the ratio of total imports to national product". Malenbaum, op. cit., p. 395.

[7]In 1964/65, imports totalled LE 400.8 million while exports were only LE 265.2 million, and hence, there was a balance-of-trade deficit of LE 135.6 million. See U.A.R., CAPMS, Statistical Handbook (Cairo: June, 1971), pp. 236-241.

[8]Such as the cotton crop failure of 1961/62.

they ignored labour completely in their selection of investment projects.[9] The contention in this dissertation is that, even though labour may be in excess supply,[10] there is still some cost involved in shifting labour from rural areas (where it is assumed abundant) to urban areas (where it is scarce). Even more, it is unskilled labour that is abundantly available, but only skilled labour is required. Thus, it cannot safely be assumed that labour is abundantly available and hence treat it as a free factor. The approach followed here is to incorporate the cost of education and training of labour as part of the constraints in the overall problem of allocating investment resources.

Moreover, it seems that the Plan was not based on a comprehensive model of the economy that takes interdependencies into account.[11] This points to a serious gap in the techniques of planning in Egypt. As a result, the fundamental interdependencies among the different sectors were not well understood in the Plan. For example, the planners failed to place emphasis on agriculture commensurate with its position in Egypt's system of production. This led to the recurrence of several bottlenecks and shortages. The present work is construed as a step towards

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[9] Hansen and Marzouk, op. cit., p. 305.

[10] Some authors, notably Bent Hansen, would even take issue with this. Hansen argues, on the basis of empirical evidence, that there is no absolute surplus of labour in Egyptian agriculture. Ibid., pp. 78-79.

[11] Cf. Charles Issawi, Egypt in Revolution: An Economic Analysis (London: Oxford U. Press, 1963), p. 68; Hansen and Marzouk, op. cit., p. 305; and Patrick O'Brien, The Revolution in Egypt's Economic System (London: Oxford U. Press, 1966), p. 158.

filling this gap. We shall thus study the interdependencies in Egypt's structure of production. The purpose here is to identify the sectors that are crucial to expansion in the rest of the economy. It is important to determine if certain individual sectors have to be expanded as a prerequisite for expanding others. It is also important to know if certain sectors have to be developed as a group, because of conditions on the production side.

In the light of the above discussion, the following hypotheses will be tested.

(a) The individual sectoral output targets in the Plan are not consistent.

(b) The overall growth target and the balance-of-trade target are not consistent.

(c) The introduction of labour cost in the investment allocation problem changes the pattern of that allocation.

2. The Method of Approach

The method of approach we follow here is that of activity analysis. It includes both input-output analysis and linear programming. This approach has had much currency in the literature on development planning in recent years.[12] This approach is especially suited to the questions

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[12] The literature on this area of development planning is vast. Here are some of the most important pioneering examples. Ragnar Frisch, A Method of Working out a Macro-economic Plan Frame with Particular Reference to the Evaluation of Development Projects. Foreign Trade and Employment (Oslo: Oslo U. Institute of Economics, 1958) (mimeographed); J. Sandee, A Demonstration Planning Model for India (Bombay: Asia Pub.

examined here. Firstly, these questions are concerned with the optimal allocation of investment resources and hence with the selection of the best production activities. The linear programming approach determines optimal choice as defined by a criterion function known in linear programming terminology as the objective function. Thus, by means of linear programming, planners are able to pick the best of many feasible alternatives. Secondly, the consistency among the individual targets in the plan is very crucial, so also is the feasibility of those targets. In the absence of a general equilibrium framework, such as linear programming, there is no guarantee that a compatible set of targets will be attainable. This is the situation encountered most frequently in the ordinary development literature. Planning on the basis of linear programming combines both consistency and feasibility simultaneously in the problem of resource allocation.[13]

House, 1960); H.B. Chenery and K. Kretschmer, "Resource Allocation for Economic Development", Econometrica, XXIV (1956), 355-399. For a sample of more recent studies see the collection in H.B. Chenery et al., eds., Studies in Development Planning (Cambridge, Mass: Harvard U. Press, 1971).

[13]In fact the distinction between the consistency aspect and the feasibility aspect of a plan antedates the practice of formulating plans on the basis of linear programming models. Consistency refers to the compatibility among the different targets of the plan. Feasibility refers to the realism of the plan itself, in the light of resource availability. An example should clarify this subtle distinction. Suppose that, on the basis of a politically determined vector of final demand, the planners work out a set of sectoral output levels using an input-output table. Suppose also that these output levels are adopted as targets. Such targets are then said to be consistent. However, it is possible that available production capacities and resources are not sufficient to generate those output levels. The targets are then called infeasible. In a linear programming, context, the resource-avaiability aspect is taken care of and hence any program that is consistent has to be feasible.

Thirdly, because of institutional and other rigidities in the Egyptian economy, markets, particularly factor markets, often fail to reflect the social valuation. It then becomes mandatory to use shadow prices instead of market prices, in those cases, to guide the allocation of resources in the course of economic development. The solution of the dual problem corresponding to the primal problem provides the shadow prices needed. Finally, the indirect effects of any course of action are often no less important than the direct effects. With respect to economic decisions this is certainly true. Thus, during the implementation of Egypt's first Five-Year Plan, many shortages developed, and production could not respond quickly enough to these shortages. The result was rising prices, interruption of production and balance-of-payments deficits. To the extent that these events were unplanned, it means that the planners were not sufficiently aware of the implications of the interdependence among different sectors. One needs therefore to examine the interrelation among the different sectors of the economy to determine which sectors are vital to the expansion in the economy at large. The input-output analysis is particularly useful here. By input-output analysis planners are in a better position to identify potential bottlenecks and to devise the necessary measures to avoid or at least minimize such bottlenecks.

3. Organization of the Dissertation

The organization of the dissertation follows from the previous discussion of the problem and the method of approach to be adopted. Thus, in Chapter II we examine the main features of Egypt's first Five-Year Plan from the standpoint of the theory of economic policy. Here, the aims or objectives of the Plan are specified and interpreted. The relationship among the aims, among the targets, and between the aims and the targets will be examined in order to test the consistency of the Plan. Two consistency tests are applied, one to the sectoral output targets and the other to the overall growth and the balance-of-payment targets in the Plan. In Chapter III, some aspects of the structure of production are analyzed. The purpose is partly to answer some of the questions raised in the previous chapter. Some indices of interdependence are computed, based on the input-output tables of the Egyptian economy for the years 1954 and 1963/64. The often observed phenomenon of recursivity in the structure of production will be discussed in the light of the triangularized input-output matrices. Also, the direct, indirect, and total (direct plus indirect) import coefficients are computed. The implications of these coefficients for the import requirements are discussed and contrasted with the Plan targets in this regard.

A planning model for the Egyptian economy is developed in chapter IV. This model is of the linear programming variety. The model distinguishes between domestic and foreign sources of investment, and takes account of the cost of education and training of labour. Both the primal and the dual formulations of the model are explored, and the sensitivity of the results to the basic assumptions of linear models are also discussed. In Chapter V the model is solved numerically. The implications of the model solution for the optimal pattern of investment are examined. We also discuss the pattern of comparative advantage implied by the model. The model is used to assess the pattern of capacity expansion and investment in Egypt's first Five-Year Plan. In particular the effect of the planners' practice of ignoring labour cost on the allocation of resources is studied. We also analyze the implication of expanding certain industries as planned, and determine the pattern of capacity expansion when the objective is to minimize foreign capital inflow. Finally, Chapter VI is devoted to summarizing the basic thesis and stating the main conclusions. Points for further research conclude the chapter.

CHAPTER II

AIMS AND TARGETS IN EGYPT'S FIRST FIVE-YEAR PLAN

The purpose of this chapter is to examine Egypt's first Five-Year Plan from the standpoint of the theory of economic policy. The main features of the Plan, as a statement of economic policy, will be singled out. This lays the ground for some of the major criticisms discussed in the later sections. In Section 1 we examine briefly the nature of aims and targets in the theory of economic policy. Section 2 examines aims and targets in the Plan. Consistency aspects of the Plan will be discussed in Sections 3, 4 and 5. The discussion of consistency in Section 3 is general, aimed at setting the tone for empirical consistency tests performed in Sections 4 and 5.

1. Aims and Targets in the Theory of Economic Policy

Economic policy is about ends and means.[1] The ends are called targets and the means are known as instruments. A "target" refers to any economic magnitude deemed desirable by the decision-maker. The means to achieve the target is called an "instrument". There is distinction in the literature between aims and targets. Aims refer to the global objectives of the policy-maker or society in question. These are usually cast in broad, loose terms. The targets are more specific.

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[1]Bent Hansen, The Economic Theory of Fiscal Policy (London: George Allen and Unwin Ltd., 1958), pp. 1-8.

The theory of economic policy distinguishes between fixed and flexible targets.[2] A policy with fixed targets is one where the target variables take on fixed numerical values (for example, to make investment during a given period LE 500 million). If, however, instead of fixing numerical values for the target variables, a function of the variables is to be optimized, the policy will be one with flexible targets. An example is the maximization of employment, or per capita consumption, or the minimization of the balance-of-payments deficit. In practice, usually a combination of fixed and flexible targets are assigned for economic policy. An example would be to stipulate as targets the minimization of investment (the flexible target) necessary to achieve a given increase in national income (the fixed target). Distinction is also made between four types of variables:[3] data, target variables, instruments and irrelevant variables. Target variables and instruments were defined above. The data are those variables considered external to the economic context of the problem at hand. Irrelevant variables are those endogenous variables other than the targets, i.e., of no direct interest to the policy-maker. The basis of the distinction between the four types may be revealed by the scheme of Table 2.1.

[2] Jan Tinbergen, Economic Policy: Principles and Design, 4th revised printing (Amsterdam: North-Holland Pub. Co.), 1967.

[3] See Jan Tinbergen, On the Theory of Economic Policy (Amsterdam: North-Holland Pub. Co., 1952), Ch. II.

Table 2.1

Classification of Variables in Economic Policy

	Variables of interest to economic policy	Variables of no interest to economic policy
Jointly-determined	target variables	irrelevant variables
Pre-determined	instruments	data

Generally speaking, the theory of economic policy is a study of the end-means relationship in the sphere of the "economic".[4] The end-means relationship by itself is very general; its study falls within the realm of logic. However, when we talk about the end-means relationship in the economic world, we discover that there is more to it than pure logic; it acquires substance that emanates from the particular mechanisms and regularities prevailing in the economic phenomena. Thus one of the foremost questions is that of the consistency of economic policy. This consistency may have to do with the relationship among the targets or between the targets and the instruments. Inconsistency among the targets is a situation where the achievement of one target precludes the achievement of another. It may result from a contradiction between some

[4]More broadly, economic policy is about the "what", the "how" and the "who", to quote Boulding. See K. Boulding, Principles of Economic Policy (Englewood Cliffs: Prentice-Hall Inc., 1958). By these terms Boulding means the targets, instruments and the policy-maker, respectively. See Chapter 1 of his book for very lucid non-technical exposition.

targets and one or more equations in the system.[5]

There are, generally speaking, two rules of thumb for economic policy: (1) the number of instruments must be at least as large as the number of targets, and (2) all the targets depend on all the instruments combined.[6] It is also important to note that the value of the instruments will depend on the data of the system. We shall now turn to the application of the above concepts to Egypt's first Five-Year Plan.

2. Aims and Targets in the Plan

In this section we examine the Plan from the standpoint of aims, and targets. We shall also examine what the planners thought would be the instruments of the economic policy embodied in the Plan.[7] But first we must say a few words about the way the Plan was constructed.[8]

It was the global target of the Plan, decided by the political leadership, to double national income in ten years. The National Planning Committee used an aggregate capital-output ratio to estimate the total amount of investment needed. That amount was broken down by sector. The

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[5] Tinbergen, *op. cit.*

[6] *Ibid.*, pp. 27-28. The two statements in the text should be qualified. In the cases which Tinbergen calls consecutive or partitionable, the values of some of the instruments may depend only on the values of some of the targets. A similar situation holds for cases of corresponding consecutivity or corresponding partition. See *ibid.*, pp. 28-30.

[7] There is a good survey of the goals and instruments of Egypt's economic policy for the period preceding the Plan, in Nabil Sukkar, "Chenery-Bruno Test of Egypt's First Comprehensive Plan," Unpublished Ph.D. Thesis, Indiana University, 1969, pp. 34-39.

[8] Regarding this point we shall draw heavily on the interesting material in Patrick O'Brien, *The Revolution in Egypt's Economic System* (London: Oxford U. Press, 1966), pp. 156-164.

implications for exports, imports and final demand were then derived using an input-output table. Within each sector, the individual ministries and departments were invited to propose individual projects to fit into the global frame of investment. The establishment of such a frame, in a consistent fashion, was the task of the National Planning Committee (NPC).

According to the preamble of the Plan Frame, the aims of the Plan may be summarized as follows:

(a) raising the welfare of the populace,

(b) distributing national income such as to achieve the "socialist, democratic, and cooperative society",

(c) activating the labour force by education and training,

(d) availing every able and willing citizen of an opportunity to work, and

(e) achieving balanced self-sustained growth of the economy.

In a nutshell, these aims are rooted in growth, social justice, and full employment.

The Plan had three basic targets:

First, to increase value added by 40% over the five-year period, 1960/61 - 1964/65;

Second, to achieve an equilibrium in the balance of payments (no excess of exports over imports) by 1964/65;[9]

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[9] Some writers, notably Issawi mention that by 1964/65 imports will decline from LE 229.2 million to LE 214.9 million, while exports will rise from LE 168.8 million to LE 229.3 million, thus turning the 1959/60 deficit of LE 60.4 million to a surplus of LE 14.4 million. He cites the French-language version of the Plan Frame. However, according to the Arabic-language version of the Frame, exports are to rise from (continued)

Third, to increase employment by 1026 thousand workers, from 5975 thousand workers in 1959/60 to 7001 thousand in 1964/65.[10]

The planners were not thinking consciously in terms of targets and instruments, and hence they were not explicit on what instruments they intended to use. But the history of economic programming in Egypt as well as the method followed in constructing the Plan may provide some clues as to the nature of the instruments therein. At the beginning of Section 2 we already outlined briefly the way the Plan was constructed. We should add here that when it could not get the private sector to implement the investments that it envisaged, the government decided to nationalize most of the large industrial enterprises in 1961 and then in 1963. We may conclude, therefore, that the total volume of investment was an instrument. But having only one instrument and more than one target violates the first rule of thumb for economic policy, and will likely lead to conflict among the targets.

We may formalize the argument with the help of the following simple model. We use the following notation:

LE 158.3 million in 1959/60 to LE 214.7 million in 1964/65, with the import figures being the same as those quoted by Issawi. This means that the balance of payment will be in equilibrium by the end-year of the Plan. The reason for the discrepancy in the export figures may be due to the difference in the basis of valuation. It seems that the figures quoted by Issawi for exports refer to the value after adding trade margins, a thing that was not included in his import figures. See Ch. Issawi, Egypt in Revolution, op. cit., p. 67, and Plan Frame, Tables 28 and 28-a.

[10]This amounts to 17 per cent increase over the Plan period, a growth rate much lower than that of national income. This indicates a marked bias against labour-intensive projects. In fact, as O'Brien put it, "officials...appeared uninterested in capital-labour ratios". See O'Brien, op. cit., p. 278.

y_{oo} = increment in total output (including intermediate inputs) over the Plan,

v_{oo} = increment in gross value added over the Plan,

m_{oo} = increment in imports of goods and services in the target year,

x_{oo} = increment in exports of goods and services in the target year,

d_{o2} = increment in foreign capital inflow in the target year,

i_{oo} = gross fixed investment over the Plan.

We postulate the following relationships:

$$v_{oo} = \nu_{oo} y_{oo} \tag{2.1}$$

$$y_{oo} = i_{oo}/\kappa_{oo} \tag{2.2}$$

$$m_{oo} = \bar{m}_{oo} + \varepsilon_{oo} y_{oo} + \omega_{oo} i_{oo} \tag{2.3}$$

$$x_{oo} = \bar{x}_{oo} \tag{2.4}$$

$$d_{o2} = m_{oo} - x_{oo} \tag{2.5}$$

where ν_{oo}, κ_{oo}, ε_{oo} and ω_{oo} are fixed scalars, and variables with a bar are given exogenously. Equations (2.1) - (2.5) should be solved to express the instrument, i_{oo}, in terms of the target variables, v_{oo} and d_{o2}.[11]

From (2.1) and (2.2) we get

$$i_{oo} = (\kappa_{oo}/\nu_{oo}) v_{oo} \tag{2.6}$$

and from (2.2) - (2.5)

$$i_{oo} = \kappa_{oo}(d_{o2} - (\bar{m}_{oo} - \bar{x}_{oo})) / (\varepsilon_{oo} + \omega_{oo}\kappa_{oo}) \tag{2.7}$$

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[11]Since the purpose of this section is only to demonstrate the relationship between the instruments and the targets, we decided to leave out the employment target, to make things simple. The exclusion of the latter from the analysis should not affect the conclusion.

The point that we would like to emphasize is that the value of i_{oo} from (2.6) may not be the same as that from (2.7). Under the circumstances, it is clear that certain inconsistencies may emerge.

If we treat the specified "surplus" in the balance of payments (or, rather, foreign capital inflow) by 1964/65 as a target, then (2.6) and (2.7) contain two targets (v_{oo} and d_{o2}) but only one instrument (i_{oo}). Only by sheer coincidence would a single value of i_{oo} achieve both fixed targets. Most probably, however, the value of i_{oo} implied by the one will differ from that implied by the other. We say that the two targets are, because of the nature of the instrument, in conflict.[12] On the other hand, if d_{o2} is assumed to be a forecast rather than a target, d_{o2} will then belong to the category of irrelevant variables, to use Professor Tinbergen's terminology. Here, there will be no inconsistency in the targets; but the likelihood of d_{o2} actually reaching the specified value will then depend on how accurately that value was determined in the first place.

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[12] Sukkar ran a consistency test on the aggregate targets of the Plan, which revealed inconsistency. See Sukkar, op. cit., p. 104. We may, for short, call conflict among the aggregate targets macro-inconsistency and conflict among sectoral targets micro-inconsistency. On logical grounds, the absence of the first does not per se rule out the possibility of the latter, while the existence of the first necessarily implies the existence of the latter. If we accept the result of the test performed by Sukkar on the aggregate targets it must follow, therefore, that (at least some of) the sectoral targets must be in conflict. This is an interesting conclusion; but equally interesting is the question: where are sectoral inconsistencies located? This is what we shall attempt to answer in sections 3, 4 and 5.

3. Consistency Aspects of Egypt's Five-Year Plan: General Discussion

Generally, there are three levels to the consistency aspect of the Plan. At one level there is consistency among the aims; at a lower level there is consistency among the targets; and still at another level there is consistency between the targets and the instruments. Since the planners were not very specific about the number and nature of instruments to be used, we shall refrain from discussing consistency between the targets and the instruments. Let this be a point for further research.

Looking now at aims (a) - (e) we notice that in particular, aims (d) and (e) may not be consistent. One reason is that, in order to provide every able and willing citizen an opportunity to work, it may be necessary to expand certain sectors (the ones with a larger capacity to absorb labour) faster than others. For example, it may be that, given the limited resources available for investment, either for capital formation or for training labour, the best that could be done would be to expand cottage or handicraft industries. If by balanced growth is meant that all sectors of the economy keep in step,[13] then the aim of full employment may not be consistent with the aim of balanced growth.

We now turn to a discussion of the consistency among targets in the Plan. There are two areas where there may be inconsistency. First, it is not certain whether the national-income target is consistent with the balance-of-payments target. Most probably, they are inconsistent.

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[13]This is one emphasis of the theory of balanced growth, to avoid problems of supply. Another emphasis of the theory, based on demand considerations, prescribes a "big push" for successful development. See Albert O. Hirschman, The Strategy of Economic Development (New York and London: Yale U. Press, 1958), pp. 51-52.

This is because the magnitude of the import-substitution effort would have to exceed one-third of total imports in the target year, a task that is likely to be very difficult to achieve.[14] The consistency aspects of these two targets will be examined more rigorously in a following section, using input-output techniques.

Another aspect of target inconsistency arises in connection with the individual output targets for different sectors. Again, let us take a look at Table 1.1 in Chapter I. The economy is divided into six main sectors: agriculture, electricity and manufacturing, construction and building, infrastructure sectors, commerce and services. It was planned that value added in these sectors should increase over the Plan period by 25%, 100%, -2%, 21%, 28% and 27%, respectively. These target growth rates do not reflect any commitment to balanced growth.[15] Even more serious, it is not very clear if these sectoral growth targets constitute a consistent set. As we know well from the technique of input-output analysis

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[14]In 1959/60 the ratio of total imports to GNP was about 18 per cent. Applying this ratio to GNP in the target year we get LE 323.4 million (= 1795 x 0.18). Target imports are LE 214.9 million, which implies an import-substitution program of about one third of imports in the target year.

In this regard, it is interesting to note that regression analysis of Egyptian imports over the period 1952/53 - 1964/65 produced an income elasticity of imports larger than one. See Essan Eldin H. Montasser, "Egypt's Pattern of Trade and Development," Unpublished Ph.D. thesis, Princeton U., 1972, pp. 173-182. Cross section regression analysis of 53 (developed and less-developed) countries indicated that "import requirements tend to be higher in absolute terms as total GDP of various countries increases." See Loreto M. Dominguez, "Economic Growth and Import Requirements," JDS, VI (April 1970), 292.

[15]As was mentioned earlier, balanced growth is one of the avowed aims of the Plan.

the different sectors of the economy are mutually interdependent. Sectors supply intermediate inputs to other sectors and demand inputs from each other. This fact imposes stringent limitations on the ability of some sectors to grow faster than others - given the balance-of-payments position. The quantitative production relationships among the individual sectors will be examined in detail in Chapter III. In this section we shall limit our discussion to these general remarks and move on to the next sections, where we are to perform a set of consistency tests to provide a more rigorous treatment.

4. Testing the Consistency of the Sectoral Output Targets

The procedure that we shall follow here is rather straightforward We start out with the final bill of goods (that is, the vector of final demand) envisaged by the planners in the end-year of the Plan, 1964/65. By working this bill out through an input-output model, we solve for the sectoral output levels. On comparing the computed output levels with the planned ones we get an idea as to how consistent the latter are. The basic assumption here is that the input-output table used reflects the true interdependencies in the economy and, hence, yields a consistent set of output levels. This set is the norm against which the planned set is to be examined for consistency.[16]

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[16] There are many problems involved here, however. One is that the input-output coefficient matrix may not reflect the true technical relations in the economy. This is not a problem with the approach per se. Another problem, a more serious one, is that the result may depend to a large extent on the degree of aggregation. See J.B. Balderston and T.M. Whitin, "Aggregation in Input-Output Models," in O. Morgenstern, ed., Economic Activity Analysis (New York: John Wiley and Sons Inc., 1954), pp. 79-128.

Formally, we have the standard input-output model in the structural form, using matrix notation

$$A_d y_o^* + f_p = y_o^* \tag{2.8}$$

where A_d is an N x N domestic input-output coefficient matrix, f_p is an N x 1 vector of planned final demands. We solve (2.8) for y_o^* in terms of f_p to get

$$y_o^* = (I - A_d)^{-1} f_p. \tag{2.9}$$

y_o^* is a set of consistent output levels for the individual sectors against which the planned levels, y_p^*, will be judged.

It is not necessary for the consistency of the sectoral output levels that $y_{oi}^* = y_{pi}^*$ for all i because one must make some allowance for random errors. We, therefore, set up the hypothesis that the difference between y_o^* and y_p^* is insignificant, in the statistical sense. There are many alternative methods of testing such a hypothesis. One particularly suitable method is to regress the computed output levels for the 1954 and 1963/64 input-output data on the planned output levels to obtain a regression equation of the form:

$$y_{oi}^* = \psi_{oo} + \psi_{o1} y_{pi}^* \tag{2.10}$$

The joint hypothesis is $\psi_{oo} = 0$, and $\psi_{o1} = 1$. Since the computed output levels, y_{oi}^*, are, by their very derivation, mutually consistent, the rejection of the above null hypothesis means that the planned output levels are not consistent. The statistic most suitable for the test at hand is Hotelling's T^2.[17]

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[17] For the statistical-theoretic rationale for this statistic, see Ben W. Bolch and Cliff J. Huang, Multivariate Statistical Methods for Business and Economics (Englewood Cliffs, N.J.: Prentice-Hall Inc., 1974),

(continued)

Table 2.2 contains the planned final bill of goods, the planned output levels estimated using the planned bill of goods and the input-output data for 1954 and 1963/64. It is clear from comparing columns (2), (3) and (4) that the planned output levels for mining and quarrying, basic metal industries and transport and communications are larger than what is implied by the planned final bill of goods. On the other hand, the planned output levels for nonmetallic manufacturing and other industries are smaller than what is implied by the same bill of goods.

When the output levels we estimated on the basis of the final bill of goods were regressed on the planned levels in the fashion indicated above, the resulting numerical estimates were as indicated in equations (2.11) and (2.12) below.

$$y^*_{54,i} = \underset{(0.547)}{7.5310} + \underset{(17.677)}{0.8674}\, y^*_{pi} \qquad (i = 1,\dots,N) \qquad (2.11)$$

$$y^*_{63/64,i} = \underset{(-0.439)}{-4.3253} + \underset{(28.406)}{0.9975}\, y^*_{pi} \qquad (i = 1,\dots,N) \qquad (2.12)$$

where $y^*_{54,i}$ and $y^*_{63/64,i}$ are the output levels estimated on the basis of the 1954 and 1963/64 input-output data, respectively, and the numbers in parentheses are the t-scores. On the basis of these estimates the joint hypothesis was rejected.[18] We infer from this statistical analysis, then, that the planned output levels are not identical with the required output levels

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pp. 128-129.

[18]The sample values of T^2 were approximately 23567.4 and 13443.9 for the 1954 and 1963/64 equations, respectively. This is much larger than the theoretical value of 12.02 at the one per cent confidence limit and with degrees of freedom 2 and 18. For a discussion of the computational procedure, see Bolch and Huang, *ibid.*

Table 2.2

Planned and Estimated Industry Output Levels for Egypt

(in LE million at 1959/60 factor prices)

No.	Industry	Planned Final Demand (1)	Planned Gross Output Levels (2)	Gross Output Levels based on: the 1954 input-output matrix (3)	Gross Output Levels based on: the 1963/64 input-output matrix (4)
1	Agriculture	137.6	732.2	643.6	743.8
2	Ginning and pressing	135.6	186.5	188.5	189.8
3	Mining and quarrying	16.5	73.4	48.1	32.5
4	Food processing	399.1	506.1	560.2	505.0
5	Tobacco	17.5	18.0	30.1	17.5
6	Spinning and weaving	141.5	239.8	245.2	238.7
7	Clothing	33.2	33.2	34.8	34.3
8	Paper and paper products	2.3	18.2	9.0	16.1
9	Chemical manufacturing	34.1	92.6	70.4	94.1
10	Coal and petroleum refining	37.1	89.8	72.8	83.5
11	Nonmetallic manufacturing	20.9	23.7	30.3	36.6
12	Basic metals	14.9	123.9	39.3	47.7
13	Metal products	24.2	33.4	34.9	38.9
14	Machinery except electrical machinery	11.6	19.0	42.3	13.4

Table 2.2 (Continued)

Planned and Estimated Industry
Output Levels for Egypt

(in LE million at 1959/60 factor prices)

No.	Industry	Planned Final Demand (1)	Planned Gross Output Levels (2)	Gross Output Levels based on: the 1954 input-output matrix (3)	Gross Output Levels based on: the 1963/64 input-output matrix (4)
15	Electricity	13.7	35.1	32.2	39.8
16	Building and construction	122.0[a]	122.0	126.9	128.2
17	Transport and communications	80.0[b]	164.0	152.3	146.2
18	Other services	330.0[b]	765.0	806.6	529.4
19	Wood and furniture	21.7	23.3	23.7	32.9
20	Other industries	110.8	136.2	149.0	161.7

Sources and Notes:

Column (1) was derived from Table 28-a of Plan Frame using the formula: Final demand = gross output + imports (c.i.f.) - intermediate deliveries - imports for final use.

Column (2) was extracted from Tables 18 and 20 of Plan Frame.

Columns (3) and (4) are estimated according to equation (2.9), using the 1954 and 1963/64 input-output matrices, respectively, along with the planned final demand vector of column (1).

[a]For this industry, we assumed that all output goes to final demand.

[b]For this industry, we assumed that about one half the output goes to final demand.

estimated from the planned final bill of goods on the basis of the input-output data for either 1954 or 1963/64. This leads to the conclusion that the planned output levels are not consistent.

5. Testing the Consistency of Growth and Balance-of-Trade Targets

A test was also designed to determine if the targets of 40% growth in value added and a zero deficit in the balance of trade are compatible. In this connection we shall also try to find out whether the indirect import requirements have been taken into account. To do that, we take the planned final bill of goods (column (1) of Table 2.2) as our starting point. Also, we shall accept the export figures given in the Plan Frame at their face value. It only remains to deduce the import levels implied by the vector of planned final demands. Utilizing input-output data the total (direct plus indirect) intermediate import requirements implied by the vector of planned final demand is calculated. To this is added the amount of imports required for final use. This sum is the total figure for imports, which must be matched by the total value of exports. Any discrepancy between total net exports (exports less imports) calculated here and the net exports figure in the Plan can be taken as an indication of inconsistency only if an equal savings cannot be achieved through import substitution. If it is not possible to carry out an import substitution program which will save imports by the amount of the gap, then it is concluded that the growth target and the balance-of-trade target are not consistent. On the other hand, if such a program is possible, it may be concluded that the two targets are consistent.

Let us outline the formal test. From the input-output table one derives the input-output coefficients from imports

$$\alpha^{m}_{ij} = m_{ij} / y^{*}_{oj} \qquad (i,j = 1,\ldots,N) \qquad (2.13)$$

Deliveries from imports of the ith good to the jth industry are denoted by m_{ij}, and y^{*}_{oj} is the gross output of the jth industry. The input-output coefficients α^{m}_{ij} give the per unit direct import requirements only. The per unit direct plus indirect import requirements are given by[19]

$$\eta_{ij} = \sum_{k=1}^{N} \alpha^{m}_{ik} \, \varepsilon_{kj} \qquad (i,j,k, = 1,\ldots,N) \qquad (2.14)$$

where ε_{kj} is the typical element of the inverse matrix $E = (I - A_d)^{-1}$. Thus, the direct plus indirect intermediate import requirements implied by the planned vector of final demand are

$$m^{*}_{1i} = \sum_{j=1}^{N} \eta_{ij} \, f_{pj} \qquad (i = 1,\ldots,N) \qquad (2.15)$$

The vector of imports for final use, say m^{*}_{2}, is assumed to be as estimated in the Plan Frame. The total figure for imports will thus be

$$m^{*}_{o} = \sum_{j=1}^{N} m^{*}_{1j} + \sum_{j=1}^{N} m^{*}_{2j} \qquad (2.16)$$

and the balance of trade deficit will be

$$d_{o2} = m^{*}_{o} - \bar{x}_{o} \qquad (2.17)$$

where $\bar{x}_o$ is the total value of exports as expressed in the Plan Frame. The consistency of the growth and balance of payments targets will depend on whether an import substitution program can be implemented to save d_{o2}. Specifically, if it can be demonstrated that import substitution of the kind envisaged in the Plan can actually save imports of that magnitude, then the two targets are consistent. If that cannot be demonstrated,

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[19] See Chapter III for details.

then the two targets are inconsistent. We must admit, however, that any such demonstration is, to some degree, more a matter of art and faith than science.

Table 2.3 contains the results of computations based on formulae (2.13) - (2.15). The final demand imports in column (1) of the table are derived, as mentioned above, straight from the Plan Frame. Total planned imports are also derived from the same source. To see if the planners really took account of imports for intermediate use, we applied equation (2.15). This was done using the planned final demand vector in column (1) of Table 2.2 once with the import coefficient matrix of 1954 and another time with the import coefficient matrix of 1963/64. The results are recorded in columns (3) and (4), respectively. Estimated total imports are then taken as the sum of final demand imports and imports for intermediate use. These are recorded in columns (5) and (6).

Calculations based on equation (2.16) produce a value of m_o^* between LE 308.3 million and LE 347.5 million, for 1964/65, depending on whether we use the 1954 or the 1963/64 input-output and import coefficient matrices. This is about 44% - 62% higher than the figure for planned imports for the target year 1964/65. Hence, d_{o2}, the export deficit, ranges from LE 94 million to LE 133 million. This range encompasses the value we would obtain had we applied Maizels' aggregate measure of gross import substitution.[20] It remains now to be determined

[20]Maizels defines gross import substitution during a given period as "the difference between actual imports at the end of the period and what they would then have been had they formed the same proportion of (continued)

Table 2.3

Planned and Calculated Imports
for Egypt in 1964/65

(in LE million at 1959/60 factor prices)

No.	Industry	Final Demand Imports	Total Planned Imports	Intermediate Imports Based on the Input-Output Matrix for		Total Imports Based On the Input-Output Matrix for	
				54	63/64	54	63/64
		(1)	(2)	(3)	(4)	(5)	(6)
1	Agriculture	11.8	47.9	10.0	48.5	21.8	60.3
2	Ginning and pressing	-	-	-	-	-	-
3	Mining and quarrying	-	-	11.4	32.8	11.4	32.8
4	Food processing	7.2	21.5	10.1	11.5	17.3	18.7
5	Tobacco	-	-	1.2	-	1.2	-
6	Spinning and weaving	-	1.6	8.6	5.8	8.6	5.8
7	Clothing	4.2	4.0	0.4	-	4.6	4.2
8	Paper and paper products	1.0	3.5	12.1	11.4	13.1	12.5
9	Chemical manufacturing	2.2	23.0	36.5	30.2	38.7	32.4

Table 2.3 (Continued)

Planned and Calculated Imports
for Egypt in 1964/65

(in LE million at 1959/60 factor prices)

No.	Industry	Final Demand Imports	Total Planned Imports	Intermediate Imports Based on the Input-Output Matrix for		Total Imports Based On the Input-Output Matrix for	
				54	63/64	54	63/64
		(1)	(2)	(3)	(4)	(5)	(6)
10	Coal and petroleum refining	-	2.6	21.5	6.2	21.5	6.2
11	Nonmetallic manufacturing	1.6	1.6	0.2	0.6	1.8	2.2
12	Basic metals	20.6	20.6	27.5	15.8	48.1	36.4
13	Metal products	-	4.1	6.5	12.2	6.5	12.2
14	Machinery except electric machinery	32.2	32.2	9.2	13.9	41.4	46.1
15	Electricity	-	-	-	-	-	-
16	Building and construction	-	-	-	-	-	-
17	Transport and communication	-	-	6.1	-	6.1	-
18	Other services	-	-	3.8	8.2	3.8	8.2

Table 2.3 (Continued)

Planned and Calculated Imports
for Egypt in 1964/65

(in LE million at 1959/60 factor prices)

No.	Industry	Final Demand Imports	Total Planned Imports	Intermediate Imports Based on the Input-Output Matrix for		Total Imports Based On the Input-Output Matrix for	
				54	63/64	54	63/64
		(1)	(2)	(3)	(4)	(5)	(6)
19	Wood and furniture	-	12.0	-	10.4	-	10.4
20	Other industries	38.8	40.3[a]	23.6	20.4	62.4	59.2
	Total	119.6	214.9	188.7	227.9	308.3	347.5

Sources and Notes:

Columns (1) and (2) are derived from Table 36 of Plan Frame.
Columns (3) and (4) are calculated using formula (2.15).
Column (5) = column (3) + column (1).
Column (6) = column (4) + column (1).
[a]Planned imports for other industries were derived as a balancing item; if calculated independently it would amount to LE 43.4 million.

if an import substitution program can be devised to achieve savings in imports of about half the base-year import bill over a mere five-year period. The answer depends, to a large extent, on the nature of imports to be substituted. For this reason it is necessary to break down the total imports into the main constituent commodities which are to be replaced. This entails distinguishing imports according to their industry of origin. This is already achieved since we are making use of the import coefficient matrix. By using the import coefficient matrix, intermediate imports of the same origin are lumped together.[21] Thus, when one is

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total consumption as at the beginning of the period." Cf. Alfred Maizels, Industrial Growth and World Trade (Cambridge: At the University Press, 1963), pp. 150-151. To apply this definition, note that what he calls actual imports at the end of the period is, in our case, planned import in the target year of the Plan, 1964/65. In the application we used the following numbers from the Plan Frame, Tables 28 and 28-a: total supply is LE 1793.9 million in 1959/60 and LE 2599.3 million in 1964/65; imports are LE 229.2 million and LE 214.9 million, respectively; giving a proportion of imports to total supply of 0.128 and 0.083, respectively. If the measure is applied using these values, gross import substitution in the Plan between 1959/60 and 1964/65 amounts to LE 117.0 million.

[21]This brings out the importance of distinguishing imported and domestic inputs in each cell of the input-output table. If only the import coefficient vector is available, it would not be possible (in estimating intermediate import requirements corresponding to any vector of final demand) to distinguish imports by industry of origin. If only an import coefficient vector is available, then the intermediate import requirements will be

$$\begin{bmatrix} \overset{m}{\alpha}_{o1} & 0 & \cdots & 0 \\ 0 & \overset{m}{\alpha}_{o2} & \cdots & 0 \\ \vdots & \vdots & & \vdots \\ 0 & 0 & \cdots & \overset{m}{\alpha}_{oN} \end{bmatrix} \begin{bmatrix} f_{o1} \\ f_{o2} \\ \vdots \\ f_{oN} \end{bmatrix} = \begin{bmatrix} \overset{m}{\alpha}_{o1} f_{o1} \\ \overset{m}{\alpha}_{o2} f_{o2} \\ \vdots \\ \overset{m}{\alpha}_{oN} f_{oN} \end{bmatrix} \qquad \text{(i)}$$

By contrast, if an import coefficient matrix is available, then the intermediate import requirements will be

(continued)

interested in examining the possibilities for import substitution, the import coefficient matrix is indispensable. We used this matrix to derive our estimates, and the figures in columns (3) and (4) in Table 2.3 are in fact imports by industry of origin. For example, the figures corresponding to industry i in these two columns represent import requirements of the ith industry's output for intermediate use. Import figures in columns (5) and (6) of Table 2.3 are also distinguished by industry of origin. This allows us to calculate two corresponding vectors of imports to be substituted. These are given in Table 2.4. The first column of Table 2.4 is the difference between columns (2) and (5) of Table 2.3,

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$$\begin{bmatrix} \alpha^m_{11} & \alpha^m_{12} & \cdots & \alpha^m_{1N} \\ \alpha^m_{21} & \alpha^m_{22} & \cdots & \alpha^m_{2N} \\ \vdots & \vdots & & \vdots \\ \alpha^m_{N1} & \alpha^m_{N2} & \cdots & \alpha^m_{NN} \end{bmatrix} \begin{bmatrix} f_{o1} \\ f_{o2} \\ \vdots \\ f_{oN} \end{bmatrix} = \begin{bmatrix} \sum_{j=1}^{N} \alpha^m_{1j} f_{oj} \\ \sum_{j=1}^{N} \alpha^m_{2j} f_{oj} \\ \vdots \\ \sum_{j=1}^{N} \alpha^m_{Nj} f_{oj} \end{bmatrix} \qquad \text{(ii)}$$

From (i), it is clear that $\alpha^m_{oj} f_{oj}$ represents imports from all industry origins required by the final demand of the jth industry. It is obvious from (ii) that $\Sigma_{j=1}^{N}\alpha^m_{ij} f_{oj}$ represents imports of industrial origin i required by final demands for all industries. Thus, in order to be able to distinguish the industrial origin of imports, the import vector is not helpful; we have to have an import matrix. Whether an import vector or an import matrix is used, the sum total of intermediate import requirements should be the same. This can be easily seen by summing the components of the right-hand side of (i) and (ii).

$$\sum_{j=1}^{N} \alpha^m_{oj} f_{oj} \equiv \sum_{i=1}^{N} \sum_{j=1}^{N} \alpha^m_{ij} f_{oj} \equiv \sum_{j=1}^{N} (\sum_{i=1}^{N} \alpha^m_{ij}) f_{oj} \qquad \text{(iii)}$$

The identity in (iii) is asserted by noting that $\alpha^m_{oj} = \Sigma_{i=1}^{N}\alpha^m_{ij}$. For a comprehensive discussion of this and other related aspects of estimating import requirements see Gamal E. Eleish, "Use of Input-Output Model in Calculating Foreign Exchange Requirements in Medium-Term Plans with Some Emphasis on the Developing Economies," a paper submitted to the First Interregional Seminar on Development Planning - Planning the External Sector: Techniques, Problems and Policies (Ankara, Turkey 6-17 Sept. 1965) mimeographed, p. 35.

Table 2.4

Import Substitution in Egypt's First Five-Year Plan

No.	Industry	Imports to be substituted	
		based on the 1954 input-output data	based on the 1963/64 input-output data
3	Mining and quarrying	11.4	32.8
5	Tobacco	1.2	-
6	Spinning and weaving	7.0	4.2
8	Paper and paper products	9.6	9.0
9	Chemical manufacturing	15.7	9.4
10	Coal and petroleum refining	18.9	3.6
11	Nonmetallic manufacturing	0.2	0.6
12	Basic metals	27.5	15.8
13	Metal products	2.4	8.1
14	Machinery except electric machinery	9.2	13.9
	Total	103.1	97.4

Source: Derived from Table 2.3.

and the second column is the difference between columns (2) and (6) of Table 2.3. It is easy to see, by referring to Table 2.4, that the output of the following industries will have to be at least partly substituted:[22] mining and quarrying, tobacco, spinning and weaving, paper and paper products, chemicals, coal and petroleum products, non-metallic manufacturing, basic metals, metal products, and machinery except electric machinery.

It is difficult to see how imports of tobacco can be totally eliminated when tobacco can hardly be grown in Egypt. Imports of mining and quarrying products, except for those that cannot be found in Egypt, may be replaced by increasing capacity in this industry. One may not envision any serious problem with regard to replacing imports of the spinning and weaving industry. Perhaps the most serious obstacles can be expected in connection with import substitution effort in paper and paper products, chemical manufacturing, basic metals and machinery. Obstacles may be the lack of raw materials such as may be the case with the paper and paper products industry. Most important, these obstacles may be the lack of skilled personnel: workers, managers, etc. This problem is more likely to affect such industries as chemicals manufacturing, basic metals and machinery. These are exactly the industries that were given great emphasis in the Plan. One may conclude, then, that it is highly unlikely that an import substitution program such as the one portrayed in Table 2.4 could be successfully carried out. Consequently

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[22]We only recorded the cases where the estimated import requirements based on both the 1954 and the 1963/64 input-output data exceeded the planned requirements. There were some industries for which estimated import requirements based on one set of production data exceeded the planned requirements, while estimates based on the other set fell short of planned requirements. We ignored such cases.

the 40% growth target and the balance-of-payments target are not likely to be consistent.

The foregoing analysis points out that the instruments of economic policy implied by the Plan were not very carefully worked out. It appears that either the planners failed to take account of the indirect import requirements,[23] or they overestimated the country's capacity to undertake such an enormous import substitution effort over such a relatively short period of time.

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[23]Students of development and economic policy in Egypt seem confused about this aspect. Some say that indirect import requirements were worked out, others say they were not. Of the first opinion is Patrick O'Brien and of the second are Issawi, and Hansen and Marzouk. Cf. O'Brien, *op. cit.*, p. 272; Hansen and Marzouk, *op. cit.*, p. 303; and Issawi, *op. cit.*, pp. 71-72.

CHAPTER III

INTERDEPENDENCE IN EGYPT'S STRUCTURE OF PRODUCTION

The analysis in Chapter II has demonstrated that the planned output targets of the individual industries were not consistent. If the input-output data on which this conclusion is based are correct, such inconsistency implies that the planners have failed to appreciate the basic interdependencies in the structure of production. This is evidenced by the recurrence of severe bottlenecks in the course of the execution of the Plan.[1] The analysis of the previous chapter has also shown that the balance-of-payments target and the overall growth target are inconsistent. It seems that the balance-of-payments target was set without careful examination of the total (direct plus indirect) import requirements for expanding capacities in different industries. The failure to take account of indirect import requirements, we believe, is one reason why the foreign exchange target was wide of the mark.

In this chapter, we would like to examine in more detail the pattern of sectoral interdependence. We would like to know if certain industries are vitally important to capacity expansion in other industries. The identification of such industries should prove very helpful, because it enables the planners to take the necessary precautions to

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[1]For example, lack of packing material, a product of the paper industry, interrupted the production of fertilizers. See Naiem A.El-Sherbiny, "Comparative Advantage and Development Planning Under the Foreign Exchange Constraint, With Special Reference to Egypt", Unpublished Ph.D. Dissertation, University of California, Berkeley, 1969, p. 157.

avoid likely bottlenecks. It is interesting to see if the individual industries can be fitted into a systematic pattern of dependence, such as a hierarchy, where some industries deliver inputs to others but do not receive any inputs from the latter. It is also important, in the light of the discussion in the previous chapter about the planners' estimate of import requirements, to identify the industries that depend heavily on imports. Also important for deriving the balance-of-payments implications of any overall capacity expansion in the economy is the estimation of indirect import requirements for individual industries.

The plan of this chapter, therefore, is the following. In Section 1 the input-output model will be presented, along with some discussion of the input-output coefficients matrix[2] and its inverse. Section 2 will discuss some indices which describe the structure of production of Egypt. This includes a discussion of the many versions of the forward- and backward-linkage coefficients, the direct vs. indirect import coefficients, and the triangularized input-output coefficients matrix. In Section 3 the empirical results based on two Egyptian input-output tables for 1954 and 1963/64 will be presented and discussed.

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[2]This is often called the "technical" coefficients matrix. It is not absolutely accurate to call it the technical matrix when the flows are measured in value, rather than quantity, terms. Prices are a factor to reckon with, and the observed pattern of coefficients may represent both technical (quantity) and economic (price) considerations. This is particularly significant when the matrices for two different years are compared. For a more detailed discussion of this point, see Otto Eckstein, "The Input-Output System - Its Nature and Use", in Oskar Morgenstern, ed., Economic Activity Analysis (New York: John Wiley & Sons, Inc., 1954), pp. 53-55.

1. The Input-Output Model

The input-output model[3] of the economy may be represented, using matrix notation, by the following (the symbols will be defined below):

$$A_d \, y_o^* + f_o = y_o^* \tag{3.1}$$

$$(I - A_d)y_o^* = f_o \tag{3.2}$$

$$y_o^* = (I - A_d)^{-1} f_o \tag{3.3}$$

$$m_o^* = m_1^* + m_2^* = A_m \, y_o^* + m_2^* \tag{3.4}$$

A_d — an N x N matrix of input-output coefficients, the index d means that the inputs are from domestic sources only. The typical element of A_d is α_{ij}^d.

y_o^* — an N x 1 vector of domestic output levels.

f_o — an N x 1 vector of final use from domestic production.

m_o^* — an N x 1 vector of imports, with components m_{oi}^* designating imports of the same origin as the output of industry i.

A_m — an N x N matrix of input-output coefficients, the index m means that the inputs are from imports. The typical element of A_m is α_{ij}^m.

m_1^* — an N x 1 vector of imports for intermediate use, with components

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[3]We shall not dwell here on the theoretical underpinnings of the model or its basic assumptions. See, for example, Otto Eckstein, op. cit.; and Wassily Leontief, "Input-Output Analysis", Chapter 7 of his Input-Output Economics (New York: Oxford University Press, 1966), pp. 134-155.

m^*_{1i} designating imports of the same origin as the output of industry i.

m^*_2 an N x 1 vector of imports for final use, with components m^*_{2i} designating imports of the same origin as the output of industry i.

The typical equation of (3.1) states that domestic output of the i^{th} industry y^*_{oi} may go either to intermediate use $\sum_{j=1}^{N} \alpha^d_{ij} y^*_{oj}$, or to final use f_{oi}. Equation system (3.3) allows us to determine the vector of domestic outputs, given the final-demand vector. Imports are expressed in equation system (3.4) as the sum of intermediate imports m^*_1 and final-demand imports m^*_2. Intermediate imports, as it is clear from m^*_1 and $A_m y^*_o$ in (3.4), are distinguished according to their industry of origin.

The input-output matrices A_d and A_m used in applications of this type are normally derived from an input-output flows table. This table may take many forms, but of special interest is the double-celled version illustrated in Table 3.1, which corresponds closest to Egyptian input-output data. Table 3.1 is a typical double-celled input-output flows table. Each cell in the major region contains two entries, an upper, y_{ij}, for inputs from domestic production and a lower, m_{ij}, for imported deliveries to intermediate use. The symbol f_{oi} represents, as above, deliveries to final use from domestic production of the i^{th} industry, and m^*_{2i} represents deliveries to final use from imports of the same origin as the output of industry i. Domestic outputs are represented, as above, by y^*_{oi}, and v^*_{oi} stands for value added in the

Table 3.1

The Input-Output Flows Table

		Receiving Industries							Final Demand	Total Output
		1	2	...	j	...	N			
Delivering Industries	1	y_{11}	y_{12}	...	y_{1j}	...	y_{1N}	f_{o1}	y^*_{o1}
		m_{11}	m_{12}	...	m_{1j}	...	m_{1N}	m^*_{21}	m^*_{o1}
	2	y_{21}	y_{22}	...	y_{2j}	...	y_{2N}	f_{o2}	y^*_{o2}
		m_{21}	m_{22}	...	m_{2j}	...	m_{2N}	m^*_{22}	m^*_{o2}
	⋮	⋮	⋮		⋮		⋮	⋮	⋮
	i	y_{i1}	y_{i2}	...	y_{ij}	...	y_{iN}	f_{oi}	y_{oi}
		m_{i1}	m_{i2}	...	m_{ij}	...	m_{iN}	m^*_{2i}	m^*_{oi}
	⋮	⋮	⋮		⋮		⋮	⋮	⋮
	N	y_{N1}	y_{N2}	...	y_{Nj}	...	y_{NN}	f_{oN}	y^*_{oN}
		m_{N1}	m_{N2}	...	m_{Nj}	...	m_{NN}	m^*_{2N}	m^*_{oN}
Value Added		v^*_{o1}	v^*_{o2}	...	v^*_{oj}	...	v^*_{oN}		
Total Output		y^*_{o1}	y^*_{o2}	...	y^*_{oj}	...	y^*_{oN}		

i^{th} industry. Note that y^*_{oi} represents the sum down any column, but it does not represent the sum across any row.[4] The sum of the i^{th} row represents total supply $y^*_{oi} + m^*_{oi}$. The distinction between domestic and imported intermediate inputs is particularly important where the country relies heavily on imports. In such cases, the ability to identify the industrial origin of imports and their diffusion into the production structure is very important.[5]

The matrix A_d may be estimated as follows:

$$\alpha^d_{ij} = y_{ij}/y^*_j \qquad (i,j=1,\ldots,N) \qquad (3.5)$$

Similarly, the matrix A_m may be estimated as

$$\alpha^m_{ij} = m_{ij}/y^*_j \qquad (i,j=1,\ldots,N) \qquad (3.6)$$

From the input-output coefficient matrix the inverse matrix $(I - A_d)^{-1}$ may be derived. Let this be denoted E, with the typical element denoted ε_{ij}. The typical element in the inverse matrix represents the <u>total</u> input requirements of industry i's output per unit demand of the j^{th} industry's output. Total input requirements mean, in this context, the direct plus indirect requirements. The matrices A_d, A_m and E are the basic sources for learning about the structure of production. But

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[4] Any element of a row includes both cells.

[5] For a discussion of the many alternative ways of incorporating imports in input-output tables, see Gamal E. Eleish, "Use of the Input-Output Model in Calculating Foreign Exchange Requirements in Medium Term Plans with Emphasis on the Developing Countries", <u>op. cit.</u>

it will be extremely difficult to learn anything of value concerning that structure by merely scanning each matrix, looking for regularities. We shall therefore make use of the well-known linkage coefficients to summarize the main features in A_d and E regarding interdependence in production. Also, we shall transform A_m and E into a set of import coefficients that describe the degree of dependence on imports for intermediate use. Finally, we shall rearrange the matrix A_d into a triangular form to reveal the uni-directionality underlying the apparent interdependence among industries. These three aspects will be the subject of Section 2.

2. Structure Of Production: Theoretical Concepts

The essence of the input-output table is that the industries comprising the economy are interrelated in production. This interrelatedness can be gauged by various types of indices. Here we shall deal with four of them: the density coefficient, the backward-linkage coefficients, the forward-linkage coefficients, and the triangularized input-output matrix. The relationship among the last three will be examined. The extent of dependence on the outside world will be measured by the import coefficients.

The Density Coefficient: For our purposes, we define the density coefficient as the proportion of nonzero elements to the total number of elements in the input-output table. This is a crude measure of the degree of interdependence in production; the higher the density, *ceteris paribus*, the stronger is the degree of interdependence, and vice versa.[6] It may be safely assumed that the density coefficient increases with the stage of development of the economy.[7] Since the density coefficient depends on the degree of aggregation of the input-output table, the level for any year may not mean much in itself. However, it is still possible to infer something about the development of the structure of production by comparing the density coefficients of two input-output matrices of the same size for two different years.

The Linkage Coefficients: Carried to its logical conclusion, the idea of interdependence means that expansion of any industry will require a parallel expansion in other industries. This is the idea of backward linkage. The expansion of one industry potentially stimulates the growth of those other industries from which it receives its inputs.[8] On the other hand, the expansion of an industry may facilitate the expansion of those industries which receive its output if it prevents the emergence of bottlenecks. This is the idea of forward linkage.[9]

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[6]The basic idea underlying this concept was inspired by reading Gamal E. Eleish, "The Input-Output Model in a Developing Economy: Egypt", Chapter 11 in Tibor Barna, ed., Structural Interdependence and Economic Development (London: MacMillan & Co., Ltd., 1963).

[7]Thus, Eleish notes that for Egypt the density coefficient was about 50 per cent for 1954, while for Italy it was 73 per cent in 1950. Ibid., p. 203. We have to view these data cautiously, however, in view of the fact that the degree of aggregation was not the same in both cases; see the text below.

[8]This is a positive way of looking at the matter. In a negative way, it may be said that the expansion of any industry will not be forthcoming unless and until output in some other industry is expanded. Backward linkages, viewed in this way, reveal potential bottlenecks.

[9]For a discussion of forward and backward linkages, see Albert O. Hirschman, The Strategy of Economic Development (New Haven and London: Yale University Press, 1958), pp. 98-119. Hirschman looks at

(continued)

These linkage concepts have been pioneered by Rasmussen, and popularized by Chenery and Watanabe almost simultaneously with the theoretical formulation by Hirschman.[10] Operationally, the backward-linkage coefficient is defined as

$$U_j = \sum_{i=1}^{N} y_{ij}/y^*_{oj} \qquad (j=1,\ldots,N) \qquad (3.7)$$

and the forward-linkage coefficient is defined as

$$U_i = \sum_{j=1}^{N} y_{ij}/(y^*_{oi} + m^*_{oi}) \qquad (i=1,\ldots,N) \qquad (3.8)$$

The above indices of interdependence are based on direct

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backward and forward linkages as two inducement mechanisms that may be set to work within the directly-productive activities sector of the economy. He defines them thus: "... every nonprimary economic activity, will induce attempts to supply through domestic production the inputs needed in that activity. ... every activity that does not by its nature cater exclusively to final demands, will induce attempts to utilize its output as input in some new activities." Ibid., p. 100.

It should be emphasized here that the context in which we appeal to the concept of linkage (backward and forward) is totally different from that in which Hirschman used that concept. Our purpose for using it is also different from his. Hirschman is mainly concerned with inducement mechanisms to supplement the market forces in resource allocation, in view of the scarcity of decision-making abilities in less-developed countries. We are mainly concerned here with disclosing the fundamental relationships in the structure of production so that we may avoid running into severe bottlenecks in the course of planning resource allocation. In the confines of our analysis, the linkage concept furnishes a relevant and very useful datum on which to base the allocation of resources; it is never conceived of as a criterion for such allocation.

[10]See P. Norrengaard Rasmussen, Studies in Intersectoral Relations (Amsterdam: North-Holland Publishing Co., 1956), especially Chapter 8, pp. 126-149; Hirschman, op. cit., pp. 98-119; and Hollis B. Chenery and T. Watanabe, "International Comparison of the Structure of Production", Econometrica, XXVI (October, 1958), pp. 487-521.

effects alone. But as is obvious, if one examines the inverse matrix $(I - A_d)^{-1}$, the direct effects represent only part of the induced demand. One might, therefore, wish to reformulate the indices of interdependence basing them on the total (direct plus indirect) effects.[11] Rasmussen has suggested using the inverse matrix with that end in mind. He proposed two basic measures of interdependence which he called the "index of the power of dispersion" and the "index of the sensitivity of dispersion". The two indices are defined, respectively, as:

$$U_{\cdot j} = \frac{1}{N} \sum_{i=1}^{N} \varepsilon_{ij} \Big/ \frac{1}{N^2} \sum_{j=1}^{N} \sum_{i=1}^{N} \varepsilon_{ij} \qquad (j=1,\ldots,N) \qquad (3.9)$$

$$U_{i\cdot} = \frac{1}{N} \sum_{j=1}^{N} \varepsilon_{ij} \Big/ \frac{1}{N^2} \sum_{i=1}^{N} \sum_{j=1}^{N} \varepsilon_{ij} \qquad (i=1,\ldots,N) \qquad (3.10)$$

where N, as before, is the number of industries distinguished in the input-output table.[12] According to Rasmussen, (3.9) "describes the relative extent to which an increase in final demand for the products of industry no. j is dispersed throughout the system of industries."[13] Likewise, (3.10) "expresses the extent to which the system of industries draws upon industry no i".[14] Both the index of the power of dispersion $U_{\cdot j}$, and the index of the sensitivity of

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[11] As is well known, the elements of the $(I - A_d)^{-1} = E$ represent the total (direct plus indirect) input requirements per unit of output. See Rasmussen, _op. cit.,_ pp. 133-135.

[12] Note that the denominator in (3.9) and (3.10) is the same, equal to the overall average of the inverse matrix. The reason for this kind of normalization is to enable inter-industry comparisons. See _ibid.,_ p. 134.

[13] _Ibid.,_ p. 135.

[14] _Ibid._

dispersion $U_{i}.$, have a bench-mark value of unity.[15]

The Triangularized Input-Output Matrix: Another measure of the degree of interdependence in the structure of production can be obtained by triangularizing the input-output matrix. A triangularized matrix reflects a recursive structure of production, that is, a hierarchy where some industries receive intermediate inputs from the rest but do not deliver any of their output for intermediate use in the latter. There is a widely-observed recursivity in the production structure of many developed countries.[16] We would like to investigate if the structure of production of a less-developed country like Egypt exhibits a similar pattern. The question is not a matter of sheer curiosity. If indeed the production structure is recursive, or block-recursive, then the policy-maker can design a pattern of expansion of sectors

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[15]This is because unity is the average value of either $U._{j}$ or $U_{i}.$. To see that, simply sum (3.9) over j and divide by N, and sum (3.10) over i and divide by N. The result is an average value for $U._{j}$ or $U_{i}.$ of unity.

[16]For a detailed discussion of the concept of recursivity, see Bent Hansen, Economic Theory of Fiscal Policy, op. cit., pp. 23-25. See also Herman Wold, Demand Analysis (New York: John Wiley & Sons, 1952), cited in Hansen.

For the phenomenon of recursivity in the production structure of many developed and some less-developed economies, see Chenery and Watanabe, op. cit.; J. K. Sengupta, "Models of Agriculture and Industry in Less Developed Economies", Chapter 5 of Tibor Barna, op. cit.; David Simpson and Tinkichi Tsukui, "The Fundamental Structure of Input-Output Tables, An International Comparison", Review of Economics and Statistics, XLVII (November, 1965), pp. 434-443; Wassily Leontief, "The Structure of Development", Chapter 2 of his Input-Output Economics, op. cit., pp. 41-67; and Bernhard Korte and Walter Aberhofer, "Triangularizing Input-Output Matrices and the Structure of Production", European Economic Review, II (Summer, 1971), p. 494.

which will minimize the number of bottlenecks.[17] The significance of such an attribute of any economic program can hardly be overemphasized.

As indicated above, recursivity of the structure of production implies that it is possible to rearrange the ordering of the industries in the technical coefficients matrix, such that all the elements above the diagonal will be less than some arbitrary amount or zero. This implies a hierarchy in the system of industries in which every industry receives inputs from the ones below it, but does not deliver anything to them in the way of intermediate inputs. Ideally, the elements of the rearranged matrix will be such that

(i) $\alpha^d_{ij} = 0 \qquad \text{for } i < j \qquad (i,j=1,\ldots,N)$

and (ii) $\alpha^d_{ij} \neq 0 \qquad \text{for } i \geq j \qquad (i,j=1,\ldots,N)$

In this extreme case all elements above the diagonal would be exactly equal to zero. The rearranged matrix is called triangular when α^d_{ii} is a single element and block-triangular when α^d_{ii} is a matrix. Two generalizations can be made here. If the matrix is triangular (block-triangular), the closer the industry (block of industries) is to the

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[17] In terms of the principles of economic policy - as discussed in the previous chapter - recursivity, when it exists, is a very convenient feature of the economic structure. In a model of wider scope - that is, one that includes aspects of the economic structure in addition to production - if the structure is recursive, then some instruments will be used in pursuit of particular targets. The task of policy-making will thus be facilitated. See Jan Tinbergen, On the Theory of Economic Policy, op. cit., Chapter IV, especially pp. 27-30.

top, the more final-demand oriented will it be. Analogously, the nearer the industry (block of industries) is to the bottom, the more resource-based will it be.

Relationship Between the Three Measures of Interdependence: It is interesting to relate the three measures of interdependence in the structure of production. (We refer to the $U_{\cdot j}$, the $U_{i\cdot}$ and the triangularization results.) The coefficient $U_{\cdot j}$ was designed to measure the dependence of the particular industry j on other industries in the system of production. Barring excess capacity, the failure to expand capacity in the other industries is bound to handicap the expansion of industry j. The coefficient $U_{i\cdot}$ was designed to measure the extent that other industries in the system of production depend upon the output of the particular industry i. For an expansion in any other industry to be successful, it must be matched by an expansion of capacity in industry i. (Provided, of course, that there does not already exist an excess capacity.) The lower the value of $U_{\cdot j}$, the more resource-based will industry j be. The lower the value of $U_{i\cdot}$, the more final-demand oriented will industry i be.

We thus expect industries with high $U_{\cdot j}$ and low $U_{i\cdot}$ to occupy the top of the triangularized input-output coefficient matrix, and those with low $U_{\cdot j}$ and high $U_{i\cdot}$ to be situated more at the bottom of that matrix. Industries with high or low values for both $U_{\cdot j}$ and $U_{i\cdot}$ may be expected to fall somewhere in between. This shows how the index of the power of dispersion, $U_{\cdot j}$, the index of the sensitivity of dispersion, $U_{i\cdot}$, and the triangularized structural matrix are related. They are but three ways of looking at the same phenomenon - interdependence in production. The last one is the most interesting of the three, because it reveals whether the production structure is circular or recursive.

In the literature dealing with the structure of production and development policy, it is frequent to encounter greater significance being attached to higher values of $U_{\cdot j}$ and $U_{i\cdot}$.[18] This bias towards high values may have been inspired by the tacit interpretation of $U_{\cdot j}$ and $U_{i\cdot}$ as inducement mechanisms that supplement the market mechanism in resource allocation.[19] In this respect, we would like to maintain that if $U_{\cdot j}$ and $U_{i\cdot}$ are interpreted, as they are here, as advance-warning signals for potential bottlenecks in the course of the development process, low values become as significant as high ones. For example, suppose that the expansion of industry j is deemed desirable. A high value for $U_{\cdot j}$ may force us to take account of the prerequisites of the growth of industry j in terms of the growth of the related industries. A low value of $U_{\cdot j}$ simply means that we can proceed with the expansion of industry j, fearless that any serious bottlenecks will emerge in other industries as a result. The above remarks are crucial for appreciating the significance of the results reported in this chapter.

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[18] See Chenery and Watanabe, op. cit., Pan A. Yotopoulos and Jeffery B. Nugent, "A Balanced-Growth Version of the Linkage Hypothesis: A Test", Quarterly Journal of Economics, LXXXVII (May, 1973), 157-171; K. V. Santhanam and R. H. Patil, "A Study of the Production Structure of the Indian Economy", Econometrica, XL (January, 1972), 159-176; Bharat R. Hazari, "Interdependence of the Indian Structure of Production", Economia Internazionale, XXIV (1971), 475-498; and Hirschman, op. cit., pp. 107-109.

[19] See Hirschman, Ibid., pp. 104-109.

Direct and Indirect Import Coefficients: The degree of dependence on the outside world is an important feature of the Egyptian economy not yet considered. We maintained earlier that the indirect import requirements may exceed the direct requirements. It follows that import requirements may be grossly underestimated if the indirect part is ignored. In this section we discuss the theoretical concepts involved. The empirical results will be examined in Section 3. Consider first the imported input-output coefficient matrix, A_m, with typical element α^m_{ij}. By summing down the columns of A_m, one obtains

$$\eta_{1j} = \sum_{i=1}^{N} \alpha^m_{ij} \qquad (j=1,\ldots,N) \qquad (3.11)$$

where η_{1j} represents the direct import requirements of industry j per unit of its output. We call η_{1j} the direct import coefficient of industry j, and η_1 will be the vector of direct import coefficients. The output of the j^{th} industry requires inputs from other industries, both directly and indirectly, in the manner indicated by the corresponding elements of the inverse matrix $(I - A_d)^{-1} = E$. One dollar of final demand for the output of industry j will require imports directly and indirectly in the amount η_{oj} where

$$\eta_{oj} = \sum_{k=1}^{N} \eta_{1k} \, \varepsilon_{kj} \qquad (j=1,\ldots,N) \qquad (3.12)$$

Thus, η_{oj} is the diredt plus indirect import coefficient of industry j. The indirect import coefficient η_{2j} may then be derived from the following equation:

$$\eta_{2j} = \eta_{oj} - \eta_{1j} \qquad (j=1,\ldots,N) \qquad (3.13)$$

3. Structure Of Production: Empirical Results

Two input-output flows tables for Egypt furnish the basis for the empirical results of this section. The tables, one for 1954 and the other for 1963/64 are in the same general format as Table 3.1. The 1954 table has 33 industries, but the 1963/64 distinguishes only 27 industries. Since the basis of the classification was not the same for both tables, they had to be compressed to a smaller size in order to make them comparable. A note on the basic features of the two tables and the procedure for their reconciliation is included in Appendix A. The input-output coefficient matrices and the inverse matrices were computed according to the procedure explained in the previous section for each table in its original size and for both in the reconciled version. The results are contained in Tables B.1-B.10 of Appendix B. On the basis of these tables we were able to derive the empirical results reported in the remaining parts of this section.

The Density of the 1954 and the 1963/64 Input-Output Tables: Using the condensed (20 by 20) version of the two input-output matrices for 1954 and 1963/64 contained in Tables B.7 and B.9, respectively, a density coefficient of .59 and .65 was obtained. From this information one may infer that the overall degree of interdependence in Egypt's structure of production has increased over the decade 1954-1963/64. This may be explained by the industrialization program that began in earnest since the early 'fifties. During the period 1954-1962, over £E 100 million were invested in industrial projects. These projects included such manufacturing industries as iron and steel, railway products, fertilizers, petroleum refining, paper and paper products, television sets and sugar manufacturing.[20]

The Linkage Coefficients: Equations (3.7) and (3.10) were applied to the 1954 and the 1963/64 input-output tables. Since the measures based on the inverse matrix, defined by equations (3.9) and (3.10) are more meaningful than those based on the direct matrix, defined by (3.7) and (3.8), only the empirical results based on (3.9) and (3.10) will be reported and discussed here.[21] Tables 3.2-3.11 contain the numerical values of the index of the power of dispersion, $U_{\cdot j}$, and the index of the sensitivity of dispersion, $U_{i\cdot}$, derived from the 1954 and the 1963/64 input-output matrices.

First, the empirical results on the power of dispersion index will be discussed.

(a) For the 1954 original (33 by 33) input-output data, Table 3.2 shows that eleven industries scored values for $U_{\cdot j}$ larger than unity. These industries are: basic chemicals, meat products, dairy products, grain milling, bakery products, other food products, spinning and weaving,

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[20] See K. M. Barbour, Growth, Location and Structure of Industry in Egypt (New York: Praeger Publishers, 1972), Table 4.6, pp. 68-69.

[21] It was noted above (see p. 46) that the indices in (3.7) and (3.8) are based on direct effects alone. It was also noted that the indices in (3.9) and (3.10) take indirect effects of interdependence among industries into account. See above, pp. 46-47. The indices defined in (3.9) and (3.10) possess the added advantage of having a bench-mark value of unity. See above, p. 48.

TABLE 3.2

THE POWER OF DISPERSION INDICES
BY INDUSTRY, 1954

NO.	INDUSTRY	POWER OF DISPERSION
15.	BAKERY PRODUCTS	1.550866
19.	SPINNING + WEAVING	1.513601
23.	TOBACCO	1.431179
20.	PROCESSING OF COTTON	1.423925
18.	OTHER FOOD PRODUCTS	1.406451
14.	GRAIN MILLING	1.372416
21.	CLOTHING	1.360033
13.	DAIRY PRODUCTS	1.340305
12.	MEAT PRODUCTS	1.309236
22.	PAPER + P. PRODUCTS	1.181079
9.	BASIC CHEMICALS	1.041633
16.	SUGAR	.988054
26.	OTHER INDUSTRIES	.972670
8.	MACHINERY	.966027
7.	PETROLEUM REFINING	.948474
30.	MEDICAL SERVICES	.929595
10.	OTHER CHEMICALS	.921402
6.	CEMENT	.918115
1.	AGRICULTURE	.912240
11.	CONSTRUCTION	.881510
24.	WOOD + FURNITURE	.836967
5.	METAL PRODUCTS	.829444
3.	ELECTRICITY	.820345
4.	METALS	.806471
29.	EDUCATION	.791288
25.	FERTILISERS	.763163
2.	MINING + QUARRYING	.742139
32.	BANKING + INSURANCE	.735865
27.	TRANSP. + COMM.	.719321
31.	TRADE + FINANCE	.707616
17.	OILS + FATS	.684426
28.	SUEZ CANAL	.613795
33.	OTHER SERVICES	.580350

processing of cotton, clothing, paper and paper products and tobacco. These industries require comparatively more inputs from other industries per unit of output. It is interesting to note that, with the exception of basic chemicals and, perhaps, paper and paper products, the above industries are of the processing variety. Mainly, they process agricultural inputs. Any impetus directed at such industries will spread to the other industries and hence, one cannot expand the members of this group without a parallel general expansion in the rest of the economy, particularly agriculture. Such industries will be characterized as receiving industries, because they have high backward linkages.

(b) For the 1963/64 original (27 by 27) input-output data, Table 3.3 shows nine industries scoring values of the power of dispersion index, $U_{.j}$, larger than unity. They are ginning and pressing, food processing, beverages manufacturing, spinning and weaving, clothing, leather and leather products, nonmetallic mineral products, metal products and miscellaneous manufacturing. Most of these industries fall within the processing industries category. A comparison of Tables 3.4 and 3.5, which put the results of Tables 3.2 and 3.3 in a comparable form, indicates that for the 1954 and the 1963/64 input-output data, the industry groups with the highest backward linkage are basically the same.[22]

One should perhaps add a word of caution concerning the interpretation of the numerical values of the power of dispersion index, $U_{.j}$.

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[22]This generalization has to be qualified, in the light of the discussion in Appendix A, to the extent that the definition and coverage of the industry classifications in the 1954 and the 1963/64 tables are not identical.

TABLE 3.3

THE POWER OF DISPERSION INDICES
BY INDUSTRY, 1963/64

NO.	INDUSTRY	POWER OF DISPERSION
8.	CLOTHING	1.481161
7.	SPINNING + WEAVING	1.457157
2.	GINNING + PRESSING	1.456014
13.	LEATHER + L. PRODS.	1.379684
4.	FOOD PROCESSING	1.363357
5.	BEVERAGES MANUF.	1.204092
23.	MISCELLANEOUS	1.044707
17.	NONMETALLIC MINERAL	1.025721
19.	METAL PRODUCTS	1.021661
14.	RUBBER PRODUCTS	.991496
25.	CONSTRUCTION + DWLNG	.988034
15.	CHEMICALS	.973467
21.	ELECTRIC MACHINERY	.945991
22.	TRANSP. EQUIPMENT	.941031
20.	MACH. EXCEPT ELCTRIC	.938238
27.	OTHER SRRVICES	.929590
18.	BASIC METALS	.920813
24.	ELECTRICITY	.897060
10.	FURNITURE + FIXTURES	.883574
11.	PAPER + CARDBOARD	.858815
1.	AGRICULTURE	.848957
12.	PRINTING + PUB.	.789115
26.	TRANSP. + COMUNCTN.	.778721
16.	PETROLEUM + COAL	.749299
6.	TOBACCO	.743714
3.	MINING + QUARRYING	.733937
9.	WOOD + CORK PRODS.	.654593

TABLE 3.4

THE POWER OF DISPERSION INDICES
BY INDUSTRY, 1954
(AGGREGATED)

NO.	INDUSTRY	POWER OF DISPERSION
6.	SPINNING+WEAVING	1.500788
2.	GINNING+PRESSING	1.439870
5.	TOBACCO	1.398087
4.	FOOD PROCESSING	1.385429
7.	CLOTHING	1.347907
8.	PAPER+P. PRODUCTS	1.176114
20.	OTHER INDUSTRIES	.966111
14.	MACHINERY EXPT. ELCT	.960292
10.	COAL+PET. REFINING	.942608
1.	AGRICULTURE	.931393
11.	NONMETALLIC MANUF.	.911086
16.	BLDG.+CONSTRUCTION	.872213
19.	WOOD+FURNITURE	.831642
15.	ELECRICITY	.827576
13.	METAL PRODUCTS	.823911
9.	CHEMICAL MANUF.	.809798
12.	BASIC METALS	.803350
3.	MINING+QUARRYING	.736717
17.	TRANSP.+COMMN.	.688123
18.	OTHER SERVICES	.646986

TABLE 3.5

THE POWER OF DISPERSION INDICES
BY INDUSTRY, 1963/64
(AGGREGATED)

NO.	INDUSTRY	POWER OF DISPERSION
6.	SPINNING+WEAVING	1.460855
2.	GINNING+PRESSING	1.459695
7.	CLOTHING	1.432015
4.	FOOD PROCESSING	1.366847
11.	NONMETALLIC MANUF.	1.029328
13.	METAL PRODUCTS	1.022927
16.	BLDG.+CONSTRUCTION	.993128
9.	CHEMICAL MANUF.	.976368
20.	OTHER INDUSTRIES	.976226
14.	MACHINERY EXPT. ELCT	.940877
18.	OTHER SERVICES	.934209
12.	BASIC METALS	.923248
15.	ELECRICITY	.899894
8.	PAPER+P. PRODUCTS	.861254
19.	WOOD+FURNITURE	.856513
1.	AGRICULTURE	.851107
17.	TRANSP.+COMMN.	.781179
10.	COAL+PET. REFINING	.751168
5.	TOBACCO	.746011
3.	MINING+QUARRYING	.737150

Although the values reported for the industries listed in (a) and (b) are larger than unity, it does not necessarily mean that the industries concerned depend equally heavily on the system of industries, nor is their dependence spread smoothly across that system. In fact, a careful perusal of the input-output coefficients matrices for 1954 and 1963/64[23] reveals an astonishing degree of concentration in the pattern of dependence.[24] It is worth pursuing this point further, because it throws considerable light on the nature of Egypt's structure of production. For 1954, Table 3.6, which is derived from Tables 3.2 and B.1, shows the percentage of inputs received by the industries with a $U_{.j} > 1$ and the main delivering industries. The table indicates quite clearly that, of the eleven industries for which $U_{.j}$ exceeded unity, at least nine showed an uneven pattern of dependence. The other two (basic chemicals and other food products) may be said to depend relatively evenly on the system of industries. Another notable fact is the focal importance of agriculture as a supplier of inputs to the rest of the sectors in the Egyptian economy for 1954; for most industries listed in Table 3.6, the chain of dependence on agriculture extends no more than two links. The analysis here throws light on an important aspect of the often-cited statement that Egypt has an agricultural economy. Table 3.6 indicates quite clearly that many of the manufacturing industries depend

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[23]See Tables B.1 and B.4 in Appendix B.

[24]This observation is quite relevant to our purpose in making these calculations. It is these industries on which the rest of the industries depend that are most likely to constitute bottlenecks to the rapid expansion of the latter. Identifying these bottleneck industries should be a prerequisite of planning capacity expansion.

Table 3.6

The Pattern of Dependence for 1954

No.	Industry ... ... gets	% of Input Requirements	From
9	Basic chemicals	23	spinning & weaving; imports
12	Meat products	75	agriculture
13	Dairy products	61	dairy products; agriculture
14	Grain milling	82	agriculture
15	Bakery products	65	grain milling
18	Other food products	62	agriculture; sugar; cotton processing; trade & finance
19	Spinning & weaving	53	spinning & weaving; processing of cotton
20	Processing of cotton	93	agriculture
21	Clothing	55	spinning & weaving; other industries
22	Paper & paper products	57	grain milling; other industries; imports
23	Tobacco	76	tobacco, trade & finance

Source: Derived from Tables 3.2 and B.1.

heavily on agriculture. It may be correct to say, therefore, that Egypt has an agriculture-based economy.[25] A third observation on Table 3.6 is the large extent to which sectors rely on themselves for intermediate inputs. Establishments in each sector seem to depend heavily upon establishments within the same sector. This may be a reflection of one, or both, of two things. In the first place, the degree of aggregation in the input-output table may be excessively high, and/or, second, vertical integration may be a common practice in those sectors. Results similar to that embodied in Table 3.6 may be ascertained by examining Table 3.7, which is derived from Tables 3.3 and B.4.

Second, we discuss the empirical results on the sensitivity of dispersion index.

(c) From Table 3.8, which includes the numerical values of the sensitivity of dispersion index, $U_{i\cdot}$, derived from the 1954 input-output data, we see that there are eight industries with a score of $U_{i\cdot}$ larger than unity. These include agriculture, petroleum refining, grain milling, spinning and weaving, other industries, transport and communications, trade and finance, and other services. It was mentioned above that $U_{i\cdot}$ can be viewed as a measure of forward linkage, the magnitude of $U_{i\cdot}$ indicating the extent to which the system of industries relies on the supply of industry i for intermediate goods. Agriculture occupies a very special place in this respect, as do trade and finance. To the

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[25]The above data do not show another, perhaps not less important, aspect of the importance of agriculture: namely, the provision of foreign exchange. Thus, in 1959/60, agriculture and agriculture-based manufacturing - cotton and food products and other agricultural products - contributed about 76% of Egypt's export earnings. See Plan Frame, op. cit., p. 68.

Table 3.7

The Pattern of Dependence for 1963/64

No.	Industry ... ... gets	% of Input Requirements	From
2	Ginning and pressing	97	agriculture
4	Food processing	70	agriculture, food processing
7	Spinning and weaving	53	ginning and pressing; spinning and weaving
8	Clothing	56	spinning and weaving; leather & leather products
13	Leather and leather products	47	food processing; leather and leather products
18	Basic metals	22	basic metals; mining and quarrying
19	Metal products	29	basic metals; chemicals
20	Machinery except electric	22	basic metals; metal products
21	Electric machinery	22	chemicals; basic metals; metal products; electric machinery

Source: Derived from Tables 3.3 and B.4.

TABLE 3.8

THE SENSITIVITY OF DISPERSION INDICES
BY INDUSTRY, 1954

NO.	INDUSTRY	SENSITIVITY OF DISPERSION
1.	AGRICULTURE	3.803015
31.	TRADE + FINANCE	2.797009
33.	OTHER SERVICES	2.527607
27.	TRANSP. + COMM.	1.393877
19.	SPINNING + WEAVING	1.348996
14.	GRAIN MILLING	1.212870
26.	OTHER INDUSTRIES	1.093331
7.	PETROLEUM REFINING	1.039762
2.	MINING + QUARRYING	.992374
8.	MACHINERY	.978480
23.	TOBACCO	.931535
4.	METALS	.899740
20.	PROCESSING OF COTTON	.893143
13.	DAIRY PRODUCTS	.876627
10.	OTHER CHEMICALS	.844045
3.	ELECTRICITY	.780097
32.	BANKING + INSURANCE	.756483
17.	OILS + FATS	.741920
16.	SUGAR	.714570
5.	METAL PRODUCTS	.696852
22.	PAPER + P. PRODUCTS	.661949
18.	OTHER FOOD PRODUCTS	.654737
9.	BASIC CHEMICALS	.631789
29.	EDUCATION	.611803
11.	CONSTRUCTION	.606245
6.	CEMENT	.591569
25.	FERTILISERS	.585066
24.	WOOD + FURNITURE	.570052
12.	MEAT PRODUCTS	.566947
15.	BAKERY PRODUCTS	.561319
21.	CLOTHING	.552460
28.	SUEZ CANAL	.542028
30.	MEDICAL SERVICES	.541704

extent that the input-output data on which these values of $U_i.$ are based represent technical data[26] (i.e., production functions in the ordinary sense of economic theory), the high value of $U_i.$ imply that those industries must be expanded if there is to be a general capacity expansion in the economy. Failure to do so is bound to cause many bottlenecks, shortages and frustrations. The bottlenecks and shortages must eventually be evened out through a balance-of-payments deficit and/or through inflation. In the Egyptian case both occurred. Thus, the country ran a rising deficit in its balance of trade that reached a climax of ₤E 205.0 million in 1965/66. At the same time, the cost-of-living price index rose from 100 in 1959/60 to 123.1 in 1965/66.[27]

(d) An examination of Table 3.9 relating to 1963/64 reveals a similar pattern with the following industries scoring values of $U_i.$ larger than unity: agriculture, food processing, spinning and weaving, chemicals, petroleum and coal, basic metals, electricity, transport and

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[26] One point that has to be thoroughly explored is the extent to which the input-output coefficients for the year concerned represent a general, underlying, structure, rather than a peculiarity of that particular year. See footnote 3 above and the reference therein.

[27] The above figures are taken from CAPMS, Statistical Abstract of the United Arab Republic 1951/52-1968/69 (Cairo, June 1970), p. 174 and p. 181, respectively. It should be pointed out that the movement of the trade deficit or the price index are not accurate gauges of the intensity of the said bottlenecks and shortages. In view of the fact that import and price controls were imposed during the period considered, it may be reasonable to look at the above figures as representing the minimum levels.

Another point of caveat about the conclusion to be derived from the above numbers. Both the trade deficit and the rise in price may be due to the aggregate excess demand as well. How much of them is due to sectoral bottlenecks and shortages and how much is due to general excess demand, is hard to tell, however.

TABLE 3.9

THE SENSITIVITY OF DISPERSION INDICES
BY INDUSTRY, 1963/64

NO.	INDUSTRY	SENSITIVITY OF DISPERSION
1.	AGRICULTURE	2.882854
27.	OTHER SERVICES	2.405971
18.	BASIC METALS	1.493146
7.	SPINNING + WEAVING	1.462390
16.	PETROLEUM + COAL	1.303961
4.	FOOD PROCESSING	1.221496
15.	CHEMICALS	1.177108
24.	ELECTRICITY	1.029883
26.	TRANSP. + COMUNCTN.	1.010230
2.	GINNING + PRESSING	.920604
3.	MINING + QUARRYING	.899252
19.	METAL PRODUCTS	.875892
13.	LEATHER + L. PRODS.	.827562
11.	PAPER + CARDBOARD	.805600
17.	NONMETALLIC MINERAL	.804205
21.	ELECTRIC MACHINERY	.780470
25.	CONSTRUCTION + DWLNG	.688494
22.	TRANSP. EQUIPMENT	.673941
14.	RUBBER PRODUCTS	.664787
10.	FURNITURE + FIXTURES	.663913
9.	WOOD + CORK PRODS.	.649333
23.	MISCELLANEOUS	.644370
20.	MACH. EXCEPT ELCTRIC	.637704
12.	PRINTING + PUB.	.637521
5.	BEVERAGES MANUF.	.619915
8.	CLOTHING	.612258
6.	TOBACCO	.607142

communications, and other services. By comparing Tables 3.10 and 3.11, which put the results on $U_{i.}$ for the 1954 and the 1963/64 input-output data in comparable form, it becomes clear that industry groups with the highest forward linkage index are mainly the same in both cases.

On the basis of this evidence, we may characterize these industries as bottlenecks' industries.[28] The expansion of capacities in these industries is a prerequisite for the expansion of capacities in the whole system of production. In the light of this, the emphasis expressed in the Plan on basic metals and chemicals seems to make sense. At the same time, the lack of a comparable emphasis on agriculture implies that the planners failed to recognize the need to expand this sector in order to prevent bottlenecks.

The Triangularized Input-Output Matrices: An attempt was made to triangularize the technical coefficient matrices of 1954 and 1963/64. The results are reported in Tables 3.12 and 3.13. Both matrices triangularize smoothly,[29] and a general pattern is quite manifest.

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[28]The term "key" industry or "key" sector is sometimes widely used in the literature. It does not have a standard meaning, by its very nature. The reader may replace the term "bottlenecks' industries" in the text with the term "key industries". See Rasmussen, op. cit., pp. 140-142, for a discussion of the concept of key industry. For applications of the concept, with varying meanings, see Alan S. Manne, "Key Sectors of the Mexican Economy, 1960-1970", Chapter 16 in Alan S. Manne and Harry M. Markowitz, eds., Studies in Process Analysis (New York and London: John Wiley & Sons, Inc., 1963), pp. 379-400. Manne defines "key sectors" as those that are of primary interest to planning authorities. Another application is in Bharat R. Hazari, "Empirical Identification of Key Sectors in the Indian Economy", Review of Economics and Statistics, LII (May, 1970), 301-305.

[29]For reasons related to the triangularization algorithm used, it was decided to triangularize the $(I - A_d)$ rather than the A_d matrix. The pattern of recursivity should be the same in both cases, since the

(continued)

TABLE 3.10

THE SENSITIVITY OF DISPERSION INDICES
BY INDUSTRY, 1954
(AGGREGATED)

NO.	INDUSTRY	SENSITIVITY OF DISPERSION
18.	OTHER SERVICES	3.236789
1.	AGRICULTURE	2.024468
6.	SPINNING+WEAVING	1.168415
4.	FOOD PROCESSING	1.104141
17.	TRANSP.+COMMN.	1.061432
20.	OTHER INDUSTRIES	1.018456
5.	TOBACCO	.931312
3.	MINING+QUARRYING	.917367
10.	COAL+PET. REFINING	.897979
14.	MACHINERY EXPT. ELCT	.892815
12.	BASIC METALS	.874044
9.	CHEMICAL MANUF.	.800196
2.	GINNING+PRESSING	.766002
15.	ELECRICITY	.709137
13.	METAL PRODUCTS	.683660
8.	PAPER+P. PRODUCTS	.642679
11.	NONMETALLIC MANUF.	.588015
19.	WOOD+FURNITURE	.567668
16.	BLDG.+CONSTRUCTION	.564555
7.	CLOTHING	.550871

TABLE 3.11

THE SENSITIVITY OF DISPERSION INDICES
BY INDUSTRY, 1963/64
(AGGREGATED)

NO.	INDUSTRY	SENSITIVITY OF DISPERSION
1.	AGRICULTURE	2.510130
18.	OTHER SERVICES	1.851228
6.	SPINNING+WEAVING	1.346287
12.	BASIC METALS	1.246181
10.	COAL+PET. REFINING	1.200907
9.	CHEMICAL MANUF.	1.013627
20.	OTHER INDUSTRIES	.959025
15.	ELECRICITY	.916853
17.	TRANSP.+COMMN.	.914476
2.	GINNING+PRESSING	.894687
4.	FOOD PROCESSING	.861071
3.	MINING+QUARRYING	.851877
8.	PAPER+P. PRODUCTS	.749768
13.	METAL PRODUCTS	.749445
11.	NONMETALLIC MANUF.	.730824
19.	WOOD+FURNITURE	.684501
16.	BLDG.+CONSTRUCTION	.664116
14.	MACHINERY EXPT. ELCT	.633832
7.	CLOTHING	.612551
5.	TOBACCO	.608614

Let us discuss the triangularized 1954 matrix first. This is contained in Table 3.12. At the top of the input-output hierarchy stand industries that cater to final demand; these are the industries centered around agriculture - clothing, spinning and weaving, ginning and pressing, paper and paper products,[30] wood and furniture, other industries, food processing and agriculture. Next come building and construction and nonmetallic manufacturing. Power industries (electricity, coal and petroleum refining) are next in line, followed by mining and quarrying and manufacturing industries. At the bottom of the matrix there are the services sectors.

If we examine the triangularized 1963/64 input matrix displayed in Table 3.13, we also observe a smooth hierarchy, but a difference emerges in the ranking of the different blocks or sets of industries. We have seen that for 1954 the order was agriculture and allied industries, power, manufacturing, and services. The 1963/64 pattern is curiously different: power industries and the bulk of the manufacturing industries exchange positions. This exchange of positions may be interpreted in two alternative ways. First, we may say that manufacturing industries, over the decade 1954-1963/64 became more oriented towards final demand. In

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only difference between $(I - A_d)$ and A_d, aside from the algebraic sign, is in the diagonal elements. Prior to triangularization, coefficients less than or equal to 1/N, where N is the order of the coefficient matrix, were ignored. This is a common practice. See Simpson and Tsukui, op. cit.

[30]From the 1954 input-output data, paper and paper products received 19 per cent of its inputs from grain milling; the other major source of input supply was imports. See Table B.1.

TABLE 3.12

THE TRIANGULARIZED INPUT-OUTPUT MATRIX FOR 1954

1.	CLOTHING	.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.	SPINNING+WEAVING	-.34	.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.	GINNING+PRESSING	0.00	-.17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.	FOOD PROCESSING	0.00	0.00	0.00	.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.	WOOD+FURNITURE	0.00	0.00	0.00	0.00	.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.	AGRICULTURE	-.20	0.00	0.00	-.16	-.06	.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.	BLDG.+CONSTRUCTION	0.00	0.00	0.00	-.20	0.00	-.09	.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.	NONMETALLIC MANUF.	0.00	0.00	-.93	0.00	0.00	0.00	-.44	.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.	METAL PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.	MACHINERY EXPT. ELCT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.06	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11.	OTHER INDUSTRIES	0.00	0.00	0.00	0.00	-.05	0.00	0.00	0.00	0.00	-.06	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12.	BASIC METALS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.13	-.16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.	CHEMICAL MANUF.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.32	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14.	ELECRICITY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.58	0.00	0.00	0.00	0.00	0.00	0.00
15.	COAL+PET. REFINING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.85	0.00	0.00	0.00	0.00	0.00
16.	MINING+QUARRYING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.95	0.00	0.00	0.00	0.00
17.	TOBACCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.14	.88	0.00	0.00	0.00
18.	PAPER+P. PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.78	0.00	0.00
19.	TRANSP.+COMMN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.06	-.16	0.00	0.00	0.00	0.00	0.00	.98	-.05
20.	OTHER SERVICES	-.12	-.18	0.00	-.10	-.08	-.09	-.08	-.37	-.12	-.15	-.09	-.13	-.07	-.37	-.12	-.10	-.10	-.13	-.08	.95

TABLE 3.13

THE TRIANGULARIZED INPUT-OUTPUT MATRIX FOR 1963/64

1.	CLOTHING	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.	SPINNING+WEAVING	-.43	.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.	GINNING+PRESSING	0.00	-.20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.	FOOD PROCESSING	0.00	0.00	0.00	.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.	WOOD+FURNITURE	0.00	0.00	0.00	0.00	.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.	AGRICULTURE	0.00	0.00	-.97	-.54	-.86	.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.	BLDG.+CONSTRUCTION	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.	NONMETALLIC MANUF.	0.00	0.00	0.00	0.00	0.00	0.00	-.07	.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.	METAL PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.	MACHINERY EXPT. ELCT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11.	OTHER INDUSTRIES	-.14	0.00	0.00	0.00	0.00	0.00	-.09	0.00	0.00	0.00	.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12.	BASIC METALS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.25	-.28	-.05	.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.	CHEMICAL MANUF.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14.	ELECRICITY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.06	0.00	0.00	0.00	0.00	-.08	.97	0.00	0.00	0.00	0.00	0.00	0.00
15.	COAL+PET. REFINING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.12	0.00	0.00	0.00	-.06	0.00	-.22	.98	0.00	0.00	0.00	0.00	0.00
16.	MINING+QUARRYING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.12	1.00	0.00	0.00	0.00	0.00
17.	TOBACCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
18.	PAPER+P. PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.96	0.00	0.00
19.	TRANSP.+COMMN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.98	-.11
20.	OTHER SERVICES	-.06	-.05	0.00	0.00	-.05	0.00	-.13	-.13	-.05	0.00	-.08	0.00	-.07	-.08	0.00	0.00	0.00	-.09	-.06	.85

other words, the dominant type of industry established over the period represents consumer goods industries. Alternatively, we may argue that the technology in the manufacturing industries must have changed over the decade such that small factory type of production was replaced by large power-consuming units, and therefore manufacturing industries rose above the power industries in the industrial hierarchy. The latter interpretation appears more plausible in the light of Egypt's recent growth experience.[31]

Another observation that results from comparing the order of the individual sector in the truangularized 1954 and 1963/64 matrices in Tables 3.12 and 3.13 is that paper and paper products have moved down the hierarchy, below agriculture and allied industries. This change could be construed as an indication that paper is no longer dependent on agriculture or allied industries for raw materials. However, this was not matched by an appropriate increase in reliance on imports. The pattern of recursivity exhibited in Tables 3.12 and 3.13 is somewhat similar to that of developed countries.[32] Simpson and Tsukui triangularized the input-output tables of five developed countries: the United States, Japan, Norway, Italy and Spain. Their analysis reveals an

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[31]For example, over the period 1959/60-1964/65, manufacturing industry grew at an annual percentage rate of 8.5, while production of electricity rose by 19.1 per cent annually. See Bent Hansen, "Planning and Economic Growth in the UAR (Egypt), 1960-65", in P. J. Vatikiotis, ed., Egypt Since the Revolution (New York: Frederick A. Praeger, Pub., 1968), p. 31.

[32]No similar studies, that I know of, dealing with LDC's have been published as yet, with a degree of detail, admitting of comparison.

underlying structure that decomposes into four blocks: Metal, Nonmetal, Energy and Services. It may be concluded, on the basis of Tables 3.12 and 3.13, that the Egyptian structure of production is moving in a similar direction.[33]

Direct, Indirect and Total Import Coefficients: Equations (3.11)-(3.13) were applied to the 1954 and the 1963/64 input-output data, in both the original size and the reduced (20 by 20) version. The resulting numerical values for η_{1j}, η_{2j} and η_{oj}, i.e., the direct, indirect and total (direct plus indirect) import coefficients, respectively, are included in Tables 3.14-3.17. One may draw several conclusions from these tables.[34] First, let us discuss the results obtained from the 1954 input-output matrix.

(i) From Table 3.14 the following industries have the highest total (direct plus indirect) import coefficients: Paper and paper products, metals, metal products, wood and furniture, machinery, electricity, other chemicals and construction. For all these industries the import coefficient was over .20. This is mainly due to direct dependence on imports, since in all of them the magnitude of the indirect import coefficient is small relative to that of the direct coefficient. On the other hand, Suez Canal, trade and finance, banking and insurance,

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[33]Again we must point out that because of the difference in their classification of industries from ours, it was not possible to follow a more rigorous method to test for the similarity in the pattern of triangularity. Visual perusal was resorted to, instead.

[34]The conclusions should be qualified to the extent that import restrictions were imposed during the particular years considered.

TABLE 3.14

DIRECT, INDIRECT, AND TOTAL
IMPORT COEFFICIENTS BY INDUSTRY, 1954

NO.	INDUSTRY	DIRECT	INDIRECT	TOTAL
22.	PAPER + P. PRODUCTS	.237569	.090843	.328412
5.	METAL PRODUCTS	.221567	.071422	.292989
4.	METALS	.224365	.062735	.287101
8.	MACHINERY	.166072	.096711	.262783
24.	WOOD + FURNITURE	.185885	.065915	.251800
26.	OTHER INDUSTRIES	.161797	.068361	.230157
11.	CONSTRUCTION	.143458	.066736	.210194
3.	ELECTRICITY	.158320	.042398	.200717
30.	MEDICAL SERVICES	.143758	.052094	.195852
6.	CEMENT	.131532	.063021	.194552
10.	OTHER CHEMICALS	.145997	.048128	.194125
7.	PETROLEUM REFINING	.131497	.051742	.183239
21.	CLOTHING	.049546	.097192	.146739
18.	OTHER FOOD PRODUCTS	.079732	.063108	.142840
23.	TOBACCO	.059434	.077538	.136972
15.	BAKERY PRODUCTS	.063804	.065452	.129255
19.	SPINNING + WEAVING	.055293	.071744	.127037
9.	BASIC CHEMICALS	.076923	.048410	.125334
27.	TRANSP. + COMM.	.085180	.027250	.112430
25.	FERTILISERS	.074783	.025752	.100534
2.	MINING + QUARRYING	.068199	.028801	.097000
14.	GRAIN MILLING	.027186	.056377	.083563
13.	DAIRY PRODUCTS	.028245	.053685	.081930
12.	MEAT PRODUCTS	.025851	.049731	.075582
17.	OILS + FATS	.051661	.019684	.071345
16.	SUGAR	.032701	.033899	.066601
20.	PROCESSING OF COTTON	.005973	.059839	.065812
29.	EDUCATION	.034904	.027629	.062533
1.	AGRICULTURE	.041167	.017876	.059043
32.	BANKING + INSURANCE	.011749	.026157	.037906
31.	TRADE + FINANCE	.016713	.019864	.036577
28.	SUEZ CANAL	.014636	.007017	.021653
33.	OTHER SERVICES	.005904	.005653	.011557

agriculture, processing of cotton, mining and quarrying, and food industries all have total import coefficients in the lower range. In all of these cases the import coefficient is less than .10. We conclude then that metal, machinery, and the bulk of chemicals, which are the industries stressed in Egypt's first Five-Year Plan, are very highly dependent on imports. The implication of this for the balance of payments of the country is too obvious to require elaboration.

(ii) There are many sectors for which the indirect coefficient is larger than the direct one. These are meat products, dairy products, grain milling, bakery products, sugar, spinning and weaving, processing of cotton, clothing, tobacco, medical services, banking and insurance and other industries. For the most part the industries in this group involve processing agricultural raw materials. Since the total import coefficients for these industries are relatively low, their development will involve lesser risk on balance of payments account. This does not, however, by itself constitute an argument for developing such industries.

The results from the 1954 data must be compared to those obtained from the data for 1963/64.

(iii) Table 3.15 indicates that tobacco, petroleum and coal, machinery except electric machinery, transport equipment, basic metals, furniture and fixtures, paper and cardboard, electric machinery, rubber products, printing and publishing, metal products, and chemicals have the highest total import coefficients in the data for 1963/64. Basically, these industries belong to the same major groups of industries with high import coefficients reported in (i) for the 1954 input - output matrix. Generally, the above industries also fall into the same major groups

TABLE 3.15

DIRECT, INDIRECT, AND TOTAL
IMPORT COEFFICIENTS BY INDUSTRY, 1963/64

NO.	INDUSTRY	DIRECT	INDIRECT	TOTAL
6.	TOBACCO	.409881	.025645	.435526
16.	PETROLEUM + COAL	.402701	.026420	.429121
20.	MACH. EXCEPT ELCTRIC	.275385	.096319	.371703
22.	TRANSP. EQUIPMENT	.270938	.083026	.353965
18.	BASIC METALS	.238326	.099617	.337944
10.	FURNITURE + FIXTURES	.296591	.037139	.333730
11.	PAPER + CARDBOARD	.265862	.045900	.311762
21.	ELECTRIC MACHINERY	.214648	.081733	.296381
14.	RUBBER PRODUCTS	.221319	.050761	.272079
12.	PRINTING + PUB.	.223321	.041234	.264555
19.	METAL PRODUCTS	.142614	.115093	.257707
15.	CHEMICALS	.135584	.070405	.205989
23.	MISCELLANEOUS	.085924	.096752	.182675
13.	LEATHER + L. PRODS.	.084579	.092585	.177165
17.	NONMETALLIC MINERAL	.065556	.098261	.163817
7.	SPINNING + WEAVING	.079790	.070452	.150242
24.	ELECTRICITY	.032645	.110523	.143168
4.	FOOD PROCESSING	.088511	.056492	.145003
25.	CONSTRUCTION + DWLNG	.047954	.076476	.124429
8.	CLOTHING	.019296	.093997	.113293
5.	BEVERAGES MANUF.	.030500	.076187	.106687
26.	TRANSP. + COMUNCTN.	.036708	.041970	.078678
3.	MINING + QUARRYING	.042478	.029299	.071777
27.	OTHER SERVICES	.020819	.040661	.061480
2.	GINNING + PRESSING	.006015	.048273	.054288
1.	AGRICULTURE	.022131	.025159	.047290
9.	WOOD + CORK PRODS.	0.000000	.003492	.003492

stressed in the Plan - chemicals, metals and machinery. Emphasizing the growth of such industries must put heavy strains on the balance of payments. Also, the industries mentioned above depend on imports in a direct way, since the indirect import coefficients for such industries are relatively small compared to the direct coefficients.

(iv) Indirect import coefficients for the 1963/64 data are larger than the direct coefficients in agriculture, ginning and pressing, beverages manufacturing, clothing, wood and cork products, leather and leather products, nonmetallic mineral products, electricity and other services. All these sectors except leather and leather products, and perhaps electricity, also have low total (direct plus indirect) import coefficients. Also, these sectors have in common that they all process raw materials.

A manifest change between 1954 and 1963/64 in the pattern of dependence on imports can be discerned by examining Tables 3.16 and 3.17, which put the results for 1954 and 1963/64 in a comparable form. A comparison of these tables reveals a rise in the total import coefficients for fifteen out of the twenty industries over the period 1954-1963/64. This period has witnessed a concerted industrialization effort based on import substitution, and the observed rise in the import coefficients could be explained in terms of this policy. We may infer on the basis of the Egyptian experience that, at least in its early stages, industrialization via import substitution must have led to an increase in the extent of dependence on imports for intermediate use. A similar conclusion was reached by Malenbaum and Macario with reference to the experience of

TABLE 3.16

DIRECT, INDIRECT, AND TOTAL
IMPORT COEFFICIENTS BY INDUSTRY, 1954
(AGGREGATED)

NO.	INDUSTRY	DIRECT	INDIRECT	TOTAL
8.	PAPER+P. PRODUCTS	.237569	.092508	.330077
13.	METAL PRODUCTS	.221567	.069944	.291511
12.	BASIC METALS	.224365	.061816	.286181
14.	MACHINERY EXPT. ELCT	.166072	.095044	.261116
19.	WOOD+FURNITURE	.185885	.064361	.250246
20.	OTHER INDUSTRIES	.161797	.067551	.229348
16.	BLDG.+CONSTRUCTION	.143458	.064271	.207730
15.	ELECRICITY	.158320	.041963	.200283
11.	NONMETALLIC MANUF.	.131532	.060938	.192469
10.	COAL+PET. REFINING	.131497	.048461	.179959
7.	CLOTHING	.049546	.094638	.144185
5.	TOBACCO	.059434	.070904	.130338
9.	CHEMICAL MANUF.	.091977	.033131	.125108
6.	SPINNING+WEAVING	.055293	.068903	.124196
4.	FOOD PROCESSING	.040154	.060684	.100838
3.	MINING+QUARRYING	.068199	.024645	.092844
17.	TRANSP.+COMMN.	.066327	.020541	.086868
2.	GINNING+PRESSING	.005973	.063158	.069131
1.	AGRICULTURE	.041167	.021877	.063044
18.	OTHER SERVICES	.013199	.012019	.025218

TABLE 3.17

DIRECT, INDIRECT, AND TOTAL
IMPORT COEFFICIENTS BY INDUSTRY, 1963/64
(AGGREGATED)

NO.	INDUSTRY	DIRECT	INDIRECT	TOTAL
5.	TOBACCO	.408810	.025800	.434610
10.	COAL+PET. REFINING	.402701	.026887	.429588
14.	MACHINERY EXPT. ELCT	.275385	.097660	.373045
12.	BASIC METALS	.238326	.099754	.338080
8.	PAPER+P. PRODUCTS	.265862	.045737	.311599
19.	WOOD+FURNITURE	.254634	.040026	.294660
20.	OTHER INDUSTRIES	.195241	.074254	.269495
13.	METAL PRODUCTS	.142614	.116113	.258727
9.	CHEMICAL MANUF.	.135584	.070514	.206098
11.	NONMETALLIC MANUF.	.065556	.098952	.164507
6.	SPINNING+WEAVING	.079790	.070468	.150258
4.	FOOD PROCESSING	.088511	.056412	.144923
15.	ELECRICITY	.032645	.110112	.142758
7.	CLOTHING	.019296	.106657	.125953
16.	BLDG.+CONSTRUCTION	.047954	.073898	.121851
17.	TRANSP.+COMMN.	.036708	.041883	.078591
3.	MINING+QUARRYING	.042478	.031477	.073955
18.	OTHER SERVICES	.020819	.039580	.060399
2.	GINNING+PRESSING	.006015	.048224	.054239
1.	AGRICULTURE	.022131	.025141	.047272

India and Latin America, respectively.[35]

[35] See Malenbaum, *op. cit.*, and Macario, *op. cit.*

CHAPTER IV

A LINEAR PROGRAMMING MODEL FOR ASSESSING THE INVESTMENT PATTERN IN EGYPT'S FIRST FIVE-YEAR PLAN

In this chapter we present a linear programming model for determining the optimal allocation of investment among different sectors. This allocation must satisfy savings, foreign exchange and production constraints. The program is designed to aid in the identification of the sectors which are most suitable for export promotion and for import substitution, considering the comparative advantage of Egypt,[1] as indicated in the input-output data for 1954 and 1963/64. In the first section the primal formulation of this model is presented. The dual form and its interpretation will be given in Section 2. The third section will be devoted to a discussion of the limitations of the model and to consideration of the likely direction of errors and their extent.

1. The Primal Formulation Of The Model

The model designed here is of the finite-horizon type. It is in the spirit of those designed by Sandee, Manne and, to a smaller degree, Chenery.[2] The primal form is as follows:

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[1]Comparative advantage here refers to the resource supplies of the country as they relate to the input requirements of different industries. It does not refer to any direct comparison between the country and the rest of the world. Such a comparison is implied, however, in the profitability considerations within the model itself. This is basically the meaning of comparative advantage propagated by Chenery. See H. B. Chenery, "Comparative Advantage and Development Policy", in A.E.A. and R.E.S., Surveys of Economic Theory, Vol. II: Growth and Development (New York: St. Martin's Press, 1965).

[2]See Jan Sandee, A Demonstration Planning Model for India (Bombay: Asia Publishing House, 1960); A. S. Manne, "Key Sectors of the Mexican Economy, 1962-72", in I. Adelman and E. Thorbecke, eds., (continued)

Maximize $F_{max} = q_{oo}$, (4.1)

subject to:

$$-y_{oi} + \sum_{j=1}^{N} \alpha_{ij}\, y_{oj} + x_{oi} - m_{oi} + \sum_{j=1}^{N} \xi_{oo}\, \theta_{ij}\, y_{oj}$$

$$+ \beta_{oj}\, q_{oo} \leq -b_{oi} \qquad (i=1,\ldots,N) \qquad (4.2)$$

$$\gamma_{ii}\, y_{oi} - n_{oi} \leq 0 \qquad (i=1,\ldots,N) \qquad (4.3)$$

$$\sum_{j=1}^{N} \xi_{oo}\, \delta_{oj}\, y_{oj} + \sum_{j=1}^{N} \xi_{oo}\, \mu_{oj}\, n_{oj} \leq d_{o1} \qquad (4.4)$$

$$\sum_{j=1}^{N} \xi_{oo}\, \phi_{oj}\, y_{oj} - \sum_{j=1}^{N} \pi_{oj}\, x_{oj} + \sum_{j=1}^{N} \pi_{oj}\, m_{oj} \leq d_{o2} \qquad (4.5)$$

The endogenous variables are:

y_{oi} change in domestic output level of i^{th} sector over the plan period, and y_o is a vector with components y_{oi};

x_{oi} change in export level of the i^{th} sector's output over the plan period, and x_o is a vector with components x_{oi};

m_{oi} change in import level of i^{th} sector's output, for purposes other than investment over the plan period, and m_o is a vector with components m_{oi};

q_{oo} a scalar indicating the change in household consumption over the plan period ;

The Theory and Design of Economic Development (Baltimore and London: The Johns Hopkins Press, 1966); and H. B. Chenery and K. Kretschmer, "Resource Allocation for Economic Development", Econometrica, XXII (October, 1956), 365-399.

n_{oi} change in employment in the i^{th} sector over the plan period, and n_o is a vector with components n_{oi}.

The exogenous variables are:

b_{oi} change in government consumption and changes in stocks of i^{th} sector's output over the plan period, and b_o is a vector with components b_{oi};

d_{o1} the planned level of domestic savings in the target year of the plan;

d_{o2} a scalar indicating the planned level of foreign capital inflow in the target year, expressed in foreign currency

The parameters are:

α_{ij} current total deliveries (domestic and foreign) of i^{th} good per unit of j^{th} sector's output (these constitute a matrix of input-output coefficients, A);

β_{oi} consumption expenditure coefficient of the i^{th} good, from both domestic production and imports, and β_o is a vector with components β_{oi};

ξ_{oo} stock-flow conversion factor;

θ_{ij} requirements of i^{th} sector's output per unit increment in the value of capital stock in sector j, and Θ is a matrix with elements θ_{ij};

γ_{ii} coefficient of increase in employment per unit increase in output in sector i, and Γ is a diagonal matrix with elements γ_{ii};

ϕ_{oj} capital from foreign sources per unit of output of the j^{th} sector, measured in foreign currency, and ϕ_o is a vector with components ϕ_{oj};

δ_{oj} capital from domestic sources per unit of output of the j^{th} sector, and δ_o is a vector with components δ_{oj};

π_{oi} foreign price (of either exports or imports) of the i^{th} sector's output, measured in foreign currency and the vector π_o is the foreign price vector, with components π_{oi}. (We assume prices are quoted at the border, so import prices are c.i.f. and export prices are f.o.b.);

μ_{oi} investment in education, training and relocation per unit of labour in sector i, and μ_o is a vector with components μ_{oi}.

The objective function for the model is represented by equation (4.1). It sets the objective in the model as the maximization of household consumption in the terminal year of the plan. The reasons for the choice of this particular objective function are many.[3] On the one hand, consumption is the raison d'être of economic activity. On the other hand, it may be politically more feasible to implement an economic program that provides for some tangible rewards. Thirdly, we must assume that consumption is the ultimate objective of the Plan and, hence, will furnish a legitimate criterion against which we may judge investment. Finally, this choice of the objective function provides the pricing system implied by the dual with a convenient numèraire, as will be

[3]The maximization of household consumption is the most widely used type of objective function in the literature. See Sandee, op. cit.; Arthur MacEwan, Development Alternatives in Pakistan (Cambridge, Mass.: Harvard University Press, 1971); Michael Bruno, "Experiments with a Multi-Sectoral Programming Model", in I. Adelman and E. Thorbecke, op. cit.; and Suresh D. Tendulkar, "Interaction Between Domestic and Foreign Resources in Economic Growth: Some Experiments for India", Chapter 6 in Hollis B. Chenery, ed., Studies in Development Planning (Cambridge, Mass.: Harvard University Press, 1971).

explained below. Although we have chosen the objective function as that of maximizing household consumption, the design of the present model admits, with minor alterations, of many alternative forms of the objective function. Thus, without changing the constraints, the following alternative objective functions may be easily adopted:

(i) minimize total investment requirements,

(ii) minimize foreign exchange requirements,

(iii) maximize total employment, and

(iv) maximize national income.[4]

Many targets could be expressed in the form of additional constraints in the model. The Plan target of doubling national income in ten years can best be expressed, in the context of the present model, in this fashion. To the system (4.1)-(4.5), add the constraint

$$\sum_{j=1}^{N} \nu_{oj}\, y_{oj} + \beta_{ov}\, q_{oo} = v_{oo} - g_{oo} \tag{4.6}$$

where ν_{oj} is the value added-output coefficient in sector j; β_{ov} is the value added-consumption coefficient; v_{oo} is a scalar indicating the change in total value added over the Plan period (set equal by definition to the target increase in national income); and g_{oo} is the given increase in value added going to government consumption over the Plan period. Note that (4.6) is a strict equality constraint; v_{oo} is given, and will be such that national income is doubled over the Plan period. In the

[4]One advantage of setting the maximization of national income as the objective function is that it allows us to see if the Plan target of doubling national income was not a feasible one. We shall not pursue this question here, however.

same vein, constraints may be added, stipulating a minimum level of employment, a minimum or maximum level of some industry's output, etc. Some of these possibilities will be utilized in the next chapter, dealing with the solution and implications of the model.

Equation (4.2) represents a set of balances for the N sectors in our model economy. Each balance dictates that the total disposition of output cannot exceed total output availability (from both domestic and foreign sources). This becomes clear if equation (4.2) is re-written as:

$$\sum_{j=1}^{N} \alpha_{ij} y_{oj} + x_{oi} + \beta_{oi} q_{oo} + b_{oi} + \sum_{j=1}^{N} \xi_{oo} \theta_{ij} y_{oj} \leq y_{oi} + m_{oi} \qquad (i=1,\ldots,N) \qquad (4.7)$$

The left-hand side of (4.7) is total demand and the right-hand side is total supply. Constraint (4.7) simply says that total demand may not exceed total supply. (The set of balances represented by (4.7) are akin to material balances in Soviet planning practice.)

The model determines efficient allocation of resources in the course of economic growth within a finite, single-period horizon. Thus, equation sub-system (4.3) indicates that, if capital investment is made in labour training and relocation, employment can be increased and new capacity can then be operated and production augmented. Here the model diverges from the assumption, frequently in development planning models, that labour is in excess supply. Such an assumption implies that labour does not constitute a barrier to the expansion of capacity and output. The Egyptian experience in development implies that the opposite is actually the case. It indicates that to increase output it is not enough to create new capacity through investment in physical capital formation. Labour with the required skills and in the appropriate amounts must also be made available.[5] The extent of the increase in employment is constrained by equation (4.4) which also constrains the increment to physical capital available. Investment in physical capital formation and investment in human capital (education, training and relocation of labour) are both required for expansion in most industries. These two types of investment jointly lead to an outward shift in the production possibility curve, which is the essence of economic growth. The complementarity between investment and employment thus becomes clear: investment creates physical capacity but trained labour is required to operate it.

The consideration of investment in human capital is important for the following reasons:

(a) the model of such construction is much in line with recent developments in growth theory and the increasing emphasis on human capital.

(b) it enables us to discuss the (implicit) assumption made in the Plan that labour is costless (because of the implicit assumption that its

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[5]This is one area where the sectoral model, of the kind suggested here, proves useful. In aggregative models there is a temptation to ignore labour constraints on production so long as the total supply of labour matches total demand. However, within this frame of overall balance, there may be sectoral imbalances (excess demands or supplies for particular skill categories). A multi-sectoral model uncovers such imbalances. In the course of implementing the Plan, Egypt experienced shortages of some labour skills, and the government stepped in to limit the power of public enterprises to bid labour away from each other. See Mustafa H. Nagi, Labour Force and Employment in Egypt: A Demographic and Socioeconomic Analysis (New York: Praeger Publishers, 1971), p. 103.

marginal productivity is zero).[6] The point that we would like to make here is that, even though the marginal productivity in Egyptian agriculture may be zero, it is still necessary to consider the social cost of using labour. These are costs of education, training and relocation (for example, in transferring rural labour to be used in urban areas where it is most needed).

One of the features of this model is the distinction between domestic and foreign financing of investment. It is felt that this is an important aspect of Egyptian development, since a substantial proportion of financing investment came from foreign sources.[7]

Equation (4.5) expresses the foreign exchange constraint. It says that the difference between import requirements and export proceeds must not exceed the planned capital inflow. Imports here are composed of two categories. The first is imports for current use (i.e., for both

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[6]See Charles Issawi, Egypt in Revolution, pp. 2-9; and Bent Hansen and Girgis Marzouk, Development and Economic Policy, pp. 305-306. The question of marginal productivity of labour in Egyptian agriculture and the related notion of disguised unemployment has stimulated some interesting debate in the literature. Cf. Bent Hansen, "Marginal Productivity Wage Theory and Subsistence Wage Theory in Egyptian Agriculture", JDS, II (July, 1966), pp. 367-407; Robert Mabro, "Industrial Growth, Agricultural Under-Employment and the Lewis Model: The Egyptian Case, 1937-1965", JDS, III (July, 1967), pp. 322-351; and Bent Hansen, "Employment and Wages in Rural Egypt", AER, LIX (1969), pp. 298-313.

[7]According to the First Five-Year Plan, 1959/60-1964/65, about 40% of total investment was to be financed from foreign sources; for investment in manufacturing, mining and electricity, foreign financing was estimated to be about 65%. See Plan Frame, p. 18. It is interesting to note that these figures represent a very high ratio of foreign financing. In India's fourth plan, 1964/65-1970/71, for example, foreign financing was estimated at only 19% in 1965/66. See S. P. Gupta, Planning Models in India; with Projections for 1975 (New York: Praeger Publishers, 1971), p. 88, Table 3-4.

intermediate use and consumption). The second category is imports for investment purposes. For any particular sector it is assumed that domestic and foreign sources of capital goods are combined in given proportions because there are specialized types of equipment which cannot be produced locally. This is accounted for by the first terms in equations (4.4) and (4.5)[8] in which the coefficients δ_{oj} and ϕ_{oj} are regarded as constants.

2. The Dual And Its Interpretation

The dual form of the model is represented by equation (4.8) and inequalities (4.9) through (4.13), with dual variables p_{oi}, w_{oi}, and z_{os}. The p_{oi} and z_{os} are shadow prices of output and resource flows, respectively. The w_{oi} are rents assigned under circumstances explained below.

$$\text{Minimize} \quad F_{min} = -\sum_{i=1}^{N} b_{oi}\, p_{oi} + \sum_{s=1}^{2} d_{os}\, z_{os} \tag{4.8}$$

subject to

$$-p_{oj} + \sum_{i=1}^{N} (\alpha_{ij} + \xi_{oo}\,\theta_{ij})p_{oi} + \gamma_{jj}\, w_{oj} + \xi_{oo}\,\delta_{oj}\, z_{o1} + \xi_{oo}\,\phi_{oj}\, z_{o2} \geq 0 \qquad (j=1,\ldots,N) \tag{4.9}$$

$$p_{oj} - \pi_{oj}\, z_2 \geq 0 \qquad (j=1,\ldots,N) \tag{4.10}$$

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[8]The coefficients δ_{oj} represent capital from domestic sources per unit increment in capacity and ϕ_{oj} represent capital from foreign sources per unit increment in capacity, expressed in foreign currency. The appearance of ξ_{oo}, the stock-flow conversion factor in both terms of (4.4) and the first term of (4.5), means that only part of capital outlay will be spent in the final year of the plan.

$$-p_{oj} + \pi_{oj} z_2 \geq 0 \qquad (j=1,\ldots,N) \qquad (4.11)$$

$$-w_{oj} + \xi_{oo} \mu_{oj} z_{o1} \geq 0 \qquad (j=1,\ldots,N) \qquad (4.12)$$

$$\sum_{i=1}^{N} \beta_{oi} p_{oi} \geq 1$$

Before considering the dual interpretation, let us first match the number of variables and constraints in the dual and primal problems.[9] This matching is illustrated in the following table.

Table 4.1

The Primal-Dual Relationship

	Primal	Dual
Endogenous variables	$y_{oj}, x_{oj}, m_{oj}, n_{oi}, q_{oo}$	$p_{oi}, w_{oi}, z_{o1}, z_{o2}$
Number of endogenous variables	4N + 1	3N + 2
Number of constraints	3N + 2	4N + 1

The dual constraint (4.9) can be rewritten

$$\sum_{i=1}^{N} (\alpha_{ij} + \xi_{oo} \theta_{ij}) p_{oi} + \gamma_{jj} w_{oj} + \xi_{oo} \delta_{oj} z_{o1}$$

[9] As is well known from the theory of linear programming, the dual problem should have as many constraints as there are variables, and as many variables as there are constraints, in its primal. See R. Dorfman, P. A. Samuelson and R. M. Solow, Linear Programming and Economic Analysis (New York: McGraw-Hill Book Co., Inc., 1958), pp. 40-41.

$$+ \xi_{oo} \phi_{oj} z_{o2} \geq p_{oj} \qquad (j=1,\ldots,N) \qquad (4.14)$$

As noted above, p_{oi} and z_{oi} on the left-hand side are prices of commodities and resources, respectively. The variables w_{oj} are the rents payable to specifically trained units of labour. Therefore, the left-hand side of (4.14) represents the incremental cost of production per unit of the j^{th} sector's output, while the right-hand side is the incremental unit value (price) of that output. Efficiency in production requires that there should be no increase in an activity if it increases cost more than revenue. Thus, if the j^{th} activity is to be increased from its base-year level, the equality in (4.14) will become effective.

An analogous interpretation applies to constraints (4.10) through (4.13). Consider constraints (4.10) and suppose that the j^{th} good is exported. We then obtain the following set of conditions:

$$p_{oj} = \pi_{oj} z_{o2}. \qquad \text{for some } j \qquad (4.15)$$

The right-hand side of (4.15) is the earnings per unit of increased exports of commodity j in domestic currency. π_{oj} is the foreign price of the i^{th} commodity, and hence z_{o2} is interpreted as the exchange rate. Thus (4.15) is the equilibrium (efficiency) condition for the j^{th} export activity. (The price in the domestic market must equal the foreign price c.i.f.) If the increase of the j^{th} export activity is zero, (4.14) reads

$$p_{oj} > \pi_{oj} z_{o2}, \qquad \text{for some } j \qquad (4.16)$$

which indicates that exports of the j^{th} commodity cannot be increased without incurring loss.

Constraints (4.11) are the equilibrium (efficiency) conditions for the j^{th} import activity. They may be rewritten

$$\pi_{oj} \, z_{o2} \geq p_{oj} \qquad (j=1,\ldots,N) \qquad (4.17)$$

The right-hand side represents the cost of obtaining the j^{th} commodity from domestic production, and the left-hand side is the cost of importing it. If there is to be any increase in the importation of the j^{th} commodity, therefore, the equality must hold in (4.17) with the weak inequality holding otherwise.

Now consider constraint set (4.12). It may be written in the form

$$\xi_{oo} \, \mu_{oj} \, z_{o1} \geq w_{oj} \qquad (j=1,\ldots,N) \qquad (4.18)$$

The left-hand side can be interpreted as the cost of investment in labour training, while the right-hand side may be interpreted as the return to capacity made possible by such investment. If the inequality holds in (4.18) for any j, investment in human capital in the corresponding sector is not warranted. In equilibrium the equality will hold, indicating that the value of increases in capacity are equal to the cost of creating it.

Finally, we have the condition, implied by constraint (4.13), that the value of the consumption bundle be greater than or equal to unity.[10] If the inequality holds, the cost of final goods exceeds the price and, in market equilibrium, none will be produced. It is assumed

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[10] It is interesting to note that the corresponding primal specification of consumption implies unitary expenditure elasticities for all commodities. This is because the expenditure elasticity is $(dq_{oi}/dq_{oo})/(q_{oi}/q_{oo}) = \beta_{oi}/\beta_{oi} = 1$.

that there is a positive amount produced. It follows from the Simplex Criterion of linear programming that in any optimal solution to the linear programming algorithm, the equality must hold and that therefore

$$\sum_{i=1}^{N} \beta_{oi}\, p_{oi} = 1. \tag{4.19}$$

This provides us with a numèraire for the price system determined by the dual. The price of output of any activity can be determined in terms of (relative to) the price of the composite consumption bundle.

In the light of the above discussion, the objective function of the dual may be interpreted as the minimization of the resource cost of output, net of government consumption expenditure and stock changes. This means choosing the resource prices so as to minimize the cost of output - which is the essence of guiding resource allocation by comparative advantage.

3. Sensitivity Of Results To Different Assumptions Of The Model

In this section we discuss the main limitations of the model presented in the foregoing sections of this chapter. Note that this is a programming model of the same genre as those widely used by Chenery, Sandee and Manne.[11] Any assessment of the suitability of the model can only be made with reference to the main purposes of designing it and the data and research resources available. The model is designed mainly to tackle the problem of choosing the "best" configuration of investment channels, given the availability of resources in the economy. The word

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[11] See Chapter 1, Section 2, for a selective list of the literature in this category.

"best" here simply means that choice which optimizes an objective function. It is also designed with the intention of discussing one of the shortcomings of Egyptian planning, namely, the neglect of labour cost in the profitability calculations of individual projects.[12]

A linear programming format seems to suit these purposes reasonably well. Such a family of models include some scope for choice which is deemed necessary for economic policy decisions. The choice permitted within those models could be on different levels. On one level there is the possibility of choice between domestic and foreign sources of supply. On another level there is the possibility of choice between domestic and foreign sources of financing investment.[13] Linear programming models, and with them the model designed here, provide a general equilibrium framework for such choices, thus taking all effects, direct or indirect, into account. The indirect effects of some course of action (choice alternative) may be large and far-reaching in ways that are not obvious. However, the balance sheet of linear programming models has its debit side as well, particularly from the viewpoint of the purposes of our study and the nature of the problems to be examined. This sets some limitations on the use of the model and may qualify some of the conclusions reached. The model assumes away economies of scale and external economies by virtue of the assumptions of proportionality

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[12]The rate of return on capital in terms of value added played a role in project evaluation. This assumes that other production factors, such as labour, are free. See Hansen and Marzouk, op. cit., p. 305.

[13]The model does not allow for choice in some important aspects, such as the techniques of production or the time path of basic aggregates. Also, the aggregate consumption bundle is fixed.

and additivity, respectively.[14]

It is important to note, however, that these particular shortcomings are not specific to linear programming (or, more generally, activity analysis) models. They are also troublesome for conventional models and methods.[15] The linear programming model assumes constant coefficients of production. But the assumption of fixed production coefficients is less restrictive than one would first expect. Production functions with fixed coefficients for labour and capital may be more suitable for depicting existing production relationships than production functions that allow for substitution. Leontief has concluded, on the basis of empirical evidence, that fixed capital and labour coefficients may be more appropriate than the constant elasticity of substitution (CES) function or the Cobb-Douglas.[16]

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[14]As far as economies of scale are concerned, this does not constitute a serious handicap, since the extent of these economies is highly controversial. See E. A. G. Robinson, ed., Economic Consequences of the Size of Nations: Proceedings of a Conference Held by the International Economic Association (London: MacMillan & Co. Ltd., 1963). Especially the papers by Jewkes and Marcy, and the discussion of the earlier paper, pp. 358-366.

[15]Or what Hicks characterizes as Paretian. See, J. R. Hicks, "Linear Theory", Chapter XI of A.E.A. and R.E.S., Surveys of Economic Theory, Volume III: Resource Allocation (London: MacMillan & Co. Ltd., 1963), p. 101.

[16]Wassily Leontief, "An International Comparison of Factor Costs and Factor Use - A Review Article", AER, LIV (June, 1964), pp. 335-345. It is well known that the two functions mentioned in the text (the CES and Cobb-Douglas) allow for factor substitution. Leontief's analysis came in the course of his review of a book by B. S. Minhas carrying the same title, in which Minhas claims to have refuted the factual assumption of the modern theory of international trade - that, regardless of factor price ratios, industries can be meaningfully classified either as capital-intensive or labour-intensive. By examining the relationship between the capital-labour ratio and the ratio of wage to rate of return on capital for some 17 industries in a number of (continued)

Moreover, although the assumption of fixed production coefficients implies that there is no direct substitution, it does not, however, preclude the possibility of indirect substitution. The latter is a result of the choice among sectors.

We mentioned above that the model developed in this chapter is of the finite-horizon type. Such models give values of the unknowns in the terminal planning year only. It tells us nothing about the time profile of different variables during the plan period. But it is the nature of the task of model-building that only a few questions may be answered with any one model. We make no claim that our model can answer any questions about the development of different variables over the planning period; these questions call for another type of model. We are not concerned with this at the present.

Linear programming models utilize the method of comparative statics. The questions we are trying to tackle here could, perhaps, be better dealt with using dynamic analysis. However, the design of a dynamic model is an absorbing task; it requires a large volume of data which is not presently available and its computation costs tend to be extremely high. Under the circumstances, in the absence of formal planning models for Egypt,[17] a comparative static model seems a reasonable first step.

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countries, Leontief found little evidence that the industries change their factor proportions with a change in the factor-price ratio. He thus suggests that "Fixed coefficients of production can be interpreted more meaningfully as representing a special case of technological conditions under which the two factors can be substituted for each other, but only within relatively narrow limits ...", ibid., p. 345.

[17] Some models, mainly by Frisch, were designed with the Egyptian case in mind. But to the best knowledge of the present writer, they were never used in practice. See M.M.El - Imam, Models Used in Drafting the 20-Years Plan (1959-1978), I.N.P., Memo No. 255 (Cairo: December 3, 1962), p. 1.

CHAPTER V

IMPLICATIONS OF THE MODEL SOLUTION

It was mentioned in the introduction that, although it started from a deficit, the Egyptian first Five-Year Plan was designed to close the gap in the balance of trade by the terminal year. We also mentioned that the planned pattern of sector expansion did not seem to reflect the pattern of comparative advantage in some cases. This assertion will be rigorously examined in this chapter. The model developed in the previous chapter was designed to throw light on these issues by the examination of the Plan targets. For example, we would like to know why did the planned equilibrium in the balance of trade turn into a heavy deficit. Also, to what extent did the pattern of sector expansion in the Plan reflect the country's comparative advantage? What impact will the cognizance of the cost of training, educating and relocating labour have on the allocation of investment funds? These questions are, obviously, not unrelated. At root they are all concerned with the optimal allocation of resources in the course of economic growth.

In this chapter we report a number of simulation experiments using the linear programming model of the previous chapter. These experiments were conducted in order to aid in the understanding of some of the questions raised in the previous paragraph, and to go at least part of the way towards an answer. Two sets of simulations were tried, one using the 1954 input-output coefficients matrix, and the other using the 1963/64 matrix. The results of each set were aggregated for comparability. All the data used and their sources are reported in the Appendix C. We now turn to our attempt to answer the questions raised above.

1. Optimal Investment Allocation And Comparative Advantage

The optimal allocation of investment is that allocation which maximizes the increase in consumption in the end-year of the Plan, and satisfies all the constraints of the model. This allocation is said to reflect the comparative advantage of the country in the period of the input-output data used. The term comparative advantage was defined above in loose terms. We are now in a position to provide a more precise definition of the term in the context of this study.

As formulated here, the model has two alternative ways of supplying any tradable commodity. The first is by using available resources directly to produce it. The second is by using available resources to produce some other commodity or commodities and then exchanging the latter for the commodity needed. The export and import activities in the model allow for this second possibility. In the optimal solution, those activities which are more conducive to the maximization of the objective function will appear in the basis. Some of these will be domestic production activities, some import activities and others export activities. We can then determine, by looking at the vector of optimal activities, the investments required in order to move Egypt in the direction of comparative advantage, given its existing production structure. This direction is determined by the subset of domestic-output and export activities selected in the simulation. Comparative advantage in this sense means producing those commodities for which the opportunity cost is less than the price at which it can be imported or the revenue which accrues from exporting it. We would like to emphasize that we prefer to think of comparative advantage here as a "principle of planning, rather than as a result of market forces."[1]

The procedure adopted in the simulation was the following. First, the model was solved using the basic data reported in Appendix C. Because the model is an open one, the possibility of foreign trade will result in a tendency towards complete specialization. The solution to the linear programming model will exhibit concentrated expansion in only one or a few industries, accompanied by a corresponding concentration in exports and imports[2]. This of course is unrealistic since there normally are foreign demand and domestic supply considerations that are impossible

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[1]See H.B. Chenery, "Comparative Advantage and Development Policy," AER, LI (March 1961), 22.

[2]It is a characteristic of models such as the one used here that there will always be one "cheapest" source of supply, and hence a tendency towards complete specialization. Also, the nature of the model is such that, for any commodity, either exports or imports will be nonnegative-that is, any one commodity cannot both be exported and imported. Cf. Dorfman, Samuelson and Solow, op. cit.; K.J. Arrow, "Import Substitution in Leontief Models," Econometrica, XXII (Oct., 1954), 484; and S. Chakravarty, Capital and Development Planning (Cambridge: MIT Press, 1969), 216.

to incorporate into the model and which require imposing an upper limit on most exports. The estimation of those upper limits calls for intensive analysis of the market conditions for individual commodities. Instead, we decided to impose an arbitrary upper limit of 10% of base-year (1959/60) capacity on any industry where specialization tends to be concentrated. This restriction on the capacity expansion in the optimal industry leads to the emergence of a second line of specialization. Expansion in the new industry is in turn limited to 10% of base-year capacity, thus leading to a third line of specialization emerging, and so on.

This process of successive limitation is continued until no more industries show any tendency to specialization. The process described thus produces the set of industries where the country is most likely to possess comparative advantage. The order in which such industries appear in the above described sequence of optimal solutions represents the order of priority to be assigned thereto. Since it is the direction of capacity expansion (i.e., in what industries) rather than the magnitude of expansion itself that interests us at this stage, the arbitrary upper limits imposed on individual industries are not very harmful. The upper limits are introduced merely as a device to enable us to identify the order of priority that should be assigned to each industry.

The results of the simulations are contained in Table 5.1. The industries included in the table are those where specialization is successfully introduced. The left-hand side represents results of simulations based on the 1954 input-output matrix and the right-hand side represents the results of simulations based on the 1963/64 input-

Table 5.1

Industries Assigned Higher Priority for Expansion

As a Result of Simulations Based on the 1954 Input-Output Matrix		As a Result of Simulations Based on the 1963/64 Input-Output Matrix	
Industry No.	Industry	Industry No.	Industry
17	Oils and fats	1	Agriculture
25	Fertilizers	9	Wood and cork products
10	Other chemicals	3	Mining and quarrying
28	Suez Canal	12	Printing and publishing
1	Agriculture	20	Machinery except electrical machinery
2	Mining and quarrying		

output matrix. The numbers corresponding to the individual industries on each side are the same as the industry numbers in the 1954 and 1963/64 input-output tables, respectively. Thus, the left-hand side reports the industry in which specialization, and hence capacity expansion is most desirable. As indicated in the table, the first industry selected by the model is industry number 17 in the 1954 input-output table- oils and fats. The second best industry for expansion is fertilizers, then other chemicals, and so on. In other words, specialization according to Egypt's comparative advantage on the basis of the 1954 input-output matrix would require giving top priority to oils and fats, fertilizers, other chemicals, Suez Canal, agriculture, and mining and quarrying- in that order. On the other hand, specialization according to the country's comparative advantage on the basis of its 1963/64 input-output relations would require giving priority to agriculture, wood and cork products, mining and quarrying, printing and publishing and machinery except electrical machinery- in that order. The industries included in Table 5.1 will be called, for short, priority industries.

How does this simulated pattern of comparative advantage compare with the pattern of sectoral expansion envisaged in Egypt's first Five-Year Plan? Recall that the Plan emphasized expansion in the major industry groups of metals, machinery and chemicals. These are equivalent to industries 4, 5, 8-10 in the classification of the 1954 input-output table and to industries 14-15 and 18-22 in the classification of the 1963/64 input-output table[3]. It is clear that the pattern of expansion emphasized in the Plan is quite different from the pattern of comparative advantage simulated by the model. Only one industry is common to both the planned and the simulated patterns of expansion. Depending on whether the simulation is based on the 1954 or on the 1963/64 input-output data, that common industry is other chemicals in the one case and machinery except electrical machinery in the other. In fact the simulations based on the 1954 production data seem to suggest that the economy expand along a agriculture-food processing-fertilizers front as compared with the planned metals-machinery-chemicals front. Also, in simulations based on the 1963/64 production data agriculture appeared as a top priority

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[3] See Appendix C.

sector.

The analysis of interdependence in Chapter III has demonstrated the focal importance of agriculture as a supplier of intermediate inputs to other industries. Agriculture is also very important as a supplier of food directly to final demand.[4] All this would lead one to believe that agriculture should at least keep pace with other industries. To the contrary, the Plan envisaged an increase in value added in agriculture of only 28% as compared with a growth in total value added by 40%. This is one of the most crucial mistakes in the Plan.

Two observations are in order here relating to the basis, within the model, for choosing between different industries for expansion and to the interdependence among individual industries. First, because foreign exchange is incorporated as one of the constraints, the model tends to select those industries which - ceteris paribus - have a low import coefficient. On this basis one would expect that the industries included in Table 5.1, generally, would have relatively low direct plus indirect import coefficients. The data in Tables 3.12 and 3.13 bears out this

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[4]See Tables 3.5 and 3.6. For an extensive analysis of the interrelation between agriculture and industry with special reference to Egypt, see Hazem El-Beblaoui, L'Interdépendance Agriculture - Industrie et le Développement Economique (l'example égyptien) (Paris, Editions Cujas, 1967). For an analysis of the importance of agriculture in the context of the food problem in Egypt, see Galal Amin, Food Supply and Economic Development, with Special Reference to Egypt (London: Frank Cass and Co. Ltd., 1966). An interesting analysis of the relation between agriculture and industry in less developed countries is given in J.K. Sengupta, "Models of Agriculture and Industry in Less Developed Economies," Ch. 5 of Tibor Barna (ed.) Structural Interdependence and Economic Development, op. cit.

expectation. Thus, with the exception of fertilizers and other chemicals, the industries on the left-hand side of Table 5.1 have import coefficients ranging from .022 to .097 only. This is fairly low compared to the mean value of .141 for the import coefficient based on the 1954 production data. Also, with the exception of machinery and printing and publishing, the industries on the right-hand side of Table 5.1 have import coefficients ranging from .003 to .079 only, as compared to the mean value for the import coefficient based on the 1963/64 production data of .203. The importance of import requirements in choice of the industries to be expanded is underscored when we note that, in the course of limiting the output of individual sectors, the shadow price of foreign exchange increases relative to that of domestic savings.[5] This movement in relative shadow prices of resources reflects the decline in the productivity of domestic savings relative to that of foreign exchange as the extent of specialization is delimited.

The second observation is that the output levels of some individual industries tend to move together more that others.[6] For example, construction appears to be required for the expansion of almost all other industries. There is also a close connection between fertilizers

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[5]In the course of restraining the output of individual industries, the ratio of the shadow price of foreign exchange, z_{02}, to that of domestic savings, z_{01}, rose from .67 to 4.5 for simulations based on the 1954 input-output matrix, and from .63 to 12.3 for simulations based on the 1963/64 one.

[6]This statement is based on observing the development of the output levels for individual industries in the course of the simulations. The whole set of simulations are in my worksheets which, for reasons of space limitation, cannot be included in the dissertation.

transport and communications, between electricity and other chemicals; and between building and construction and mining and quarrying. The importance of construction to all other industries despite its relatively low forward linkage coefficient,[7] may be explained by the fact that construction is obviously required for any other industry to expand.[8] In the light of all that, the planned fall in value added in construction between the base year and the target-year of the Plan becomes hard to explain, let alone to defend.[9] This brings out an aspect of interdependence that is of some methodological interest. In order to make a comprehensive assessment of sectoral interdependances, a general equilibrium model is necessary.[10] This is another argument in favour of the planning models

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[7]See Tables 3.7 and 3.8.

[8]The ratio of construction and buildings to total investment was .59, .16, .22, .40 and .58 in agriculture, manufacturing, electricity, transport communications and storage, and services, respectively, during the Plan. See Plan Frame, Table 2, p. 28.

[9]Value added in construction was planned at LE 51 million in 1964/65, slightly lower than the LE 52 million for the base-year 1959/60. See Plan Frame, Table 18.

[10]Another example is provided by Hirschman. He notes that machinery and equipment have a weak forward linkage effect. Op. cit., p. 107. He argues that this is so because in input-output practice those industries deliver mainly to final demand. Although such industries are important for investment, their overall significance may not be fully grasped if the judgement is based only on the magnitude of the linkage coefficients. This gives further support to the argument in the text that a general equilibrium model is needed for a reliable assessment of interdependence among industries.

of the type developed in Chapter IV of this study.

The strong tie between fertilizers and transport and communications may be explained by the fact that the production of fertilizers in Egypt is concentrated away from the market in rural areas. As for the connection between other chemicals and electricity, it is a little hard to explain. The industry called other chemicals in the input-output table for 1954 is mainly composed of plastics and rubber products. Such products are not known to require exceptionally large amounts of electricity as a factor in chemical reactions. It could be that production of such industries requires relatively large amounts of energy and, furthermore, that electricity is the main source of such energy in the case of Egypt. Finally, it is not difficult to explain the strong relation between construction and building on the one hand and mining and quarrying on the other. Capacity expansion in mining and quarrying obviously depends heavily on constructing roads, tunnels, buildings, etc.

2. Comparative Advantage And The Labour Constraint

It has been mentioned before that one of the basic shortcomings of the method of planning adopted in Egypt's first Five-Year Plan was the neglect of labour. It seems that the planners worked on the assumption that there is a surplus of labour in Egypt. For purposes of resource allocation for economic development this may be an unrealistic assumption, however. Unskilled labour may be abundantly available, but skilled and semi-skilled labour may be in short supply. This is a very real possibility in many less developed countries. It is certainly true for Egypt. Once we recognize this fact, we may follow one of two approaches in dealing with it:

(a) One may consider that, for the duration of the Plan, labour supply of any skill category is given. Such a skill category will then be treated as a primary factor in limited supply.

(b) One may consider that, within the horizon of the Plan, the supply of skilled labour is not given. The required skills may be bestowed on labour,[11] which implies incurring costs of education, training and relocation.

On the second approach, the only limitation of the supply of labour skills is the primary factors needed to "produce" it.[12] In the first approach labour, of any particular skill, constitutes a limitation on capacity expansion in its own right.[13] It is difficult to pinpoint,

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[11]The word "skill" here is used as a catchall word to include locational as well as occupational characteristics. In this broad sense, a worker may be said to have gained "skill" by becoming able to move to where his skill is most needed.

[12]This should not be confused with the classical notion that population growth and hence the supply of labour, in the long run, is endogenously generated. According to Adam Smith, the rate of population growth, and hence the rate of growth of the supply of labour "varies with the difference between the actual money wage and the subsistence wage". See Irma Adelman, Theories of Economic Growth and Development (Stanford, California: Stanford U. Press, 1961), p. 30.

[13]The literature on single-period optimizing models of the linear programming variety is almost exclusively concerned with the first approach. See for example the papers by Adelman and Sparrow and Bruno in Irma Adelman and Erik Thorbecke, op. cit.; see also the article by Bruno in Ch. 8 of H.B. Chenery, op. cit. The bulk of the literature assumes, however, that labour is abundantly available and hence ignore the labour constraint altogether. See the article by Manne in Adelman and Thorbecke, op. cit., and the articles by MacEwan and Tendulkar in Chenery, op. cit.; and also Sandee, op. cit., and P.B. Clark, Planning Import Substitution (Amsterdam: North-Holland Pub. Co., 1970).

a priori, the difference in empirical results between those two approaches, regarding resource allocation. Whatever that difference may be, it is clear that the incorporation of labour in the model according to either approach will generally lead to conclusions about resource allocation different from those reached when labour is totally ignored. In this study, the second approach was adopted.[14] The reason for this choice is twofold. In the first place, the assumption underlying this approach corresponds more closely to the Egyptian case. In Egypt, unskilled labour may be said to be abundantly available but only skilled and semi-skilled labour is needed. Secondly, because the labour constraint is easily represented by a set of balancing equations for employment the algorithm generates directional signals useful for the formulation of educational policy and thus facilitates detection of imbalances of supply and demand by skill category. Again, this is a very relevant feature in view of the fact that, in Egypt, surpluses of some skills (viz. engineers) exist side by side with shortages of others (viz. foremen, technicians, etc.)

Before examining the empirical results, let us describe how the cost of training labour is reflected in the model. Refer back to constraints (4.3) and (4.4) of Chapter IV:

$$\gamma_{ii} \; y_{oi} - n_{oi} \leq 0 \qquad (i = 1,\ldots,N) \qquad (4.3)$$

$$\sum_{j=1}^{N} \xi_{oo} \; \delta_{oj} \; y_{oj} + \sum_{j=1}^{N} \xi_{oo} \; \eta_{oj} \; n_{oj} \leq d_{o1} \qquad (4.4)$$

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[14] This is reflected in constraints (4.3) and (4.4) of the model developed in Chapter IV.

As mentioned above, the first term in (4.3) represents, for any industry i, the demand for labour by that industry, and the second term represents supply of labour to that industry. The second term in (4.4) is the cost of educating, training and relocating labour. The coefficient μ_{oj} represents such cost per unit of labour.[15] It is clear from examining constraints (4.3) and (4.4) that, within the confines of the model in Chapter IV, the domestic savings constraint has to be binding in order for labour cost to have any impact on capacity expansion. Otherwise, it will be pointless to talk about the labour constraint in the sense of the second approach.[16]

In the simulations we experimented with two alternative sets of values for μ; call them μ_1 and μ_2. The components of μ_1 were all zeros to simulate the method adopted by the planners. The components of μ_2 were estimated on the basis of years of shooling and the cost per year of schooling for different skills.[17] The results of the simulations based on the 1954 production data are recorded in Tables 5.2 and 5.3. Table 5.2 illustrates the activity-level or quantity aspect of the

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[15] In the present study, one unit of labour is one worker.

[16] This brings up another basic difference between the two approaches discussed above. When labour skills are generated endogenously, by investment, the labour constraints are not independent of the savings constraints; they only operate when the latter is binding. When labour skills are given exogenously, the labour constraints are independent of any other constraint.

[17] See Appendix D for the method of estimating these values. It should be pointed out that in the appendix μ includes only education cost; the training and relocation cost was hard to estimate and hence was neglected.

Table 5.2

Effect of the Labour Cost on Pattern of Capacity Expansion

(in LE'000 in 1959/60 factor prices)

Industry No.	Industry	Capacity Expansion When Labour Cost Is: zero (1)	as estimated (2)	(2) ÷ (1) (3)
1	Agriculture	13604.5	12002.2	0.8822
3	Electricity	615.2	596.3	0.9693
10	Other chemicals	2400.0	2400.0	1.0000
11	Construction	195.1	183.6	0.9411
17	Oils and fats	2000.0	2000.0	1.0000
25	Fertilizers	1000.0	1000.0	1.0000
27	Transport and communications	5947.8	5536.5	0.9309
28	Suez Canal	10000.0	1.3	0.0001
29	Education	715.9	701.4	0.9798
30	Medical services	1187.7	1164.0	0.9801
32	Banking and insurance	623.8	584.3	0.9367
33	Other services	22194.0	20794.3	0.9370
	The value of the maximand	107687.3	105541.7	0.9801

allocation problem under the two alternative sets of values of labour cost, μ.[18] Column (1) includes the incremental outputs over the plan

[18] The practice followed before of imposing an upper limit on capacity expansion of 10% of the base-year capacities was followed here.

(continued)

period if the vector of labour cost is μ_1. The numbers in column (2) are incremental outputs over the plan period if the vector of labour cost is μ_2. The figures in column (3) are the ratios of incremental output in column (2) to the corresponding ones in column (1). Column (3) indicates that the inclusion of labour cost affects the pattern of capacity expansion. The capacity expansion figures in column (2) are not simply a scaled down version of capacity expansion figures in (1), which implies that the exclusion of labour cost tends to favour the expansion of some industries more than others. We thus conclude that the incorporation of the labour constraints in the manner explained above results in a different pattern of resource allocation.

The examination of Table 5.3 may shed some more light on this problem. This table contains some elements of the dual solution corresponding to the primal solution included in Table 5.2. Specifically, it contains the shadow price of domestic savings, z_{o1}, and that of foreign exchange, z_{o2}, obtained by solving the model, once using μ_1 and then using μ_2. The values of these shadow prices are included for solutions based on the 1954 and the 1963/64 production data. A careful look at Table 5.3 reveals that the ratio of the shadow price of foreign capital inflow to the shadow price of domestic savings -that is z_{o2}/z_{o1}- is lower when $\mu = \mu_1$ than when $\mu = \mu_2$. In other words, the exclusion of labour

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This is why industries 10, 17 and 25 have the same incremental output in both cases. These industries have reached the maximum possible increment in their output.

cost lowers the relative shadow price of foreign capital inflow in terms of the shadow price of domestic savings. If these prices were used to evaluate individual investment projects, it would induce a bias in favour of those projects which have a higher foreign exchange content.

Table 5.3

Labour Cost and Factor Prices

	Solutions based on 1954 production data		Solutions based on 1963/64 production data	
z	With Labour Cost Zero	With Labour Cost as Estimated	With Labour Cost Zero	With Labour Cost as Estimated
z_{o1}	0.435788	0.378651	1.185403	3.696846
z_{o2}	0.982736	0.976339	0.723522	0.0
z_{o2}/z_{o1}	2.26	2.58	0.61	0.0

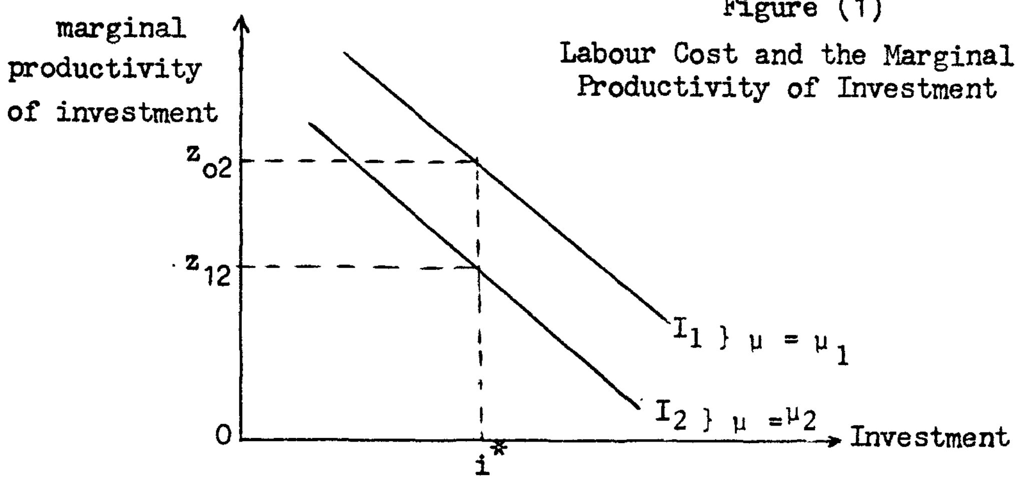
Source: Compiled from several solutions to the linear programming model of Chapter IV.

Empirical simulations have shown thus far that the inclusion of labour cost results in a pattern of capacity expansion and a corresponding pattern of factor shadow prices different from those that would result if the labour cost were excluded. These simulations also reveal a third difference. As can be easily seen from the last row of Table 5.2, another consequence of the accounting for labour cost is that a lower level of the maximand is obtained, as compared to the case where such cost is ignored. This means that the marginal productivity of investment will be higher when the cost of educating, training and relocating labour is assumed to be zero. If in fact this cost is not zero, and if it is neglected in investment calculations, this will result in an overestimation of the marginal productivity of investment.

The above can be readily demonstrated by the aid of the following diagram.

Figure (1)

Labour Cost and the Marginal Productivity of Investment



In Figure (1), I_2 is the marginal-productivity-of-investment curve when $\mu > 0$ and I_1 is the curve when $\mu = 0$. For any given level of investment (say for a steel-mill project, i^*) the marginal productivity of investment, and hence the profitability of any particular project, will depend on whether we are looking at the I_2 or the I_1 curve.

3. Implications Of Expanding Certain Industries As Planned

Egypt's first Five-Year Plan stipulated a large expansion of basic manufacturing industries (metals, machinery and chemicals). Value added in 1964/65 was to become 393% of the base-year value added for metals, metal products and machinery, and 313% for basic and other chemicals.[19] It was also mentioned that one of the specific targets of the Plan was to reduce the deficit in the balance of trade to zero. In particular, we wanted to investigate whether or not the country could in fact attain an equilibrium in the balance of trade by the end of the first Five-Year Plan, given the above-mentioned targets. The implications of these specific targets are examined below.

To test the feasibility of these specific targets, the linear programming model was solved under constraints stipulating minimum expansion in those industries that the Plan stressed. Thus metals, metal products and machinery were assumed to increase by 300 per cent over the Plan period. Also basic chemicals and other chemicals were assumed to increase by 200 percent over the same period.[20] At a later stage, on top of the above constraints, the constraint stipulating zero foreign capital inflow was also imposed. The main results of these simulations are as follows:

(a) There is a sharp drop in the value of the maximand (the increase in household consumption) as the above expansion targets are incorporated in the model. Table 5.4 indicates the results of experiments based on the 1963/64 input-output data. The table registers a drop in the increment in household consumption of about 22 per cent, from LE 113.9 million without the additional constraints to LE 88.6 million with those constraints. This drop is easy to explain. The imposition of the above constraints interferes with the "make-or-buy" choice made by the

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[19]See Plan Frame, Tables 28 and 28-a.

[20]See Plan Frame, pp. 8-10.

Table 5.4

Pattern of Expansion with and without Planned Targets for Machinery and Chemicals

(In LE'000 in 1959/60 prices)

Industry No.	Industry	Increment In Industry Output: Before Including Planned Targets for Machinery and Chemicals	Increment In Industry Output: After Including Planned Targets for Machinery and Chemicals
1	Agriculture	54700	54700
2	Ginning and pressing		
3	Mining and quarrying	2200	2200
4	Food processing		
5	Beverages manufacturing		
6	Tobacco manufacturing		
7	Spinning and weaving		
8	Clothing		
9	Wood and cork products	1700	1700
10	Furniture and fixtures		
11	Paper and cardboard		
12	Printing and publishing	2000	2000
13	Leather and leather products		
14	Rubber products		
15	Chemicals		62400

Table 5.4 (Continued)

Pattern of Expansion with and without Planned Targets for Machinery and Chemicals

(In LE'000 in 1959/60 prices)

Industry No.	Industry	Increment In Industry Output: Before Including Planned Targets for Machinery and Chemicals	Increment In Industry Output: After Including Planned Targets for Machinery and Chemicals
16	Petroleum and coal		
17	Nonmetallic minerals		
18	Basic metals		56400
19	Metal products		55200
20	Machinery except electric machinery	230	2924042
21	Electric machinery		18000
22	Transport equipment		43500
23	Miscellaneous		
24	Electricity	789	66427
25	Construction and dwelling	897	15354
26	Transport and communications	10407	47101
27	Other services	43056	258393
	Household consumption	113930	88552

model. Apparently, it is cheaper to import (buy) the products of those industries than to produce (make) them domestically. If we decided to produce them, there is a corresponding cost which our model measures by the drop in the value of the maximand.

This is the familiar free trade-autarky choice. The drop in household consumption does not constitute an argument against such expansion targets. For one thing, we have said nothing about the time horizons that extend beyond the Plan period. Also, we do not know exactly what non-economic goals the policy-maker had in mind when he decided on those targets. We only wanted to spell out the implications of such "political" decisions.

(b) This planned pattern of expansion results in a pattern of trade which is not realistic. It calls for tremendous increases in exports of these infant industries. For example, as the simulations on which Table 5.4 is based show, production of machinery (except electric machinery) is to rise by almost LE 3 billion, with exports of the same exceeding LE 2.6 million. This, of course, is unbelievable. What it implies, however, is that the insistence on the achievement of these expansion targets may be prohibitively costly.

(c) If we couple the achievement of those expansion targets with the stipulation that the balance of trade be in equilibrium by the end of the tenth year, we either observe a sharp drop in the maximand (for the 1954 input-output data) or get no feasible solution (for the 1963/64 input-output data). Thus, for 1954 input-output data, household consumption at the target year becomes LE 10.9 million instead of LE 95.8 million. This simply means that if the country were to achieve all these targets combined, it would have to follow an austerity program; the increase in consumption would have to be cut drastically. That did not occur.[21] For the 1963/64 input-output data, the absence of any feasible solution implies that the achievement of the specified expansion targets and the balance-of-trade-equilibrium target is impossible.

4. Foreign Capital Inflow as a Minimand

An attempt was made to replace maximizing household consumption with minimizing foreign capital inflow. The purpose of this simulation was to see if that would result in a different pattern of resource allocation. The answer to such a question is rather difficult, since there are many factors to watch for that could cause a difference in the outcome under the two cases. It is not difficult to transform our problem from one of mazimizing household consumption to one of minimizing foreign capital inflow. To do so, one imposes a lower limit on consumption, and expresses the optimand as the difference between export proceeds and import payments. This process leaves the total number of variables and constraints unchanged.[22]

When the model is modified in this manner and solved we get a different pattern of expansion. Consider Tables 5.5 and 5.6, which

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[21] In fact private consumption increased from LE 974.0 million in 1959/60 to LE 1462.9 million in 1964/65, rising at a compound annual rate of 7 per cent.

[22] The reason is that the minimum-level constraints on household (continued)

Table 5.5

Pattern of Expansion when Foreign Capital Inflow is Minimized, with No Upper Limits on Capacity Expansion

Industry	Increase Over the Plan in			
	Domestic Output[a]	Exports[a]	Imports[a]	Employment[b]
1. Agriculture	0.0	0.0	18425.3	0.0
2. Mining and quarrying	0.0	0.0	1103.5	0.0
3. Electricity	674.5	0.0	0.0	224.8
4. Metals	0.0	0.0	187.3	0.0
5. Metal products	0.0	0.0	976.7	0.0
6. Cement	0.0	0.0	16.3	0.0
7. Petroleum refining	0.0	0.0	4401.9	0.0
8. Machinery	0.0	0.0	1284.4	0.0
9. Basic chemicals	0.0	0.0	514.9	0.0
10. Other chemicals	0.0	0.0	4426.2	0.0
11. Construction	194.9	0.0	0.0	129.9
12. Meat products	0.0	0.0	6564.5	0.0
13. Dairy products	0.0	0.0	3960.4	0.0
14. Grain milling	0.0	0.0	4671.3	0.0
15. Bakery products	0.0	0.0	8114.2	0.0
16. Sugar	0.0	0.0	2440.4	0.0
17. Oils and fats	0.0	0.0	1357.0	0.0
18. Other food products	0.0	0.0	2453.3	0.0

Table 5.5 (Continued)

Pattern of Expansion when Foreign Capital Inflow is Minimized, with No Upper Limits on Capacity Expansion

Industry	Increase Over the Plan in			
	Domestic Output[a]	Exports[a]	Imports[a]	Employment[b]
19. Spinning and weaving	0.0	0.0	6462.8	0.0
20. Processing of cotton	0.0	0.0	1.5	0.0
21. Clothing	0.0	0.0	1894.4	0.0
22. Paper and paper products	0.0	0.0	342.2	0.0
23. Tobacco	0.0	0.0	4672.8	0.0
24. Wood and furniture	0.0	0.0	928.2	0.0
25. Fertilizers	46363.5	46363.5	0.0	13246.7
26. Other Industries	0.0	0.0	4648.5	0.0
27. Transportation and communication	6847.4	0.0	0.0	3423.7
28. Suez Canal	1.6	0.0	0.0	0.8
29. Education	713.9	0.0	0.0	356.9
30. Medical services	1180.1	0.0	0.0	590.1
31. Trade and finance	0.0	0.0	18568.0	0.0
32. Banking and insurance	1148.6	0.0	0.0	574.3
33. Other services	19759.3	0.0	0.0	19759.3

Sources and Notes:

The above figures represent the solution of the model without restricting the expansion in the leading industry (fertilizers).

[a]In LE 1000.

[b]In workers.

relate to experiments with the 1954 input-output data. Table 5.5 shows that if the objective is to minimize foreign capital inflow, then fertilizers would be the leading sector in terms of the pace of expansion. Its whole output would be exported, since there is no increase in the output of agriculture. We should not take the numbers in these tables literally; what is really significant is the general direction of expansion rather than the exact magnitude. When the objective is to minimize foreign capital inflow, the emerging pattern of expansion seems to differ from that obtained by maximizing household consumption. The basis for this statement is that the leading sector (in terms of expansion rate) is not the same in the two cases. When household consumption is maximized, oils and fats is the industry that shows the highest tendency to expand. Thus, we may conclude that the policy implication of the two objective functions are different. In the one case a capital-goods industry (fertilizers) is stressed and in the other a consumer-goods industry (oils and fats) takes the lead.

It is interesting to examine the implications of the planned growth targets for metals, machinary and chemicals in the context of the present version of our model. To do that, we super-imposed on the model the lower-limit constraints on the growth of these industries. Experiments with the 1954 input-output data showed that no feasible solution could be obtained.

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consumption replaces the foreign exchange constraint, while household consumption stays in as a variable.

This is in line with the results of the analysis in Chapter II. In that chapter, we concluded that the balance-of-trade target and the overall growth target in Egypt's first Five-Year Plan appear to be inconsistent.

5. Shadow Prices And Resource Allocation

From the theory of linear programming, the shadow price associated with any individual constraint represents the marginal contribution (whether positive or negative) to the objective function of relaxing that constraint.[23] Of particular significance are the shadow prices of primary factors - in our case domestic savings and foreign capital inflow. These shadow prices are z_{o1} and z_{o2}, respectively. The importance of these two prices has to do with the purpose of our analysis: to study the pattern of resource allocation implied by any optimal program (i.e., any solution to our model). The study of the pattern of resource allocation may be viewed from yet another aspect, that of project appraisal. This point was dealt with before.[24] What we would like to do here is to make a few pertinent observations on the meaning of shadow prices and their interpretation in the context of this model.

First, because we chose the units of measurement of individual activities such that the corresponding base-year prices are unity, the shadow prices implied by the solution of this model may best be viewed as price indices, with the base-year as a reference point. Note also

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[23] See Dorfman, Samuelson and Solow, Linear Programming and Economic Analysis, op. cit., p. 15.

[24] See pp. 113-114 above.

that because of the way the model was constructed (specifically, because of the choice of household consumption as a maximand), all shadow prices are expressed in terms of the price of the consumption bundle. It was mentioned in the previous chapter that such a price acts as the numeraire for the price system implied by the model solution. Second, it is clear by examining the simulations based on the 1954 input-output data or on the 1963/64 data, that as the output of the priority industries (i.e. industries where specialization tends to be concentrated) is restricted, the shadow price of foreign capital inflow, z_{02}, rises and that of domestic savings, z_{01}, falls. This is illustrated by the case in Table 5.6, where simulations based on the 1954 input-output data are included. The table may be read thus. At first, specialization tends to be

Table 5.6

Specialization and Shadow Prices

No.	Industry	Household Consumption (LE million)	Shadow Price of Domestic Savings	Shadow Price of Foreign Capital
17	Oils and fats	691.4	1.294	0.869
25	Fertilizers	675.5	1.252	0.874
10	Other chemicals	432.0	0.602	0.955
28	Suez Canal	365.8	0.425	0.977
1	Agriculture	358.4	0.405	0.979
2	Mining and quarrying	294.9	0.222	1.002

Source: Consecutive simulations based on the 1954 input-output data.

exclusively in oils and fats, providing maximum household consumption of LE 691.4 million. The primary resources (domestic savings and foreign capital inflow) will be exhausted, with corresponding shadow prices of 1.294 and 0.869, respectively. Then as we restrict output of oils and fats to 10% of base-year capacity, another line of specialization appears - this time in fertilizers. As a result of limiting the scope of specialization in oils and fats, the value of the maximand falls to LE 675.5 million and z_{o1} falls to 1.252 while z_{o2} rise to 0.874. The rest of the table can be read in a similar fashion. The fall in z_{o1} can easily be explained by the fact that as specialization is being limited, domestic savings have to be allocated to investment in industries where it is less productive. On the other hand, narrowing the scope of specialization means that export earnings fall more proportionally than imports which must lead to a rise in the shadow price of foreign capital inflow, z_{o2}.

Third, the product shadow prices, p_{oi}, derived from all solutions of the model of Chapter IV fall into one of two classes; one class for tradable goods based on the exchange rate, and the other class for nontradable goods. All shadow prices of tradable goods are the same - equal to the shadow price of foreign capital inflow, z_{o2}. This is due to the absence of any tariffs or transport costs on imports or subsidies to exports. Finally, in addition to being useful directly for project appraisal, shadow prices are useful also indirectly by allowing us, through the application of the Simplex Criteria, to examine the activities that did not appear in the basis and see what measures are required to bring them in.

6. The Relationship Of Consumption To Saving: The Consumption Frontier

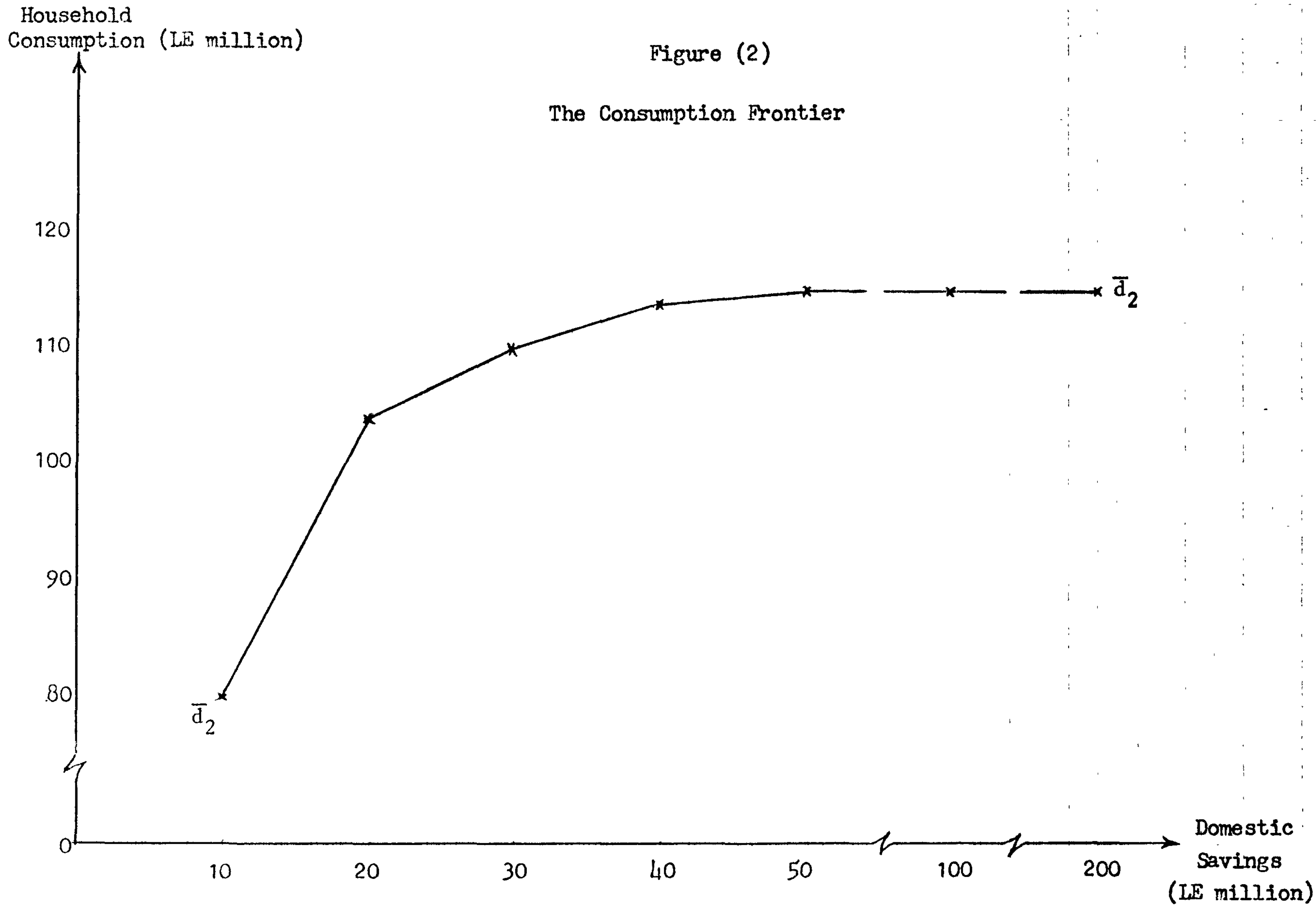
The linear programming model of Chapter IV is expressed in structural form. By expressing all the endogenous variables of the model in terms of the exogenous variables and the parameters, we can express the model in what is known as the reduced form. The reduced form will allow us to trace the effect on any of the endogenous variables of a change in the exogenous ones. In particular we would like to study the effect of changing domestic savings on household consumption.

In order to do that, it is necessary to fix the value of the other exogenous variables (particularly foreign capital inflow, d_{o2}). Foreign capital inflow, d_{o2}, is assigned a value of \$ 100 million, and domestic savings, d_{o1}, is allowed to change from LE 10 million to LE 200 million. The result is a consumption frontier that is illustrated in Figure (2).

In Figure (2), domestic savings is represented on the horizontal axis and household consumption is represented on the vertical axis. In the model domestic savings has the function that it sets aside past resources for augmenting capacity during the Plan period. Household consumption refers to the increment over the period of the plan. The broken-line curve $\bar{d}_2\bar{d}_2$ represents the consumption frontier, attained for a given value of foreign capital inflow equal to $\bar{d}_{o2}$ (in our experiment $\bar{d}_{o2}$ = \$ 100 million). The points marked with a x sign represent optimal solutions. Note that the slope of the curve gets flatter as the value of d_{o1} increases. This means that the marginal productivity of domestic

Figure (2)

The Consumption Frontier



savings is falling. The slope of the curve along any segment represents the increase in the household consumption made possible by a unit increase in domestic savings -given the level of foreign capital inflow. It may also be called the shadow price of domestic savings.

Figure (2) indicates that if the foreign capital inflow is $ 100 million, any domestic savings in excess of LE 50 million will contribute nothing to the maximand.[25]

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[25] In terms of the jargon of the two-gap model, the foreign exchange gap will be dominant. See Jaroslav Vanek, *Estimating Foreign Resource Needs for Economic Development; theory, method, and a case study of Colombia* (New York: McGraw-Hill Book Co., 1967).

CHAPTER VI

CONCLUDING REMARKS

In this final chapter the main threads of the argument in the previous chapters are pulled together. Thus, Section 1 summarizes the main route the investigation has taken so far. In Section 2, the major conclusions arrived at will be presented and their implications discussed. In this section, we shall not enumerate all the findings reached in the course of the study. For these the reader should refer to the concluding sections of the previous chapters. Only the most important findings are recorded here. Finally, research areas that have been suggested by this study are examined in some detail in Section 3.

1. Summary Of The Analysis

This study was motivated by the fact that the choice of industries in the first Egyptian Plan was not based on a comprehensive planning model. In the absence of such a model, the consistency of different output targets cannot be guaranteed beforehand. This is why two types of consistency tests were performed on the Plan. One was to test the consistency of individual output targets. The other was to check the consistency of the balance-of-trade target and the overall-growth target. This latter test led to the examination of the possibility of carrying out the relatively large import-substitution program embodied in the Plan.

The discussion then moved to the interdependence aspect in the structure of production. The input-output model was outlined, and the different, most common linkage indices were discussed. The triangularized input-output coefficient matrix was also discussed, with some analysis of the relationship between the different linkage indices and the triangularized matrix. In order to explore the implications of expanding individual industries for the balance-of-payments position, we examined the pattern of sectoral dependence on imports. The direct, indirect and total (direct plus indirect) import requirements per unit of output of the individual industries were analyzed. The linear programming general equilibrium model was developed in Chapter IV. A large number of simulation experiments were conducted in Chapter V. The primary purpose behind these simulations was to determine the implications for the pattern of resource allocation of taking the cost of education into account. Also, the simulations were used to investigate the effect of expanding certain industries as planned. Alternative objective functions were tried. In one of these foreign capital inflow was to be minimized. The resulting pattern of shadow prices was studied. These were found to have certain implications for project appraisal. Finally, the relationship between domestic saving and household consumption, which may be expressed as the consumption frontier, was examined.

2. Main Conclusions

In the course of this study, many conclusions were derived. This chapter is limited to only the most important of these.

(a) The pattern of capacity expansion produced by the model differs manifestly from that stipulated in the Plan. This is true whether the solution of the model is based on the 1954 production data or on the 1963/64 data. In both cases agriculture appears as a priority sector. The importance of agriculture is further amplified by the analysis of interdependence in the structure of production, which shows agriculture to have high backward and forward linkages. Such an analysis brings out very clearly the crucial place of agriculture as a bottleneck industry. Agriculture becomes all the more important when we consider its contribution to final demand, namely for consumption. The model used here does not take account of population growth and of the increased demand that is implied. In the absence of a reasonable expansion in agriculture, the pressing food problem will tend to solve itself by more balance-of-payments deficits and/or halting or slowing down the growth of the economy. In the light of all this, it is surprising that the Plan stipulates a growth rate of agriculture much lower than the overall growth rate of the economy (28 per cent vis à vis 40 per cent). This system of priorities reflects a mode of thinking which associates progress with industrialization. But the analysis in this study indicates quite clearly that industrialization should never be interpreted in practice to mean neglecting agriculture relative to other industries, particularly manufacturing. In fact, economic history is full of evidence as to the importance of agriculture to the growth and industrialization in the history of economic development.[1]

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[1] See the collection of articles in E. L. Jones (ed.), Agriculture and Economic Growth in England 1650-1815 (London: Methuen & Co. Ltd., 1967). See also the extensive literature therein.

(b) The analysis based on simulations with the linear programming model of Chapter IV provides evidence that the neglect of labour cost in project appraisal results in a bias in favour of projects which have a high foreign-exchange content. Such projects are usually capital-intensive. Thus, the assumption of surplus labour, when made in the context of a less-developed economy where only unskilled labour is abundant, leads to the use of more capital than labour. This can only be expected to aggravate rather than help the employment problem. The industries given higher priority in Egypt's first Five-Year Plan provide good evidence in support of the above propositions. The Plan stressed the growth of metals, machinery and chemicals. Investment for capacity creation and/or expansion in such industries requires relatively large amounts of foreign exchange. Moreover, the analysis of Chapter III has shown that these industries tend to have relatively high import coefficients. The implication for the balance of payments is quite obvious. Development of metals, machinery and chemicals should be expected to place heavy strains on the external position of the country.

(c) Related to the above is the finding that the degree of dependence on imports for purposes of intermediate use has increased over the period 1954 through 1963/64. In Chapter III, we have seen that the import coefficients for 15 out of the 20 industries making up the aggregated input-output matrices for 1954 and 1963/64 have risen. The import substitution policy that the country has followed intensively over the period stands as the most likely cause of such an increase in the degree of dependence on the rest of the world. If this explanation is accepted, it provides more evidence to the view that import substitution may not be logically possible at a rate consistent with the Plan targets. This seems to pose fundamental problems with one of the avowed aims of planning in Egypt - that of self-sufficiency.

(d) This leads to another conclusion of a rather analytical nature. When deriving the implications of a certain set of targets to determine their consistency, it is necessary to break each target down to its constituent parts. For example, to judge the consistency of a 40% growth of total value added and an equilibrium in the balance of trade, the answer hinges on whether the 40% growth will come basically from expanding capacity in heavy industry, light industry, or agriculture, etc. Thus, the inconsistency between the growth target and the balance-of-trade target may be due to the high priority given to metals, machinery and chemicals and the low priority given to agriculture.

(e) The analysis of interdependence in the structure of production in Chapter III revealed that agriculture, basic metals and chemicals belong to the group called bottleneck industries. This means that capacity in these industries has to be expanded as a prerequisite to any overall growth in the economy. From this vantage point, the emphasis on basic metals and chemicals in the Plan makes good sense. On the other hand, the lack of similar emphasis on agriculture is incomprehensible. Construction appears from the linear programming simulations to be required for capacity expansion of almost every other industry. Yet, instead of stipulating a growth in construction in step with the rest of the economy, the Plan envisaged a decline. Of course, this was not to happen.[2]

(f) The structure of production of the Egyptian economy is recursive. This is based on the empirical finding that the input-output matrices for 1954 and 1963/64 triangularize smoothly. Such a finding means that there are some industries which may be classified as final-demand oriented. They will be more at the top of the triangularized input-output matrix. Other industries may be classified as resource-based industries. These will be more at the bottom of the triangularized matrix. The implication of this for planning is obvious. The development of the final-demand oriented industries may be launched after consideration of the availability of necessary intermediate inputs and final demand for these commodities. As to development of the resource-based industries, care has to be given to resource availability as well as to the availability of intermediate demand by other industries.

(g) The consistency tests performed in Chapter II have revealed that the individual output targets in the Plan do not seem to be consistent. The reason for inconsistency is the lack of a comprehensive framework within which to tackle the resource allocation problem. This is where the method of approach adopted here, that of activity analysis, becomes very useful. The solution to either the input-output model or to the linear programming model provides consistent values. It was proven, using statistical regression analysis, that the planned output levels are significantly different from the set of consistent

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[2]Thus, although value added in construction was planned to fall from £E 52 million to £E 51 million during the Plan period, it rose at an annual rate of 10.4 per cent. See Plan Frame, Table 18, and B. Hansen, "Planning and Economic Growth", op. cit., p. 31.

output levels generated by solving the input-output model.

(h) Another consistency test was performed on the overall growth target and the balance-of-trade target. The analysis in Chapter II demonstrates that it is difficult to imagine that the import-substitution program implied by these targets is possible to achieve over a period as short as five years. Our calculations revealed that about one-third of the target-year (1964/65) imports would have to be replaced. The imports to be replaced include such products as paper and paper products, machinery and chemicals. We argued above that it does not seem likely that these imports will be easily replaced in view of the fact that the country has just started in these areas. One is forced to conclude, then, that either the planners overestimated the economy's capacity to replace imports as required by the overall growth and balance-of-trade targets or they neglected indirect import requirements. Either way, the conclusion still holds that the overall growth target and the balance-of-trade target do not seem to be consistent.

(i) The model developed in Chapter IV brings into the picture the often-neglected fact that, although education may be free in a given society - which is the case in Egypt - the opportunity cost of education is not zero. It would only be zero if the resources going into education were free. Usually such resources are scarce, and a decision has to be made as to their optimal use. This points to the importance of having an educational policy or plan tied in with the economic and social development plan.

3. Points For Further Research

It should be emphasized that the simulations reported in

Chapter V are only of exploratory or demonstrative nature. The reason for this is the crude nature of the data used in some cases, and even the absolute lack of it in some others. This provides directions for further research. It was also mentioned in Chapter IV that the limitations of the model developed therein makes it more of a point of departure for further improvement. All this leads to a number of points that came out of the work reported in this study, and which will be fruitful to pursue in the future.

First, the study points to the lack of data about the intersectoral capital coefficients. The ij^{th} such coefficient indicates the requirements of the i^{th} sector's output per unit increment in the value of the capital stock in sector j. The matrix of intersectoral capital coefficients is an integral part of the supply-demand balance equations for the products of the capital goods industry. This is one area where investment by economic statisticians will have a high rate of return. Although Egypt may be in a better position with respect to input-output statistics, there is still a large room for improvement. Thus, the input-output table for 1963/64 needs to be updated and the conceptual confusion resulting from following two different methods of valuation should be eliminated. Finally, no data are available on the cost of education, training and relocating labour. In the simulations of Chapter V we had to estimate the cost of education and training in an indirect manner,[3] and the cost of relocation had to be ignored for the time being. Definitely, the accumulation and dissemination of data about

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[3]See Appendix D.

such aspects is very helpful, not only for the study of the allocation of investment resources, but also for the design of a sound science and education policy. In this area developed countries devote large efforts, but the less-developed countries have not started to seriously think about this. The cost of relocating labour may have important implications for regional development, and the cost of training may have a bearing on the pattern of comparative advantage.

Second, the model developed in Chapter IV has two particularly important limitations. The development of the different variables over the planning period is not traced out as part of the solution to the model, which yields only terminal-year values. Of course, there may be something to be said for the flexibility in fixing yearly targets within the planning horizon. But such flexibility may violate the requirements of optimality. Thus, the endeavour to achieve flexibility and at the same time preserve optimality of the time path of individual variables represents another area for further research. Furthermore, the model of Chapter IV is comparative statics. Future research efforts should be exerted to cultivate it with the necessary dynamic elements. Finally, some research effort should be directed towards incorporating population growth into the model. For the Egyptian case, population growth is very important and its incorporation into the model should give useful insights into the implications of population growth for the balance of payments of the country.

Third, it would be interesting to explore the implications of the focal importance of particular industries. For example, it would be interesting in the light of the importance that construction enjoys in the simulations reported here, to derive the implications for cement production and transportation. Or, to take the case of another key industry such as agriculture, the implications for fertilizers and related industries of a program of agricultural expansion should be explored. One of the merits of the input-output approach adopted here is that it spells out such hidden interrelationships and, with some effort, would enable us to quantify them.

Fourth, the analysis in Chapter II was handicapped by the lack of any background material as to the exact nature of the instruments in the Plan. Questions arise such as: What are those instruments? How do they mesh together? How do they suit the targets" Are those instruments consistent with the targets? The answers to these questions are worth the research effort required for them.

Fifth, in the analysis of Chapter III, we were confronted with the question of whether the price increase and the balance-of-payments deficit experienced during the Plan were due to general excess demand or to sectoral bottlenecks. Most probably, it is due to both. But the interesting question still is: how much of the inflation and trade deficit that the Egyptian economy experienced during the Plan was due to general excess demand and how much of it was caused by sectoral bottlenecks?

Sixth, it appeared during the discussion of the indices of interdependence (particularly backward and forward linkages) that such measures of interdependence as the power of dispersion index and the sensitivity of dispersion index are not perfect indicators of the importance of some industries. For example, it was discovered from the linear programming simulations that construction is an important industry for capacity expansion in other industries. Yet it does not have a high index for the power of dispersion (a measure of forward linkage). This points to the need to devise more comprehensive measures of interdependence.

Finally, a study of the nature and extent of structural change in the system of production of Egypt is badly needed. This is borne out by the analysis of interdependence in Chapter III, and by comparing the results therein for both the 1954 and the 1963/64 production data. For example, what is the nature of technological change in the different industries over the decade 1954-1963/64? Why did the metals, machinery and chemicals industries move upward in the triangularized input-output matrix between 1954 and 1963/64? These and other questions provide virgin areas for further research.

APPENDICES

APPENDIX A

RECONCILIATION OF THE 1954 AND THE 1963/64 INPUT-OUTPUT TABLES

The major data source required for the purpose of the analysis in the text are the inter-industry flows used to estimate the input-output coefficient matrix. Two flows tables are available for Egypt, one for 1954, the other for 1963/64. The two tables differ in size and in the method of valuation used. Consequently, it was necessary to transform each table in such a way that they would give a comparable picture of Egypt's structure of production. In order to achieve comparability, the two tables were compressed to the same size. Before going into the steps and methods used in the reconciliation, it is both necessary and useful to give some background information about each of these tables.

1. The 1954 Table

The 1954 table represents the first construction of an input-output table for Egypt.[1] The available version is an aggregated form (33 x 33) of a large worksheet version (83 x 83). In the latter value added was broken down in detail according to primary factors, in the former, value added is aggregated into a single row. Except for foreign trade, transactions are valued at producers' prices (i.e., excluding

[1]See Gamal E. Eleish, "The Input-Output Model in a Developing Economy: Egypt," ch. 11 of T. Barna, op. cit., pp. 199-223, on which the description here relies heavily.

indirect taxes, subsidies and trade and handling margins). Imports are valued c.i.f. and exports f.o.b. Transactions are shown gross, and trade and transport margins appear in separate rows of the table. Domestic and imported intermediate deliveries appear as two separate elements in each cell. Six categories of final demand are distinguished: private capital formation, public capital formation, stocks, household consumption, public consumption, and exports.

2. The 1963/64 Table

The 1963/64 table was constructed in the Ministry of Planning as a basis for further improvement.[2] The table consists of 27 sectors. Two methods of valuation are employed side by side. For transactions in the commodities sectors, producers' prices are used and imports for these sectors are recorded c.i.f. For transactions in the services sectors, indirect taxes and subsidies are included, and imports for these sectors include tariffs. Both value added and final demand appear in an aggregate form. The figures for total gross output of each sector represent target values in the 1963/64 Plan year, and both value added and final demand were deduced as residuals. Imports appear in the lower row of each cell.

3. Reconciliation of the 1954 and 1963/64 Tables

It is desired that comparabilities between the 1954 and the 1963/64 table should be achieved with the maximum number of sectors defined. The

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[2] See U.A.R., Ministry of Planning, Input-Output Unit, "The construction of an imput-output table for the year 1963/64, at producers' cost, with constant prices based on 1959/60," memo. 704 (June 1966), in Arabic. Our description of the 1963/64 table will be based on this memorandum.

33 sectors of the 1954 table and the 27 sectors of the 1963/64 table are therefore regrouped in the largest possible number of identical sectors. Thus, we may have two comparable pictures for the Egyptian economy in its production aspect over the decade 1954-1963. The reconciliation proceeds as follows:

(a) each sector in the two tables is given the closest number in the International Standard Industrial Classification (ISIC), down to the group level.

(b) if in one of the tables the members of a major group are included as separate sectors while in the other table they appear only as one sector (representing the major group), they are lumped in one sector in the first table.

This process of reconciliation results in aggregation which leaves only 20 sectors that can be identified in both tables. Table A.1 gives a listing of these 20 sectors, along with the corresponding numbers in the International Standard Industrial Classification (ISIC), in 1954 input-output table, and in the 1963/64 input-output table. Tables A.2 and A.3 include the domestic flows tables for 1954 and 1963/64 in their original size. The import flows tables are contained in Tables A.6 and A.7. Tables A.4, A.5, A.8 and A.9 include the aggregated versions. All values are in LE thousand.

However, it cannot be claimed that the two tables become, after the reconciliation, perfectly comparable. Two problems have yet to be solved. First, the figures for total gross output of each sector in the 1963/64 table have to be adjusted, up or down, according to the fulfilment of the Plan targets. This adjustment renders more reliable value added and final demand figures. Second, as mentioned above, the transactions in the rows of the services sectors in the 1963/64 table include indirect taxes and subsidies; ideally, these have to be netted out somehow. Because of the lack of the necessary information, we cannot do anything in the way of rectifying these problems. Nonetheless, they must be kept in mind whenever results based on the two tables are compared.

Table A.1

The Reconciliation of the 1954 and 1963/64 Input-Output Tables for Egypt

Serial number	ISIC code number	Number in 1954 table	Number in 1963/64 table	Name of Sector
1	1	1	1	Agriculture
2		20	2	Ginning and pressing (processing of cotton)
3	2	2	3	Mining and quarrying
4	311-312	12-16, 18	4	Food processing (meat products, dairy products, grain, milling, bakery products, sugar, other food products)
5	314	23	6	Tobacco
6	321	19	7	Spinning and weaving
7	322	21	8	Clothing
8	341	22	11	Paper and paper products
9	351-352	9, 10, 17, 25	15	Chemical manufacturing (basic chemicals, other chemicals, oils and fats, fertilizers)
10	353-354	7	16	Coal and petroleum refining
11	36	6	17	Nonmetallic manufacturing
12	37	4	18	Basic metal industries
13	381	5	19	Manufacturing of metal products

Table A.1 (Continued)

The Reconciliation of the 1954 and 1963/64 Input-Output Tavkes for Egypt

Serial number	ISIC code number	Number in 1954 table	Number in 1963/64 table	Name of Sector
14	382	8	20	Manufacture and repair of machinery, except electrical machinery
15	410	3	24	Electricity
16	500	11	25	Building and construction
17	7	27, 28	26	Transport and communication
18		29-33	27	Other services
19	33	24	9, 10	Wood and furniture
20	39	26	5, 12-14, 21-23	Other industries (beverages manufacturing, printing and publishing, leather and leather products, rubber material, manufacture and repair of electrical machinery, manufacture and repair of transport equipment, miscellaneous manufacturing)

TABLE A.2

DOMESTIC FLOWS MATRIX FOR EGYPT ,1954

RECEIVING INDUSTRIES

DELEVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. AGRICULTURE	47480.	0.	0.	0.	0.	0.	0.	60.	0.	0.	0.
2. MINING + QUARRYING	0.	0.	0.	340.	170.	110.	8350.	0.	60.	90.	1770.
3. ELECTRICITY	0.	10.	0.	230.	140.	350.	60.	330.	10.	60.	30.
4. METALS	0.	10.	0.	1180.	1630.	0.	0.	1110.	0.	0.	2660.
5. METAL PRODUCTS	0.	20.	100.	410.	620.	0.	0.	1200.	0.	0.	1870.
6. CEMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4230.
7. PETROLEUM REFINING	2820.	210.	1940.	60.	40.	700.	100.	210.	90.	60.	1200.
8. MACHINERY	770.	210.	170.	60.	90.	10.	570.	6660.	20.	40.	3490.
9. BASIC CHEMICALS	360.	0.	10.	0.	40.	10.	20.	70.	30.	510.	170.
10. OTHER CHEMICALS	330.	0.	20.	0.	180.	20.	70.	170.	80.	1330.	440.
11. CONSTRUCTION	20.	0.	40.	0.	0.	0.	30.	0.	0.	0.	0.
12. MEAT PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. DAIRY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14. GRAIN MILLING	1070.	0.	0.	0.	0.	0.	0.	0.	0.	10.	0.
15. BAKERY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. SUGAR	0.	0.	430.	0.	0.	0.	0.	0.	120.	0.	0.
17. OILS + FATS	0.	0.	0.	0.	0.	0.	0.	0.	0.	1960.	0.
18. OTHER FOOD PRODUCTS	1770.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19. SPINNING + WEAVING	1450.	0.	0.	0.	0.	0.	0.	0.	440.	10.	0.
20. PROCESSING OF COTTON	770.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22. PAPER + P. PRODUCTS	0.	10.	10.	0.	10.	110.	60.	10.	0.	20.	20.
23. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24. WOOD + FURNITURE	10.	0.	0.	0.	10.	0.	0.	40.	0.	0.	200.
25. FERTILISERS	4570.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. OTHER INDUSTRIES	190.	30.	30.	70.	200.	260.	190.	970.	20.	110.	3010.
27. TRANSP. + COMM.	1100.	2120.	20.	90.	110.	180.	1530.	600.	70.	110.	1380.
28. SUEZ CANAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29. EDUCATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30. MEDICAL SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31. TRADE + FINANCE	24330.	340.	1800.	620.	570.	640.	1690.	2820.	280.	1610.	7660.
32. BANKING + INSURANCE	100.	130.	10.	20.	230.	0.	240.	440.	30.	30.	180.
33. OTHER SERVICES	124300.	480.	80.	300.	380.	190.	1300.	1430.	160.	220.	960.
TOTAL OUTPUT	404810.	13050.	12300.	9850.	11670.	5550.	25780.	38830.	2860.	12740.	71310.

DELEVERING INDUSTRIES	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1. AGRICULTURE	34660.	10570.	67000.	0.	6070.	130.	3520.	2930.	80680.	0.	0.
2. MINING + QUARRYING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. ELECTRICITY	110.	60.	540.	120.	190.	20.	170.	750.	30.	30.	0.
4. METALS	0.	0.	0.	0.	0.	340.	40.	0.	0.	0.	0.
5. METAL PRODUCTS	0.	80.	0.	0.	10.	0.	0.	0.	220.	0.	0.
6. CEMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. PETROLEUM REFINING	0.	240.	760.	360.	240.	0.	410.	190.	180.	10.	20.
8. MACHINERY	150.	190.	270.	150.	60.	30.	220.	470.	600.	10.	10.
9. BASIC CHEMICALS	0.	60.	0.	50.	20.	80.	70.	380.	80.	20.	20.
10. OTHER CHEMICALS	20.	190.	20.	140.	60.	190.	200.	960.	190.	60.	40.
11. CONSTRUCTION	0.	0.	0.	0.	0.	0.	10.	20.	0.	0.	0.
12. MEAT PRODUCTS	50.	0.	0.	0.	0.	0.	30.	100.	0.	0.	20.
13. DAIRY PRODUCTS	0.	16690.	0.	400.	0.	0.	20.	0.	0.	0.	0.
14. GRAIN MILLING	80.	130.	450.	37210.	0.	0.	980.	30.	0.	0.	600.
15. BAKERY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. SUGAR	0.	390.	0.	1190.	0.	0.	3710.	0.	0.	0.	10.
17. OILS + FATS	0.	40.	0.	570.	0.	730.	510.	0.	0.	0.	10.
18. OTHER FOOD PRODUCTS	0.	40.	0.	1520.	0.	0.	1590.	0.	0.	0.	0.
19. SPINNING + WEAVING	0.	20.	710.	0.	380.	20.	120.	30290.	0.	4940.	20.
20. PROCESSING OF COTTON	0.	0.	0.	0.	0.	0.	4520.	15050.	0.	0.	0.
21. CLOTHING	20.	0.	20.	0.	0.	0.	10.	70.	490.	100.	0.
22. PAPER + P. PRODUCTS	10.	30.	30.	10.	30.	0.	90.	30.	0.	10.	290.
23. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24. WOOD + FURNITURE	0.	10.	0.	0.	0.	0.	10.	0.	0.	0.	0.
25. FERTILISERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. OTHER INDUSTRIES	30.	240.	70.	150.	120.	20.	410.	190.	0.	2860.	590.
27. TRANSP. + COMM.	260.	310.	490.	50.	310.	190.	260.	450.	10.	80.	60.
28. SUEZ CANAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29. EDUCATION	0.	0.	0.	0.	0.	0.	0.	10.	0.	0.	0.
30. MEDICAL SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31. TRADE + FINANCE	3340.	1990.	2840.	990.	3090.	440.	4860.	13340.	1670.	1440.	230.
32. BANKING + INSURANCE	110.	50.	260.	10.	170.	50.	140.	1050.	50.	10.	80.
33. OTHER SERVICES	1520.	390.	2520.	1830.	160.	350.	730.	1450.	170.	200.	70.
TOTAL OUTPUT	46420.	44610.	81660.	57050.	21180.	13550.	26840.	86810.	87060.	14330.	3620.

DELEVERING INDUSTRIES	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
1. AGRICULTURE	0.	0.	0.	150.	0.	0.	10.	80.	0.	0.	0.
2. MINING + QUARRYING	0.	0.	120.	450.	30.	50.	0.	0.	0.	0.	0.
3. ELECTRICITY	20.	550.	10.	300.	670.	0.	50.	180.	2710.	60.	1310.
4. METALS	0.	460.	10.	1660.	0.	10.	0.	0.	0.	0.	0.
5. METAL PRODUCTS	60.	50.	0.	70.	460.	30.	0.	0.	110.	0.	10.
6. CEMENT	0.	0.	0.	470.	0.	0.	0.	0.	0.	0.	0.
7. PETROLEUM REFINING	0.	140.	180.	1870.	5450.	260.	30.	10.	480.	0.	50.
8. MACHINERY	90.	370.	40.	220.	1520.	30.	10.	10.	230.	300.	720.
9. BASIC CHEMICALS	0.	30.	60.	230.	0.	0.	0.	40.	0.	0.	150.
10. OTHER CHEMICALS	50.	90.	160.	610.	80.	30.	10.	1110.	0.	0.	400.
11. CONSTRUCTION	0.	0.	0.	20.	130.	0.	70.	70.	600.	440.	1820.
12. MEAT PRODUCTS	0.	0.	0.	90.	0.	0.	110.	60.	0.	0.	20.
13. DAIRY PRODUCTS	0.	0.	0.	0.	0.	0.	10.	20.	0.	0.	10.
14. GRAIN MILLING	20.	20.	0.	3170.	0.	0.	0.	0.	3570.	0.	0.
15. BAKERY PRODUCTS	0.	0.	0.	0.	0.	0.	150.	50.	0.	0.	20.
16. SUGAR	70.	0.	0.	30.	0.	0.	30.	30.	0.	0.	10.
17. OILS + FATS	0.	0.	0.	30.	0.	0.	70.	20.	0.	0.	0.
18. OTHER FOOD PRODUCTS	0.	0.	0.	130.	770.	0.	120.	0.	160.	0.	1160.
19. SPINNING + WEAVING	40.	0.	0.	60.	20.	0.	0.	0.	0.	0.	20.
20. PROCESSING OF COTTON	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22. PAPER + P. PRODUCTS	250.	0.	0.	800.	60.	20.	50.	10.	410.	40.	180.
23. TOBACCO	20560.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24. WOOD + FURNITURE	10.	330.	0.	70.	30.	0.	0.	0.	120.	0.	160.
25. FERTILISERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. OTHER INDUSTRIES	660.	620.	30.	2970.	380.	50.	120.	40.	890.	90.	510.
27. TRANSP. + COMM.	560.	90.	150.	390.	1660.	820.	130.	180.	26510.	1120.	1210.
28. SUEZ CANAL	0.	0.	0.	0.	20.	0.	0.	0.	0.	0.	0.
29. EDUCATION	0.	0.	0.	0.	40.	0.	30.	870.	330.	60.	0.
30. MEDICAL SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31. TRADE + FINANCE	16730.	590.	550.	2750.	4510.	280.	130.	690.	2830.	1020.	900.
32. BANKING + INSURANCE	40.	20.	50.	50.	990.	70.	0.	70.	5350.	250.	150.
33. OTHER SERVICES	1210.	170.	320.	670.	1360.	1690.	430.	130.	10520.	610.	4200.
TOTAL OUTPUT	49130.	10060.	5750.	36960.	86170.	31430.	5730.	7930.	249500.	15320.	276090.

TABLE A.3

DOMESTIC FLOWS MATRIX FOR EGYPT ,1963/64

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. AGRICULTURE	121600.	139400.	0.	254179.	769.	0.	2200.	0.	0.
2. GINNING + PRESSING	705.	0.	0.	4175.	0.	0.	47740.	0.	0.
3. MINING + QUARRYING	0.	0.	0.	101.	233.	0.	0.	0.	0.
4. FOOD PROCESSING	8550.	0.	0.	75510.	618.	20.	551.	0.	0.
5. BEVERAGES MANUF.	0.	0.	0.	25.	164.	0.	0.	0.	0.
6. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. SPINNING + WEAVING	0.	525.	155.	1211.	5.	73.	73845.	14630.	0.
8. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.
9. WOOD + CORK PRODS.	0.	0.	240.	5.	5.	19.	0.	51.	0.
10. FURNITURE + FIXTURES	0.	0.	0.	165.	175.	0.	0.	0.	0.
11. PAPER + CARDBOARD	0.	0.	0.	1106.	10.	284.	1400.	80.	0.
12. PRINTING + PUB.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. LEATHER + L. PRODS.	0.	0.	0.	0.	0.	0.	0.	4445.	0.
14. RUBBER PRODUCTS	0.	0.	0.	0.	0.	0.	0.	40.	0.
15. CHEMICALS	25925.	2.	450.	740.	216.	113.	1101.	0.	0.
16. PETROLEUM + COAL	7953.	0.	1091.	1043.	170.	73.	717.	0.	0.
17. NONMETALLIC MINERAL	0.	0.	180.	274.	300.	0.	0.	0.	0.
18. BASIC METALS	0.	100.	115.	139.	9.	379.	0.	0.	0.
19. METAL PRODUCTS	0.	40.	360.	815.	310.	0.	530.	17.	0.
20. MACH. EXCEPT ELCTRIC	0.	55.	99.	55.	9.	2.	200.	9.	0.
21. ELECTRIC MACHINERY	0.	32.	114.	45.	11.	56.	394.	30.	0.
22. TRANSP. EQUIPMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.
23. MISCELLANEOUS	0.	0.	80.	0.	0.	0.	341.	100.	0.
24. ELECTRICITY	0.	36.	301.	1075.	76.	255.	2713.	89.	0.
25. CONSTRUCTION + DWLNG	480.	100.	200.	200.	100.	200.	400.	0.	10.
26. TRANSP. + COMUNCTN.	400.	13.	290.	145.	42.	250.	192.	56.	16.
27. OTHER SRRVICES	13704.	3245.	1060.	22091.	1660.	769.	12003.	2037.	124.
TOTAL OUTPUT	664000.	144300.	33900.	468000.	8800.	16000.	233100.	34100.	2900.

DELIVERING INDUSTRIES	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. AGRICULTURE	1200.	354.	0.	0.	0.	206.	0.	220.	0.
2. GINNING + PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING + QUARRYING	0.	55.	0.	0.	0.	1491.	7545.	720.	2051.
4. FOOD PROCESSING	0.	76.	0.	3500.	0.	1087.	0.	0.	0.
5. BEVERAGES MANUF.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. SPINNING + WEAVING	169.	39.	4.	83.	891.	496.	0.	0.	0.
8. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.
9. WOOD + CORK PRODS.	510.	0.	0.	0.	0.	50.	0.	80.	0.
10. FURNITURE + FIXTURES	0.	0.	0.	0.	0.	0.	0.	0.	0.
11. PAPER + CARDBOARD	87.	652.	1730.	20.	33.	1380.	0.	1119.	0.
12. PRINTING + PUB.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. LEATHER + L. PRODS.	93.	0.	2.	1450.	0.	0.	0.	0.	0.
14. RUBBER PRODUCTS	0.	0.	0.	0.	70.	75.	0.	0.	0.
15. CHEMICALS	623.	517.	580.	581.	235.	7619.	573.	145.	122.
16. PETROLEUM + COAL	0.	297.	367.	83.	50.	2280.	1497.	3333.	3012.
17. NONMETALLIC MINERAL	210.	9.	0.	0.	0.	262.	0.	1120.	150.
18. BASIC METALS	56.	36.	245.	0.	10.	102.	351.	390.	8335.
19. METAL PRODUCTS	860.	62.	51.	50.	126.	310.	0.	187.	97.
20. MACH. EXCEPT ELCTRIC	0.	12.	0.	0.	3.	73.	80.	55.	150.
21. ELECTRIC MACHINERY	0.	30.	79.	0.	11.	101.	302.	79.	59.
22. TRANSP. EQUIPMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.
23. MISCELLANEOUS	0.	0.	0.	0.	0.	0.	252.	0.	37.
24. ELECTRICITY	395.	296.	73.	10.	740.	5090.	511.	1775.	641.
25. CONSTRUCTION + DWLNG	0.	100.	40.	20.	100.	200.	100.	100.	100.
26. TRANSP. + COMUNCTN.	26.	130.	150.	13.	201.	633.	207.	811.	43.
27. OTHER SRRVICES	990.	1346.	2845.	754.	750.	4650.	346.	3003.	2007.
TOTAL OUTPUT	17600.	14500.	26500.	10700.	9100.	66000.	64000.	20000.	46600.

DELIVERING INDUSTRIES	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
1. AGRICULTURE	0.	0.	0.	0.	500.	0.	0.	370.	5375.
2. GINNING + PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING + QUARRYING	0.	0.	0.	0.	100.	0.	110.	0.	495.
4. FOOD PROCESSING	0.	0.	0.	0.	0.	0.	0.	0.	7572.
5. BEVERAGES MANUF.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. SPINNING + WEAVING	229.	0.	137.	110.	156.	0.	0.	0.	1503.
8. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	1140.
9. WOOD + CORK PRODS.	70.	50.	30.	10.	30.	0.	675.	150.	110.
10. FURNITURE + FIXTURES	0.	0.	0.	0.	0.	0.	5620.	140.	3800.
11. PAPER + CARDBOARD	153.	0.	111.	165.	97.	0.	0.	462.	3235.
12. PRINTING + PUB.	0.	0.	0.	0.	0.	0.	0.	425.	6210.
13. LEATHER + L. PRODS	146.	17.	0.	132.	403.	0.	0.	90.	132.
14. RUBBER PRODUCTS	92.	78.	142.	1190.	0.	0.	0.	2070.	1055.
15. CHEMICALS	1189.	156.	713.	430.	375.	0.	6826.	103.	4345.
16. PETROLEUM + COAL	136.	100.	0.	209.	33.	7693.	2899.	8441.	2451.
17. NONMETALLIC MINERAL	255.	20.	359.	572.	826.	0.	10575.	396.	894.
18. BASIC METALS	8355.	2353.	2255.	1535.	2386.	0.	703.	892.	130.
19. METAL PRODUCTS	616.	291.	727.	2610.	951.	0.	145.	2473.	1320.
20. MACH. EXCEPT ELCTRIC	0.	145.	0.	225.	0.	40.	0.	70.	310.
21. ELECTRIC MACHINERY	50.	59.	998.	755.	0.	525.	14374.	1240.	1107.
22. TRANSP. EQUIPMENT	0.	0.	0.	1920.	0.	0.	0.	235.	6845.
23. MISCELLANEOUS	23.	15.	256.	60.	46.	0.	240.	0.	2132.
24. ELECTRICITY	1184.	217.	444.	444.	79.	880.	0.	1330.	2762.
25. CONSTRUCTION + DWLNG	200.	50.	20.	10.	20.	100.	0.	0.	3062.
26. TRANSP. + COMUNCTN.	184.	51.	20.	1.	15.	255.	2136.	3912.	56007.
27. OTHER SRRVICES	1699.	572.	1329.	2500.	1000.	2777.	19719.	18004.	78604.
TOTAL OUTPUT	32900.	11700.	21300.	37300.	15700.	34400.	155400.	171300.	536052.

TABLE 4.4
DOMESTIC FLOWS MATRIX FOR EGYPT ,1954
(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	47480.	80680.	0.	121820.	0.	2930.	0.	0.	130.	0.
2. GINNING+PRESSING	770.	0.	0.	4520.	0.	15050.	0.	0.	0.	0.
3. MINING+QUARRYING	0.	0.	0.	0.	0.	0.	0.	0.	270.	8350.
4. FOOD PROCESSING	2840.	0.	0.	64480.	90.	130.	0.	710.	130.	0.
5. TOBACCO	0.	0.	0.	0.	28560.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	1450.	0.	0.	1230.	40.	30290.	4940.	20.	470.	0.
7. CLOTHING	0.	490.	0.	50	0.	70.	100.	0.	0.	0.
8. PAPER+P. PRODUCTS	0.	0.	10.	200.	250.	30.	10.	290.	20.	60.
9. CHEMICAL MANUF.	5200.	270.	0.	1950.	50.	1340.	80.	70.	5130.	90.
10. COAL+PET. REFINING	2820.	180.	210.	2010.	0.	190.	10.	20.	330.	100.
11. NONMETALLIC MANUF.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12. BASIC METAL	0.	0.	10.	40.	0.	0.	0.	0.	350.	0.
13. METAL PRODUCTS	0.	220.	20.	90.	60.	0.	0.	0.	0.	0.
14. MACHINERY EXPT. ELCT	770.	600.	210.	1840.	90.	470.	10.	10.	130.	570.
15. ELECRICITY	0.	30.	10.	1190.	20.	750.	30.	0.	100.	60.
16. BLDG.+CONSTRUCTION	20.	0.	0.	10.	0.	20.	0.	0.	0.	30.
17. TRANSP.+COMMN.	1100.	10.	2120.	1680.	560.	450.	80.	60.	523.	1530.
18. OTHER SERVICES	148730.	1890.	950.	23490.	17980.	15650.	1650.	380.	4090.	3230.
19. WOOD+FURNITURE	10.	0.	0.	20.	10.	0.	0.	0.	0.	0.
20. OTHER INDUSTRIES	190.	0.	30.	1020.	660.	190.	2860.	590.	180.	190.
TOTAL OUTPUT	400810.	87060.	13050.	277680.	49130.	86810.	14330.	3620.	34900.	25780.

DELIVERING INDUSTRIES	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	0.	0.	0.	60.	0.	0.	0.	90.	0.	150.
2. GINNING+PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING+QUARRYING	110.	340.	170.	0.	0.	1770.	80.	0.	0.	450.
4. FOOD PROCESSING	0.	0.	0.	0.	430.	0.	770.	5550.	20.	3420.
5. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	0.	0.	0.	0.	0.	0.	20.	20.	0.	60.
7. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8. PAPER+P. PRODUCTS	110.	0.	10.	10.	10.	20.	80.	690.	0.	880.
9. CHEMICAL MANUF.	30.	0.	140.	240.	30.	610.	110.	1800.	120.	870.
10. COAL+PET. REFINING	700.	60.	40.	210.	1940.	1200.	5710.	490.	140.	1070.
11. NONMETALLIC MANUF.	0.	0.	0.	0.	0.	4230.	0.	0.	0.	470.
12. BASIC METALS	0.	1180.	1630.	1110.	0.	2660.	10.	0.	463.	1660.
13. METAL PRODUCTS	0.	410.	620.	1200.	100.	1870.	490.	120.	50.	70.
14. MACHINERY EXPT. ELCT	10.	60.	90.	6664.	170.	3490.	1553.	1270.	370.	220.
15. ELECRICITY	350.	230.	140.	330.	0.	30.	670.	4310.	550.	300.
16. BLDG.+CONSTRUCTION	0.	0.	0.	0.	40.	0.	130.	3000.	0.	20.
17. TRANSP.+COMMN.	100.	90.	110.	600.	20.	1380.	2580.	29150.	90.	390.
18. OTHER SERVICES	830.	940.	1180.	3090.	1170.	8800.	8940.	28650.	780.	3470.
19. WOOD+FURNITURE	0.	0.	10.	40.	0.	200.	30.	280.	330.	70.
20. OTHER INDUSTRIES	260.	70.	280.	970.	30.	3010.	430.	1650.	620.	2970.
TOTAL OUTPUT	5550.	9850.	11870.	30830.	12380.	71310.	117680.	554570.	10060.	36960.

TABLE A.5

DOMESTIC FLOWS MATRIX FOR EGYPT ,1963/64

(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	121600.	139400.	0.	254179.	0.	2200.	0.	354.	206.	0.
2. GINNING+PRESSING	705.	0.	0.	4175.	0.	47740.	0.	0.	0.	0.
3. MINING+QUARRYING	0.	0.	0.	101.	0.	0.	0.	55.	1491.	7545.
4. FOOD PROCESSING	8550.	0.	0.	75510.	20.	551.	0.	76.	1087.	0.
5. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	0.	525.	155.	1211.	73.	73045.	14630.	39.	496.	0.
7. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8. PAPER+P. PRODUCTS	0.	0.	0.	1100.	284.	1400.	80.	652.	1300.	0.
9. CHEMICAL MANUF.	25925.	2.	450.	740.	113.	1101.	0.	517.	7619.	573.
10. COAL+PET. REFINING	7953.	0.	1091.	1043.	73.	717.	0.	297.	2280.	1497.
11. NONMETALLIC MANUF.	0.	0.	180.	274.	0.	0.	0.	9.	262.	0.
12. BASIC METALS	0.	100.	115.	139.	379.	0.	0.	36.	182.	351.
13. METAL PRODUCTS	0.	40.	360.	810.	0.	530.	17.	62.	310.	0.
14. MACHINERY EXPT. ELCT	0.	55.	99.	55.	2.	200.	9.	12.	73.	80.
15. ELECRICITY	0.	36.	301.	1075.	255.	2713.	89.	296.	5090.	511.
16. BLDG.+CONSTRUCTION	400.	100.	200.	200.	200.	400.	0.	100.	200.	100.
17. TRANSP.+COMMN.	400.	13.	290.	145.	250.	192.	56.	130.	633.	207.
18. OTHER SERVICES	13704.	3245.	1060.	22891.	769.	12003.	2037.	1340.	4650.	346.
19. WOOD+FURNITURE	0.	0.	240.	170.	19.	0.	51.	0.	50.	0.
20. OTHER INDUSTRIES	0.	32.	202.	70.	56.	735.	4631.	30.	256.	554.
TOTAL OUTPUT	664000	144300.	33900.	468000.	16800.	233100.	34100.	14500.	66000.	64000.

DELIVERING INDUSTRIES	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	220.	0.	0.	0.	0.	0.	370.	5375.	1200.	1269.
2. GINNING+PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING+QUARRYING	720.	2051.	0.	0.	0.	110.	0.	495.	0.	333.
4. FOOD PROCESSING	0.	0.	0.	0.	0.	0.	0.	7572.	0.	4110.
5. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	0.	0.	229.	0.	0.	0.	0.	1503.	169.	1306.
7. CLOTHING	0.	0.	0.	0.	0.	0.	0.	1140.	0.	0.
8. PAPER+P. PRODUCTS	1115.	0.	153.	0.	0.	0.	462.	3235.	87.	2190.
9. CHEMICAL MANUF.	145.	122.	1109.	156.	0.	6826.	103.	4345.	623.	3050.
10. COAL+PET. REFINING	3333.	3012.	136.	100.	7693.	2099.	8441.	2451.	0.	912.
11. NONMETALLIC MANUF.	1120.	150.	255.	20.	0.	10575.	396.	894.	210.	2057.
12. BASIC METALS	390.	8335.	8355.	2353.	0.	703.	892.	130.	56.	6446.
13. METAL PRODUCTS	107.	97.	616.	291.	0.	145.	2473.	1320.	860.	4833.
14. MACHINERY EXPT. ELCT	55.	150.	0.	145.	40.	0.	70.	310.	0.	237.
15. ELECRICITY	1775.	641.	1104.	217.	800.	0.	1330.	2762.	395.	1066.
16. BLDG.+CONSTRUCTION	100.	100.	200.	50.	100.	0.	0.	3062.	10.	310.
17. TRANSP.+COMMN.	811.	43.	104.	51.	255.	2136.	3912.	56807.	42.	530.
18. OTHER SERVICES	3803.	2007.	1690.	572.	2777.	19719.	10804.	70604.	1114.	10044.
19. WOOD+FURNITURE	80.	9.	70.	50.	0.	6295.	290.	3910.	510.	290.
20. OTHER INDUSTRIES	79.	96.	311.	169.	525.	14614.	4060.	17481.	93.	7696.
TOTAL OUTPUT	28800.	46600.	32900.	11700.	34400.	155400.	171300.	536052.	20500.	120600.

TABLE A.6
IMPORT FLOWS MATRIX FOR EGYPT ,1954

RECEIVING INDUSTRIES

DELEVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. AGRICULTURE	1760.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2. MINING + QUARRYING	0.	0.	260.	420.	40.	0.	2710.	60.	0.	10.	60.
3. ELECTRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4. METALS	0.	0.	30.	1340.	1840.	0.	0.	1250.	10.	0.	3010.
5. METAL PRODUCTS	0.	170.	60.	250.	370.	0.	0.	720.	0.	0.	1120.
6. CEMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	100.
7. PETROLEUM REFINING	1840.	140.	1270.	20.	20.	460.	40.	40.	60.	40.	90.
8. MACHINERY	50.	320.	270.	100.	0.	0.	140.	1620.	0.	0.	680.
9. BASIC CHEMICALS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10. OTHER CHEMICALS	70.	0.	20.	0.	120.	20.	80.	250.	100.	1600.	530.
11. CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12. MEAT PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. DAIRY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14. GRAIN MILLING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15. BAKERY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. SUGAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17. OILS + FATS	0.	0.	0.	0.	0.	0.	0.	0.	0.	90.	0.
18. OTHER FOOD PRODUCTS	690.	0.	40.	0.	0.	0.	0.	0.	0.	0.	0.
19. SPINNING + WEAVING	180.	0.	0.	0.	0.	0.	0.	0.	20.	0.	0.
20. PROCESSING OF COTTON	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22. PAPER + P. PRODUCTS	0.	10.	10.	10.	10.	200.	110.	20.	0.	30.	40.
23. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24. WOOD + FURNITURE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25. FERTILISERS	11610.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. OTHER INDUSTRIES	210.	30.	10.	70.	210.	30.	80.	960.	10.	60.	4420.
27. TRANSP. + COMM.	100.	180.	0.	10.	10.	10.	120.	40.	0.	10.	120.
28. SUEZ CANAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29. EDUCATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30. MEDICAL SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31. TRADE + FINANCE	0.	0.	0.	10.	0.	0.	10.	10.	0.	0.	20.
32. BANKING + INSURANCE	0.	40.	0.	0.	10.	0.	100.	150.	10.	10.	60.
33. OTHER SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTAL OUTPUT	400810.	13050.	12380.	9850.	11670.	5550.	25760.	38830.	2860.	12740.	71310.

DELEVERING INDUSTRIES	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1. AGRICULTURE	1110.	10.	1450.	0.	250.	10.	450.	150.	0.	0.	0.
2. MINING + QUARRYING	0.	0.	10.	10.	0.	0.	10.	190.	10.	0.	0.
3. ELECTRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4. METALS	0.	0.	0.	0.	0.	380.	40.	0.	0.	0.	0.
5. METAL PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. CEMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. PETROLEUM REFINING	0.	160.	500.	230.	150.	0.	260.	70.	120.	0.	10.
8. MACHINERY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9. BASIC CHEMICALS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10. OTHER CHEMICALS	20.	220.	20.	170.	70.	230.	240.	1160.	230.	70.	50.
11. CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12. MEAT PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. DAIRY PRODUCTS	0.	420.	0.	10.	0.	0.	0.	0.	0.	0.	0.
14. GRAIN MILLING	0.	0.	0.	3160.	0.	0.	0.	0.	0.	0.	0.
15. BAKERY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. SUGAR	0.	20.	0.	30.	0.	0.	150.	0.	0.	0.	0.
17. OILS + FATS	0.	0.	0.	10.	0.	30.	20.	0.	0.	0.	0.
18. OTHER FOOD PRODUCTS	10.	20.	0.	0.	0.	0.	460.	0.	0.	0.	0.
19. SPINNING + WEAVING	0.	0.	90.	0.	50.	0.	10.	2320.	0.	520.	0.
20. PROCESSING OF COTTON	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21. CLOTHING	0.	0.	10.	0.	0.	0.	0.	20.	130.	30.	0.
22. PAPER + P. PRODUCTS	20.	50.	50.	10.	60.	10.	170.	40.	0.	10.	520.
23. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24. WOOD + FURNITURE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25. FERTILISERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. OTHER INDUSTRIES	0.	310.	20.	0.	50.	10.	240.	550.	0.	80.	240.
27. TRANSP. + COMM.	20.	30.	40.	0.	20.	20.	20.	40.	0.	10.	10.
28. SUEZ CANAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29. EDUCATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30. MEDICAL SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31. TRADE + FINANCE	0.	20.	30.	0.	0.	0.	20.	60.	40.	0.	0.
32. BANKING + INSURANCE	10.	0.	20.	10.	20.	20.	50.	200.	40.	0.	20.
33. OTHER SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTAL OUTPUT	46420.	44610.	81660.	57050.	21100.	13550.	26840.	86810.	87060.	14330.	3620.

DELEVERING INDUSTRIES	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
1. AGRICULTURE	0.	0.	0.	10.	0.	60.	0.	10.	0.	0.	10.
2. MINING + QUARRYING	0.	10.	10.	40.	130.	0.	20.	10.	0.	0.	0.
3. ELECTRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4. METALS	0.	520.	10.	1870.	0.	0.	0.	0.	0.	0.	0.
5. METAL PRODUCTS	0.	30.	0.	20.	280.	20.	0.	0.	60.	0.	0.
6. CEMENT	0.	0.	0.	10.	0.	10.	0.	0.	0.	0.	0.
7. PETROLEUM REFINING	0.	90.	120.	700.	3500.	170.	10.	0.	260.	0.	40.
8. MACHINERY	0.	0.	0.	0.	2160.	40.	0.	0.	110.	0.	10.
9. BASIC CHEMICALS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10. OTHER CHEMICALS	50.	100.	190.	740.	90.	30.	10.	1840.	0.	0.	450.
11. CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12. MEAT PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. DAIRY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14. GRAIN MILLING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15. BAKERY PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. SUGAR	0.	0.	10.	0.	0.	0.	0.	0.	0.	0.	0.
17. OILS + FATS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18. OTHER FOOD PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	10.	0.	150.
19. SPINNING + WEAVING	10.	0.	40.	10.	0.	0.	0.	0.	0.	0.	0.
20. PROCESSING OF COTTON	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22. PAPER + P. PRODUCTS	470.	0.	10.	1500.	100.	30.	90.	20.	730.	70.	280.
23. TOBACCO	2890.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24. WOOD + FURNITURE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25. FERTILISERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. OTHER INDUSTRIES	250.	1100.	30.	1030.	690.	20.	50.	30.	110.	0.	590.
27. TRANSP. + COMM.	50.	10.	10.	30.	150.	70.	10.	20.	2280.	70.	90.
28. SUEZ CANAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29. EDUCATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30. MEDICAL SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31. TRADE + FINANCE	0.	0.	0.	0.	20.	0.	0.	0.	90.	40.	0.
32. BANKING + INSURANCE	10.	0.	20.	20.	220.	0.	0.	20.	530.	0.	110.
33. OTHER SERVICES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTAL OUTPUT	49130.	10060.	5750.	36960.	86170.	31430.	5730.	7930.	249500.	15320.	276890.

TABLE A.7

IMPORT FLOWS MATRIX FOR EGYPT ,1963/64

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. AGRICULTURE	730.	0.	0.	32832.	0.	5600.	6300.	0.	0.
2. GINNING + PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING + QUARRYING	0.	0.	0.	0.	0.	0.	0.	0.	0.
4. FOOD PROCESSING	0.	0.	0.	5464.	0.	0.	0.	0.	0.
5. BEVERAGES MANUF.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. SPINNING + WEAVING	0.	260.	0.	470.	0.	0.	4300.	255.	0.
8. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.
9. WOOD + CORK PRODS.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10. FURNITURE + FIXTURES	0.	0.	0.	0.	0.	0.	0.	0.	0.
11. PAPER + CARDBOARD	0.	0.	0.	0.	0.	760.	0.	124.	0.
12. PRINTING + PUB.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. LEATHER + L. PRODS.	0.	0.	0.	0.	0.	0.	0.	75.	0.
14. RUBBER PRODUCTS	0.	0.	0.	0.	0.	0.	0.	0.	0.
15. CHEMICALS	13000.	0.	190.	89.	20.	35.	4431.	0.	0.
16. PETROLEUM + COAL	410.	90.	172.	107.	10.	6.	234.	25.	0.
17. NONMETALLIC MINERAL	0.	0.	0.	0.	0.	0.	0.	0.	0.
18. BASIC METALS	0.	35.	35.	42.	0.	130.	0.	0.	0.
19. METAL PRODUCTS	0.	10.	192.	270.	104.	0.	415.	3.	0.
20. MACH. EXCEPT ELCTRIC	0.	400.	560.	465.	90.	26.	1540.	54.	0.
21. ELECTRIC MACHINERY	0.	25.	175.	35.	0.	50.	395.	26.	0.
22. TRANSP. EQUIPMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.
23. MISCELLANEOUS	0.	0.	63.	0.	0.	0.	244.	83.	0.
24. ELECTRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.
25. CONSTRUCTION + DWLNG	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. TRANSP. + COMUNCTN.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27. OTHER SRRVICES	565.	40.	53.	1649.	13.	279.	740.	13.	0.
TOTAL OUTPUT	664600.	144300.	33900.	460000.	8000.	16800.	233100.	34100.	2900.

DELIVERING INDUSTRIES	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. AGRICULTURE	0.	0.	0.	0.	0.	0.	0.	0.	0.
2. GINNING + PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING + QUARRYING	0.	0.	0.	0.	0.	633.	23865.	809.	80.
4. FOOD PROCESSING	0.	0.	0.	400.	0.	3600.	0.	0.	0.
5. BEVERAGES MANUF.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. SPINNING + WEAVING	0.	0.	0.	0.	0.	220.	0.	0.	0.
8. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.
9. WOOD + CORK PRODS.	4425.	0.	0.	0.	0.	330.	0.	0.	0.
10. FURNITURE + FIXTURES	0.	0.	0.	0.	0.	0.	0.	0.	0.
11. PAPER + CARDBOARD	160.	3305.	4010.	0.	0.	485.	0.	0.	0.
12. PRINTING + PUB.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13. LEATHER + L. PRODS.	0.	0.	0.	25.	0.	0.	0.	0.	0.
14. RUBBER PRODUCTS	0.	0.	0.	0.	1640.	0.	0.	0.	0.
15. CHEMICALS	90.	237.	1480.	415.	210.	2455.	210.	301.	115.
16. PETROLEUM + COAL	10.	15.	29.	7.	10.	89.	49.	41.	1360.
17. NONMETALLIC MINERAL	0.	0.	0.	0.	0.	0.	0.	0.	0.
18. BASIC METALS	42.	0.	87.	0.	0.	42.	115.	131.	7900.
19. METAL PRODUCTS	280.	20.	13.	10.	35.	104.	0.	35.	128.
20. MACH. EXCEPT ELCTRIC	0.	90.	0.	0.	20.	535.	690.	420.	720.
21. ELECTRIC MACHINERY	0.	42.	60.	0.	11.	285.	345.	71.	320.
22. TRANSP. EQUIPMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.
23. MISCELLANEOUS	0.	0.	0.	0.	0.	0.	185.	0.	30.
24. ELECTRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.
25. CONSTRUCTION + DWLNG	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. TRANSP. + COMUNCTN.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27. OTHER SRRVICES	213.	146.	239.	40.	80.	359.	636.	80.	439.
TOTAL OUTPUT	17600.	14500.	26500.	10700.	9100.	66800.	64800.	28800.	46600.

DELIVERING INDUSTRIES	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
1. AGRICULTURE	0.	0.	0.	0.	0.	0.	0.	0.	0.
2. GINNING + PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING + QUARRYING	0.	0.	0.	0.	0.	0.	0.	0.	0.
4. FOOD PROCESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.
5. BEVERAGES MANUF.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. SPINNING + WEAVING	0.	0.	0.	0.	0.	0.	0.	0.	0.
8. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.
9. WOOD + CORK PRODS.	405.	340.	300.	150.	200.	0.	1090.	130.	175.
10. FURNITURE + FIXTURES	0.	0.	0.	0.	0.	0.	0.	0.	0.
11. PAPER + CARDBOARD	0.	0.	0.	0.	0.	0.	0.	0.	865.
12. PRINTING + PUB.	0.	0.	0.	0.	0.	0.	0.	0.	665.
13. LEATHER + L. PRODS.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14. RUBBER PRODUCTS	45.	35.	75.	140.	0.	0.	0.	0.	0.
15. CHEMICALS	325.	20.	555.	85.	145.	0.	0.	0.	2110.
16. PETROLEUM + COAL	49.	1000.	25.	255.	5.	100.	0.	1692.	153.
17. NONMETALLIC MINERAL	0.	0.	30.	0.	55.	0.	540.	0.	55.
18. BASIC METALS	3365.	696.	426.	437.	696.	0.	102.	143.	0.
19. METAL PRODUCTS	200.	120.	450.	5275.	160.	0.	0.	1720.	1040.
20. MACH. EXCEPT ELCTRIC	0.	750.	0.	2740.	0.	340.	0.	550.	2410.
21. ELECTRIC MACHINERY	100.	155.	2360.	550.	0.	637.	5570.	1800.	1145.
22. TRANSP. EQUIPMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.
23. MISCELLANEOUS	17.	13.	165.	75.	35.	0.	150.	0.	2090.
24. ELECTRICITY	0.	40.	0.	0.	0.	0.	0.	0.	0.
25. CONSTRUCTION + DWLNG	0.	0.	0.	0.	0.	0.	0.	0.	0.
26. TRANSP. + COMUNCTN.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27. OTHER SRRVICES	186.	93.	186.	399.	53.	40.	0.	253.	452.
TOTAL OUTPUT	32900.	11700.	21300.	37300.	15700.	34400.	155400.	171300.	536052.

TABLE A.8

IMPORT FLOWS MATRIX FOR EGYPT ,1954

(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	1760.	0.	0.	3270.	0.	150.	0.	0.	10.	0.
2. GINNING+PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING+QUARRYING	0.	10.	0.	30.	0.	190.	0.	0.	20.	2710.
4. FOOD PROCESSING	690.	0.	0.	4280.	0.	0.	0.	0.	10.	0.
5. TOBACCO	0.	0.	0.	0.	2090.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	180.	0.	0.	130.	10.	2320.	520.	0.	60.	0.
7. CLOTHING	0.	130.	0.	10.	0.	20.	30.	0.	0.	0.
8. PAPER+P. PRODUCTS	0.	0.	10.	360.	470.	40.	10.	520.	50.	110.
9. CHEMICAL MANUF.	11680.	230.	0.	770.	50.	1160.	70.	50.	2240.	80.
10. COAL+PET. REFINING	1840.	120.	140.	1300.	0.	70.	0.	10.	220.	40.
11. NONMETALLIC MANUF.	0.	0.	0.	4.	0.	0.	0.	0.	0.	0.
12. BASIC METALS	0.	0.	0.	40.	0.	0.	0.	0.	480.	0.
13. METAL PRODUCTS	0.	0.	170.	0.	0.	0.	0.	0.	0.	0.
14. MACHINERY EXPT. ELCT	50.	0.	320.	0.	0.	0.	0.	0.	0.	140.
15. ELECRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. BLDG.+CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17. TRANSP.+COMMN.	100.	0.	180.	130.	50.	40.	10.	10.	40.	120.
18. OTHER SERVICES	0.	40.	40.	180.	10.	260.	0.	20.	60.	110.
19. WOOD+FURNITURE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20. OTHER INDUSTRIES	210.	0.	30.	620.	250.	550.	80.	240.	110.	60.
TOTAL OUTPUT	400010.	87060.	13050.	277680.	49130.	86810.	14330.	3620.	34900.	25780.

DELIVERING INDUSTRIES	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	0.	0.	0.	0.	0.	0.	60.	20.	0.	10.
2. GINNING+PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING+QUARRYING	0.	420.	40.	60.	260.	60.	130.	30.	10.	40.
4. FOOD PROCESSING	0.	0.	0.	0.	40.	0.	0.	160.	0.	0.
5. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.
7. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8. PAPER+P. PRODUCTS	200.	10.	10.	20.	10.	40.	130.	1190.	0.	1500.
9. CHEMICAL MANUF.	20.	0.	120.	250.	20.	530.	120.	1500.	100.	740.
10. COAL+PET. REFINING	460.	20.	20.	40.	1270.	90.	3670.	310.	90.	700.
11. NONMETALLIC MANUF.	0.	0.	0.	0.	0.	100.	10.	0.	0.	10.
12. BASIC METALS	0.	1340.	1840.	1250.	30.	3010.	0.	0.	520.	1870.
13. METAL PRODUCTS	0.	250.	370.	720.	60.	1120.	300.	60.	30.	20.
14. MACHINERY EXPT. ELCT	0.	100.	0.	1620.	270.	60.	2200.	120.	0.	0.
15. ELECRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. BLDG.+CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17. TRANSP.+COMMN.	10.	10.	10.	40.	0.	120.	220.	2470.	10.	30.
18. OTHER SERVICES	0.	10.	10.	160.	0.	80.	240.	790.	0.	20.
19. WOOD+FURNITURE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20. OTHER INDUSTRIES	30.	70.	210.	960.	10.	4420.	710.	690.	1100.	1030.
TOTAL OUTPUT	5550.	9850.	11870.	38830.	12360.	71310.	117600.	554570.	18860.	36960.

TABLE A.9

IMPORT FLOWS MATRIX FOR EGYPT ,1963/64

(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	700.	0.	0.	32032.	5600.	6300.	0.	0.	0.	0.
2. GINNING+PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING+QUARRYING	0.	0.	0.	0.	0.	0.	0.	0.	633.	23865.
4. FOOD PROCESSING	0.	0.	0.	5464.	0.	0.	0.	0.	3600.	0.
5. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	0.	260.	0.	470.	0.	4300.	255.	0.	220.	0.
7. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8. PAPER+P. PRODUCTS	0.	0.	0.	0.	760.	0.	124.	3305.	485.	0.
9. CHEMICAL MANUF.	13000.	0.	190.	89.	35.	4431.	0.	237.	2455.	210.
10. COAL+PET. REFINING	410.	90.	172.	187.	0.	234.	25.	15.	89.	49.
11. NONMETALLIC MANUF.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12. BASIC METALS	0.	35.	35.	42.	130.	0.	0.	0.	42.	115.
13. METAL PRODUCTS	0.	10.	192.	270.	0.	415.	3.	20.	104.	0.
14. MACHINERY EXPT. ELCT	0.	480.	560.	465.	26.	1540.	54.	90.	535.	690.
15. ELECRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. BLDG.+CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17. TRANSP.+COMMN.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18. OTHER SERVICES	585.	40.	53.	1649.	279.	740.	13.	146.	359.	636.
19. WOOD+FURNITURE	0.	0.	0.	0.	0.	0.	0.	0.	330.	0.
20. OTHER INDUSTRIES	0.	25.	230.	35.	50.	639.	184.	42.	205.	530.
TOTAL OUTPUT	664000.	144300.	33900.	468000.	16000.	233100.	34100.	14500.	66030.	64800.

DELIVERING INDUSTRIES	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2. GINNING+PRESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3. MINING+QUARRYING	809.	88.	0.	0.	0.	0.	0.	0.	0.	0.
4. FOOD PROCESSING	0.	0.	0.	0.	0.	0.	0.	0.	0.	402.
5. TOBACCO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6. SPINNING+WEAVING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7. CLOTHING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8. PAPER+P. PRODUCTS	0.	0.	0.	0.	0.	0.	0.	865.	160.	4015.
9. CHEMICAL MANUF.	301.	115.	325.	20.	0.	0.	0.	2110.	90.	2910.
10. COAL+PET. REFINING	41.	1360.	49.	180.	100.	0.	1692.	153.	10.	349.
11. NONMETALLIC MANUF.	0.	0.	0.	0.	0.	540.	0.	55.	0.	85.
12. BASIC METALS	131.	7906.	3365.	696.	0.	102.	143.	0.	42.	1646.
13. METAL PRODUCTS	35.	120.	200.	120.	0.	0.	1720.	1040.	280.	6055.
14. MACHINERY EXPT. ELCT	420.	720.	0.	750.	340.	0.	550.	2410.	0.	2850.
15. ELECRICITY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16. BLDG.+CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17. TRANSP.+COMMN.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18. OTHER SERVICES	80.	439.	186.	93.	40.	0.	253.	452.	213.	1010.
19. WOOD+FURNITURE	0.	0.	405.	340.	0.	1890.	130.	175.	4425.	650.
20. OTHER INDUSTRIES	71.	350.	162.	203.	637.	5720.	1000.	3900.	0.	5136.
TOTAL OUTPUT	28800.	46600.	32900.	11700.	34400.	155400.	171300.	536052.	20500.	128600.

APPENDIX B

THE INPUT-OUTPUT DATA FOR
1954 AND 1963/64

This appendix contains all the input-output data which are derived from the input-output flows tables of Appendix A. They constitute the basis for the consistency tests of Chapter II and the indices of interdependence in Chapter III. The data included here also furnish the input-output coefficient matrices which form part of the data of the linear programming model of Chapers IV and V. The first three tables, Tables B.1-B.3, contain the matrices A_d, A_m and E,[1] respectively, for 1954 in the original (33 by 33) size. Tables B.4-B.6 include the matrices A_d, A_m and E for 1963/64 in the original (27 by 27) size. The last four tables of this appendix, Tables B.7-B.10, include the consolidated (20 by 20) version of the domestic coefficient matrix and its inverse for 1954 and 1963/64, respectively.

[1] Recall that A_d is the domestic input-output coefficients matrix, A_m is the import coefficients matrix, and E is $(I - A_d)^{-1}$, the inverse of the domestic coefficient matrix. See Chapter III for details.

TABLE 8.1

DOMESTIC COEFFICIENTS MATRIX FOR EGYPT ,1954

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. AGRICULTURE	.118460	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001946	0.000000	0.000000	0.000000
2. MINING + QUARRYING	0.000000	0.000000	0.000000	.034518	.014322	.019820	.323894	0.000000	.020979	.007064	.024821
3. ELECTRICITY	0.000000	.000766	0.000000	.023350	.011794	.063063	.002327	.010704	.003497	.004710	.000421
4. METALS	0.000000	.000766	0.000000	.119797	.137321	0.000000	0.000000	.036004	0.000000	0.000000	.037302
5. METAL PRODUCTS	0.000000	.001533	.008078	.041624	.052233	0.000000	0.000000	.038923	0.000000	0.000000	.026224
6. CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.059318
7. PETROLEUM REFINING	.007636	.016092	.156704	.006091	.003370	.126126	.003879	.006812	.031469	.004710	.016828
8. MACHINERY	.001921	.016092	.013732	.006091	.007582	.001802	.022110	.216023	.006993	.003140	.048941
9. BASIC CHEMICALS	.000748	0.000000	.000808	0.000000	.003370	.001802	.000776	.002271	.018490	.040031	.002384
10. OTHER CHEMICALS	.000823	0.000000	.001616	0.000000	.008425	.003604	.002715	.005514	.027972	.104396	.006170
11. CONSTRUCTION	.000650	0.000000	.003231	0.000000	0.000000	0.000000	.001164	0.000000	0.000000	0.000000	0.000000
12. MEAT PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. DAIRY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14. GRAIN MILLING	.002670	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000785	0.000000
15. BAKERY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16. SUGAR	0.000000	0.000000	.034733	0.000000	0.000000	0.000000	0.000000	0.000000	.041958	0.000000	0.000000
17. OILS + FATS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.153846	0.000000
18. OTHER FOOD PRODUCTS	.004416	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19. SPINNING + WEAVING	.033618	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.153846	.000785	0.000000
20. PROCESSING OF COTTON	.001921	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22. PAPER + P. PRODUCTS	0.000000	.000766	.000808	0.000000	.000842	.019820	.002327	.000324	0.000000	.001570	.000280
23. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	.000025	0.000000	0.000000	0.000000	.000842	0.000000	0.000000	.001297	0.000000	0.000000	.002805
25. FERTILISERS	.011402	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. OTHER INDUSTRIES	.000474	.002299	.002423	.007107	.016849	.046847	.007370	.031463	.006993	.008634	.042210
27. TRANSP. + COMM.	.002744	.162452	.001616	.009137	.009267	.018018	.059348	.019462	.024476	.008634	.019352
28. SUEZ CANAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29. EDUCATION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	.060702	.026054	.087237	.062944	.048026	.115315	.065555	.065521	.097902	.126374	.107418
32. BANKING + INSURANCE	.000249	.009962	.000808	.002030	.019377	0.000000	.009310	.014272	.010490	.002355	.002524
33. OTHER SERVICES	.310122	.036782	.006462	.030457	.032013	.034234	.050427	.046383	.055944	.017268	.013462

DELIVERING INDUSTRIES	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1. AGRICULTURE	.746661	.236942	.020475	0.000000	.287678	.009594	.131148	.633752	.926717	0.000000	0.000000
2. MINING + QUARRYING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. ELECTRICITY	.002370	.001345	.006613	.002103	.009605	.001476	.006334	.008640	.000345	.002094	0.000000
4. METALS	0.000000	0.000000	0.000000	0.000000	0.000000	.005092	.001490	0.000000	0.000000	0.000000	0.000000
5. METAL PRODUCTS	0.000000	.001793	0.000000	0.000000	.000474	0.000000	0.000000	0.000000	.002527	0.000000	0.000000
6. CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. PETROLEUM REFINING	0.000000	.005380	.009307	.006310	.011374	0.000000	.015276	.002189	.002068	.000698	.005525
8. MACHINERY	.003231	.004259	.003306	.002629	.002844	.002214	.008197	.005414	.006892	.000698	.002762
9. BASIC CHEMICALS	0.000000	.001345	0.000000	.000876	.000948	.005904	.002608	.004377	.000919	.001396	.005525
10. OTHER CHEMICALS	.000431	.004259	.000245	.002454	.002844	.014022	.007452	.011059	.002182	.004187	.011050
11. CONSTRUCTION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000373	.000230	0.000000	0.000000	0.000000
12. MEAT PRODUCTS	.001077	0.000000	0.000000	0.000000	0.000000	0.000000	.001118	.001152	0.000000	0.000000	.005525
13. DAIRY PRODUCTS	0.000000	.374131	0.000000	.007011	0.000000	0.000000	.000745	0.000000	0.000000	0.000000	0.000000
14. GRAIN MILLING	.001723	.002914	.005511	.652235	0.000000	0.000000	.036513	.000346	0.000000	0.000000	.187845
15. BAKERY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16. SUGAR	0.000000	.008742	0.000000	.020859	0.000000	0.000000	.138227	0.000000	0.000000	0.000000	.002762
17. OILS + FATS	0.000000	.000897	0.000000	.009991	0.000000	.053875	.019001	0.000000	0.000000	0.000000	.002762
18. OTHER FOOD PRODUCTS	0.000000	.000897	0.000000	.026643	0.000000	0.000000	.059240	0.000000	0.000000	0.000000	0.000000
19. SPINNING + WEAVING	0.000000	.000448	.008695	0.000000	.018009	.001476	.004471	.348923	0.000000	.344731	.005525
20. PROCESSING OF COTTON	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.168405	.173367	0.000000	0.000000	0.000000
21. CLOTHING	.000431	0.000000	.000245	0.000000	0.000000	0.000000	.000373	.000806	.005528	.006978	0.000000
22. PAPER + P. PRODUCTS	.000215	.000672	.000367	.000175	.001422	0.000000	.003353	.000346	0.000000	.000698	.080110
23. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	0.000000	.000224	0.000000	0.000000	0.000000	0.000000	.000373	0.000000	0.000000	0.000000	0.000000
25. FERTILISERS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. OTHER INDUSTRIES	.000646	.005380	.000857	.002629	.005687	.001476	.015276	.002189	0.000000	.199581	.162983
27. TRANSP. + COMM.	.005601	.006949	.005000	.000876	.014692	.014022	.009687	.005184	.000115	.005583	.016575
28. SUEZ CANAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29. EDUCATION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000115	0.000000	0.000000	0.000000
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	.071952	.044609	.024982	.017353	.146445	.032472	.181073	.153669	.019182	.100488	.063536
32. BANKING + INSURANCE	.002370	.001121	.003194	.000175	.008057	.003690	.005216	.012095	.000574	.000698	.022099
33. OTHER SERVICES	.032745	.008742	.030860	.018054	.007583	.025830	.027198	.016703	.001953	.013957	.019337

DELIVERING INDUSTRIES	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
1. AGRICULTURE	0.000000	0.000000	0.000000	.004058	0.000000	0.000000	.001745	.010088	0.000000	0.000000	0.000000
2. MINING + QUARRYING	0.000000	0.000000	.020870	.012175	.000348	.001591	0.000000	0.000000	0.000000	0.000000	0.000000
3. ELECTRICITY	.000467	.054672	.001739	.008117	.007775	0.000000	.008726	.022699	.010862	.003916	.004745
4. METALS	0.000000	.045726	.001739	.044913	0.000000	.000318	0.000000	0.000000	0.000000	0.000000	0.000000
5. METAL PRODUCTS	.001221	.004970	0.000000	.001894	.005338	.000955	0.000000	0.000000	.000441	0.000000	.000036
6. CEMENT	0.000000	0.000000	0.000000	.012716	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. PETROLEUM REFINING	0.000000	.013917	.031304	.028956	.063247	.008272	.005236	.001261	.001603	0.000000	.000181
8. MACHINERY	.001832	.036779	.006957	.005952	.017640	.000955	.001745	.001261	.000922	.019582	.002608
9. BASIC CHEMICALS	0.000000	.002982	.010435	.006223	0.000000	0.000000	0.000000	.005044	0.000000	0.000000	.000543
10. OTHER CHEMICALS	.001018	.008946	.027826	.016504	.000928	.003955	.001745	.139975	0.000000	0.000000	.001449
11. CONSTRUCTION	0.000000	0.000000	0.000000	.000541	.001509	0.000000	.012216	.008827	.002465	.028721	.006592
12. MEAT PRODUCTS	0.000000	0.000000	0.000000	.002435	0.000000	0.000000	.019197	.007566	0.000000	0.000000	.000072
13. DAIRY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001745	.002522	0.000000	0.000000	.000036
14. GRAIN MILLING	.000407	.001988	0.000000	.085768	0.000000	0.000000	0.000000	0.000000	.014309	0.000000	0.000000
15. BAKERY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.026178	.006305	0.000000	0.000000	.000072
16. SUGAR	.001425	0.000000	0.000000	.000812	0.000000	0.000000	.005236	.003783	0.000000	0.000000	.000036
17. OILS + FATS	0.000000	0.000000	0.000000	.000812	0.000000	0.000000	.012216	.002522	0.000000	0.000000	0.000000
18. OTHER FOOD PRODUCTS	0.000000	0.000000	0.000000	.003517	.008935	0.000000	.020942	0.000000	.000641	0.000000	.004274
19. SPINNING + WEAVING	.000814	0.000000	0.000000	.001623	.000232	0.000000	0.000000	0.000000	0.000000	0.000000	.000072
20. PROCESSING OF COTTON	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22. PAPER + P. PRODUCTS	.005089	0.000000	0.000000	.021645	.000696	.001636	.008726	.001261	.001643	.002611	.005652
23. TOBACCO	.418402	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	.001204	.032803	0.000000	.001894	.000348	0.000000	0.000000	0.000000	.000481	0.000000	.000580
25. FERTILISERS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. OTHER INDUSTRIES	.003434	.061630	.005217	.000357	.004410	.001591	.020942	.005044	.003567	.005875	.001847
27. TRANSP. + COMM.	.011398	.008946	.026087	.010552	.019264	.026690	.022688	.022699	.106253	.073107	.004383
28. SUEZ CANAL	0.000000	0.000000	0.000000	0.000000	.000232	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29. EDUCATION	0.000000	0.000000	0.000000	0.000000	.000464	0.000000	.005236	.109710	.001323	.003916	0.000000
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	.340525	.058648	.095652	.074405	.05233[illegible]	.001909	.022688	.087011	.011343	.066580	.003260
32. BANKING + INSURANCE	.000814	.001988	.008696	.001353	.011489	.001227	0.000000	.008827	.021443	.016319	.000543
33. OTHER SERVICES	.024629	.016899	.055652	.018128	.015783	.051770	.075044	.016393	.042164	.039517	.015502

TABLE A.2

IMPORT COEFFICIENTS MATRIX FOR EGYPT ,1954

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. AGRICULTURE	.004391	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2. MINING + QUARRYING	0.000000	0.000000	.021002	.042540	.003370	0.000000	.105120	.001946	0.000000	.000785	.000841
3. ELECTRICITY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4. METALS	0.000000	0.000000	.002423	.136041	.155013	0.000000	0.000000	.040545	.003497	0.000000	.042213
5. METAL PRODUCTS	0.000000	.013427	.004847	.025381	.031171	0.000000	0.000000	.023354	0.000000	0.000000	.015705
6. CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001412
7. PETROLEUM REFINING	.004591	.010728	.102585	.002030	.001685	.002883	.001552	.001297	.020979	.003140	.001262
8. MACHINERY	.000125	.024521	.021809	.010152	0.000000	0.000000	.005431	.052546	0.000000	0.000000	.001513
9. BASIC CHEMICALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	[illegible]
10. OTHER CHEMICALS	.000175	0.000000	.001616	0.000000	.010110	.003604	.003103	.008109	.034965	.125589	.007432
11. CONSTRUCTION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12. MEAT PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. DAIRY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14. GRAIN MILLING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15. BAKERY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16. SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17. OILS + FATS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007064	0.000000
18. OTHER FOOD PRODUCTS	.001722	0.000000	.003231	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19. SPINNING + WEAVING	.000449	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.006993	0.000000	0.000000
20. PROCESSING OF COTTON	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22. PAPER + P. PRODUCTS	0.000000	.000766	.000808	.001015	.000842	.016036	.004267	.000649	0.000000	.002355	.000561
23. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25. FERTILISERS	.028966	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. OTHER INDUSTRIES	.000524	.002299	.000808	.007107	.017692	.015405	.003103	.031139	.003497	.004710	.251993
27. TRANSP. + COMM.	.000249	.013793	0.000000	.001015	.000842	.001802	.004655	.001297	0.000000	.000785	.001683
28. SUEZ CANAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29. EDUCATION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	0.000000	0.000000	0.000000	.001015	0.000000	0.000000	.000388	.000324	0.000000	0.000000	.000250
32. BANKING + INSURANCE	0.000000	.003065	0.000000	0.000000	.000842	0.000000	.003879	.004865	.003497	.000785	.000841
33. OTHER SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

DELIVERING INDUSTRIES	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1. AGRICULTURE	.023912	.000224	.017757	0.000000	.011848	.000738	.016766	.001728	0.000000	0.000000	0.000000
2. MINING + QUARRYING	0.000000	0.000000	.000122	.000175	0.000000	0.000000	.000373	.002189	.000115	0.000000	0.000000
3. ELECTRICITY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4. METALS	0.000000	0.000000	0.000000	0.000000	0.000000	[illegible]	.001490	0.000000	0.000000	0.000000	0.000000
5. METAL PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. PETROLEUM REFINING	0.000000	.003587	.006123	.004032	.007109	0.000000	.009687	.000806	.001378	0.000000	.002752
8. MACHINERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9. BASIC CHEMICALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10. OTHER CHEMICALS	.030431	.004932	.000245	.002980	.003318	.016974	.008942	.013363	.002642	.004885	.013812
11. CONSTRUCTION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12. MEAT PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. DAIRY PRODUCTS	0.000000	.009415	0.000000	.000175	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14. GRAIN MILLING	0.000000	0.000000	0.000000	.055396	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15. BAKERY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16. SUGAR	0.000000	.000445	0.000000	.000526	0.000000	0.000000	.005589	0.000000	0.000000	0.000000	0.000000
17. OILS + FATS	0.000000	0.000000	0.000000	.000175	0.000000	0.000000	.000745	0.000000	0.000000	0.000000	0.000000
18. OTHER FOOD PRODUCTS	.000215	.000448	0.000000	0.000000	0.000000	.002214	.017139	0.000000	0.000000	0.000000	0.000000
19. SPINNING + WEAVING	0.000000	0.000000	.001102	0.000000	.002370	0.000000	.000373	.026725	0.000000	.036288	0.000000
20. PROCESSING OF COTTON	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21. CLOTHING	0.000000	0.000000	.000122	0.000000	0.000000	0.000000	0.000000	.000230	.001493	.002194	0.000000
22. PAPER + P. PRODUCTS	.000431	.001121	.000612	.000175	.002844	.000738	.006334	.000461	0.000000	.000698	.14365[illegible]
23. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25. FERTILISERS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. OTHER INDUSTRIES	0.000000	.006949	.000245	0.000000	.002370	.000738	.008942	.006336	0.000000	.005583	.06625[illegible]
27. TRANSP. + COMM.	.000431	.000672	.000490	0.000000	.000948	.001476	.000745	.000461	0.000000	.000698	.0276[illegible]
28. SUEZ CANAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29. EDUCATION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	0.000000	.000448	.000367	0.000000	0.000000	0.000000	.000745	.000691	0.000000	0.000000	0.000000
32. BANKING + INSURANCE	.000215	0.000000	.000245	.000175	.000948	.001476	.001863	.002304	.000459	0.000000	.001525
33. OTHER SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

DELIVERING INDUSTRIES	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
1. AGRICULTURE	0.000000	0.000000	0.000000	.000271	0.000000	.001909	0.000000	.001261	0.000000	0.000000	.000035
2. MINING + QUARRYING	0.000000	.000994	.001739	.001062	.001509	0.000000	.003490	.001261	0.000000	0.000000	0.000000
3. ELECTRICITY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4. METALS	0.000000	.051690	.001739	.050596	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5. METAL PRODUCTS	0.000000	.002982	0.000000	.000541	.003249	.000636	0.000000	0.000000	.000243	0.000000	0.000000
6. CEMENT	0.000000	0.000000	0.000000	.000271	0.000000	.000318	0.000000	0.000000	0.000000	0.000000	0.000000
7. PETROLEUM REFINING	0.000000	.008946	.020870	.018439	.046617	.035409	.001745	0.000000	.001442	0.000000	.000145
8. MACHINERY	0.000000	0.000000	0.000000	0.000000	.025667	.001273	0.000000	0.000000	.000441	0.000000	.000136
9. BASIC CHEMICALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10. OTHER CHEMICALS	[illegible]	.009742	.033043	.020722	.005944	.000955	.001745	.031148	0.000000	0.000000	.001670
11. CONSTRUCTION	[illegible]	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12. MEAT PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. DAIRY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14. GRAIN MILLING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15. BAKERY PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16. SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17. OILS + FATS	0.000000	0.000000	.001739	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18. OTHER FOOD PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000563
19. SPINNING + WEAVING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
20. PROCESSING OF COTTON	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22. PAPER + P. PRODUCTS	.049566	0.000000	.001739	.040584	.001160	.000955	.015707	.002522	.002926	.004569	.001014
23. TOBACCO	.042566	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25. FERTILISERS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. OTHER INDUSTRIES	.045089	.109344	.005217	.427868	.028807	.000636	.000726	.003783	.000441	.004569	.001811
27. TRANSP. + COMM.	.001616	.000994	.001739	.000412	.001741	.002227	.001745	.002522	.009138	0.000000	.000326
28. SUEZ CANAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29. EDUCATION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	0.000000	0.000000	0.000000	0.000000	.000233	0.000000	0.000000	0.000000	.000361	0.000000	0.000000
32. BANKING + INSURANCE	.00[illegible]284	0.000000	.003478	.000541	.002553	0.000000	0.000000	.002522	.002124	.002611	.000398
33. OTHER SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

TABLE B.3

INVERSE OF THE I-A MATRIX FOR EGYPT ,1954

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. AGRICULTURE	1.145557	.002241	.014549	.002938	.004223	.013107	.003984	.009810	.072093	.010669	.008317
2. MINING + QUARRYING	.003923	1.009575	.053042	.045345	.025063	.067687	.330672	.009374	.034906	.013112	.039826
3. ELECTRICITY	.003088	.003437	1.003008	.029107	.018399	.066760	.095786	.018510	.009524	.008595	.009544
4. METALS	.000632	.002904	.003285	1.145303	.167877	.003920	.003206	.063741	.001780	.006428	.053441
5. METAL PRODUCTS	.000525	.003925	.010202	.051395	1.063563	.001881	.003231	.055998	.001490	.001345	.033434
6. CEMENT	.000199	.000135	.000331	.000195	.000369	1.000829	.000315	.000695	.000258	.000229	.060073
7. PETROLEUM REFINING	.010695	.028565	.162182	.015085	.010929	.144534	1.019438	.017210	.040376	.011629	.032850
8. MACHINERY	.005537	.026324	.025081	.012542	.014653	.011620	.039757	1.280245	.016176	.007938	.067612
9. BASIC CHEMICALS	.001416	.000207	.001298	.000392	.004332	.002850	.001232	.003943	1.013522	.046698	.003620
10. OTHER CHEMICALS	.002439	.000788	.003016	.001022	.010929	.006379	.004008	.009786	.035794	1.121575	.009354
11. CONSTRUCTION	.002806	.001130	.004151	.000859	.001323	.001458	.002624	.001600	.001854	.001020	1.001011
12. MEAT PRODUCTS	.000454	.000030	.000035	.000039	.000076	.000286	.000063	.000140	.000329	.000071	.000152
13. DAIRY PRODUCTS	.000031	.000006	.000003	.000004	.000004	.000006	.000007	.000007	.000009	.000004	.000004
14. GRAIN MILLING	.004833	.001412	.002631	.002362	.003443	.011760	.003151	.006072	.003983	.004961	.007451
15. BAKERY PRODUCTS	.000030	.000008	.000007	.000007	.000009	.000011	.000012	.000012	.000016	.000010	.000039
16. SUGAR	.001189	.000408	.034993	.001126	.000937	.002721	.000512	.001004	.043081	.002382	.000674
17. OILS + FATS	.000548	.000165	.000517	.000192	.001818	.001184	.000711	.001662	.005868	.182413	.001631
18. OTHER FOOD PRODUCTS	.007262	.001945	.000639	.000612	.000645	.001280	.001703	.001062	.001492	.000743	.000972
19. SPINNING + WEAVING	.006928	.000200	.001450	.000228	.001231	.001376	.000506	.001280	.241503	.013183	.001231
20. PROCESSING OF COTTON	.004625	.000367	.000387	.000148	.000330	.000466	.000382	.000420	.042259	.002414	.000393
21. CLOTHING	.000036	.000003	.000004	.000002	.000004	.000007	.000004	.000005	.000437	.000026	.000006
22. PAPER + P. PRODUCTS	.000561	.001351	.001854	.000658	.001872	.023822	.003561	.002367	.381122	.002672	.003420
23. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	.000318	.000166	.000155	.000167	.001071	.000267	.000226	.001970	.000216	.000160	.003239
25. FERTILISERS	.013062	.000026	.000166	.008033	.000046	.000149	.000045	.000112	.000822	.000122	.000095
26. OTHER INDUSTRIES	.002565	.005309	.006687	.011355	.022808	.058417	.012566	.047227	.011651	.013236	.054623
27. TRANSP. + COMM.	.015742	.175601	.034681	.029997	.027432	.056953	.129214	.043612	.056613	.035765	.048583
28. SUEZ CANAL	.000004	.000041	.000008	.000007	.000006	.000013	.000030	.000010	.000013	.000049	.000011
29. EDUCATION	.000125	.000194	.000194	.000152	.000206	.000251	.000250	.000253	.000353	.000270	.000244
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	.079213	.042788	.113576	.084956	.074349	.148017	.091054	.105856	.166368	.164137	.139973
32. BANKING + INSURANCE	.002954	.014037	.006771	.006476	.024047	.007086	.017345	.023186	.019710	.008571	.008954
33. OTHER SERVICES	.367119	.046880	.029554	.046066	.049180	.059925	.075309	.076434	.099261	.040945	.036550

DELIVERING INDUSTRIES	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1. AGRICULTURE	.859435	.446541	.949084	.642092	.339559	.013790	.446373	.350012	1.062918	.144953	.222982
2. MINING + QUARRYING	.003592	.035725	.007076	.007569	.006724	.002333	.018413	.005174	.004660	.008768	.009960
3. ELECTRICITY	.005945	.005148	.010075	.009857	.012687	.003480	.013695	.018287	.003753	.012854	.006381
4. METALS	.000856	.001958	.000935	.001488	.001124	.030845	.004992	.001733	.001565	.011426	.011051
5. METAL PRODUCTS	.000788	.003984	.000854	.000945	.001397	.001743	.002253	.002180	.003621	.002205	.001759
6. CEMENT	.000205	.000249	.000217	.000217	.000222	.000070	.000473	.000278	.000216	.002961	.002674
7. PETROLEUM REFINING	.009823	.015930	.020464	.021975	.019579	.062816	.029434	.013830	.012615	.015985	.020625
8. MACHINERY	.009151	.012506	.010076	.011326	.007877	.004522	.319154	.017799	.014314	.010761	.010634
9. BASIC CHEMICALS	.001145	.003247	.001329	.002184	.001791	.007111	.004608	.008494	.002427	.006273	.008528
10. OTHER CHEMICALS	.002490	.009206	.002681	.005355	.004692	.017095	.012251	.021195	.004954	.016621	.018475
11. CONSTRUCTION	.002699	.001627	.002818	.002205	.001833	.000564	.002935	.002995	.002739	.001912	.002131
12. MEAT PRODUCTS	1.001132	.000067	.000073	.000098	.000088	.000018	.001323	.001834	.000061	.001221	.006556
13. DAIRY PRODUCTS	.000026	1.597795	.000028	.011257	.000012	.000003	.001283	.000015	.000029	.000009	.000011
14. GRAIN MILLING	.006694	.009093	1.010277	.661030	.004889	.001007	.047323	.006665	.004997	.024580	.225763
15. BAKERY PRODUCTS	.000028	.000017	.000029	1.000022	.000018	.000005	.000025	.000029	.000029	.000018	.000016
16. SUGAR	.001078	.014965	.001298	.025944	1.000910	.000488	.148170	.001429	.001193	.001259	.004148
17. OILS + FATS	.000531	.003125	.000572	.012112	.000836	1.059736	.023459	.003528	.000950	.002971	.006422
18. OTHER FOOD PRODUCTS	.005820	.004765	.006314	.032798	.002722	.000485	1.066697	.003014	.006812	.002474	.002791
19. SPINNING + WEAVING	.005515	.005022	.019388	.014086	.030192	.004236	.016614	1.541588	.009717	.537052	.016277
20. PROCESSING OF COTTON	.003587	.002531	.006248	.009199	.006345	.000843	.183375	.268441	1.004874	.093802	.003720
21. CLOTHING	.000463	.000022	.000303	.000219	.000063	.000009	.001465	.002777	.005707	1.008303	.000094
22. PAPER + P. PRODUCTS	.000896	.001933	.001062	.001262	.002354	.000257	.005533	.001620	.000640	.006957	1.092399
23. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000040	0.000000	0.000000
24. WOOD + FURNITURE	.000316	.000597	.000317	.000273	.000226	.000068	.000771	.000309	.000329	.000645	.000557
25. FERTILISERS	.009799	.035091	.010521	.007321	.003872	.000157	.005090	.003991	.012119	.001653	.002542
26. OTHER INDUSTRIES	.003537	.012005	.003901	.006809	.008876	.002879	.023487	.007911	.004215	.223956	.196381
27. TRANSP. + COMM.	.026611	.029025	.024655	.022967	.040528	.021953	.050507	.045334	.017987	.040976	.042523
28. SUEZ CANAL	.000086	.000007	.000006	.000005	.000009	.000005	.000012	.000011	.000004	.000010	.000010
29. EDUCATION	.000218	.000186	.000170	.000163	.000321	.000092	.000441	.000679	.000154	.000438	.000300
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	.134915	.112303	.096671	.095200	.183546	.044290	.267651	.281578	.096071	.226351	.121151
32. BANKING + INSURANCE	.006610	.005708	.006974	.006210	.013780	.005630	.015088	.026758	.004165	.014057	.029768
33. OTHER SERVICES	.312969	.163856	.338882	.250727	.126982	.037015	.191450	.154659	.344765	.088505	.113721

DELIVERING INDUSTRIES	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
1. AGRICULTURE	.016647	.011554	.003749	.106540	.306349	.000836	.052831	.035053	.015932	.003596	.002749
2. MINING + QUARRYING	.003826	.012999	.033613	.029623	.023003	.005147	.004698	.005758	.004073	.023804	.000882
3. ELECTRICITY	.009183	.060971	.004414	.014408	.009849	.000797	.011045	.027110	.012762	.006593	.005196
4. METALS	.002699	.061512	.003342	.057735	.002825	.000852	.002831	.002457	.000994	.003535	.000751
5. METAL PRODUCTS	.003710	.011214	.001157	.005776	.007322	.001370	.001123	.001290	.001641	.002852	.000532
6. CEMENT	.002553	.000991	.000177	.014036	.000246	.000065	.001131	.000833	.000298	.001921	.000440
7. PETROLEUM REFINING	.009742	.029589	.036988	.041741	.068714	.010617	.011849	.011771	.011710	.008274	.001866
8. MACHINERY	.008665	.053083	.012978	.013567	.026988	.002700	.005975	.006476	.005703	.030259	.004300
9. BASIC CHEMICALS	.000529	.014395	.012060	.008261	.000348	.000132	.000747	.011959	.000175	.000331	.000716
10. OTHER CHEMICALS	.003169	.012664	.032127	.021599	.001899	.001330	.003667	.158168	.000549	.000928	.001902
11. CONSTRUCTION	.002663	.010941	.001246	.031694	.002445	.000562	.013253	.011369	.003766	.030058	.006789
12. MEAT PRODUCTS	.000169	.010199	.000038	.002842	.000153	.000017	.019481	.009760	.000063	.000131	.000092
13. DAIRY PRODUCTS	.000010	.000004	.000006	.000611	.000016	.000004	.003133	.004448	.000010	.000017	.000065
14. GRAIN MILLING	.014449	.030171	.002532	.111766	.002325	.000597	.023327	.009989	.015835	.002924	.000755
15. BAKERY PRODUCTS	.000030	.003007	.000011	.000310	.000019	.000005	.026325	.009202	.000043	.000113	.000074
16. SUGAR	.003111	.002482	.000798	.002552	.001769	.000119	.009665	.006567	.000772	.000464	.000906
17. OILS + FATS	.000625	.002147	.005254	.034676	.000531	.000233	.014400	.030008	.000164	.000251	.000410
18. OTHER FOOD PRODUCTS	.001839	.000808	.000912	.005341	.016105	.000569	.024276	.003686	.002163	.001277	.004714
19. SPINNING + WEAVING	.002884	.001552	.003039	.007050	.000683	.000084	.001461	.003714	.000464	.000256	.000389
20. PROCESSING OF COTTON	.000841	.000427	.000688	.002326	.001832	.000112	.004443	.001332	.000476	.000266	.000867
21. CLOTHING	.000011	.001007	.000007	.000047	.000015	.000001	.000050	.000019	.000008	.000003	.000007
22. PAPER + P. PRODUCTS	.011587	.002176	.000715	.026649	.001428	.000887	.010564	.003438	.002250	.003542	.000858
23. TOBACCO	1.719636	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. WOOD + FURNITURE	.030828	1.034219	.000154	.002291	.000494	.000063	.000207	.000181	.000616	.000255	.000649
25. FERTILISERS	.000183	.000132	1.000043	.001215	.000072	.000010	.000602	.000480	.000182	.000041	.000031
26. OTHER INDUSTRIES	.031066	.073508	.008096	1.095879	.007747	.002501	.027078	.012367	.005898	.010830	.002946
27. TRANSP. + COMM.	.089756	.026723	.049068	.035628	1.037318	.038156	.032329	.045727	.115058	.088007	.006103
28. SUEZ CANAL	.000021	.000006	.000011	.000008	.000241	1.000007	.000008	.000011	.000027	.000020	.000001
29. EDUCATION	.000915	.000155	.000225	.000196	.000635	.000044	1.005348	.110534	.001512	.004168	.000017
30. MEDICAL SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000
31. TRADE + FINANCE	.607538	.078744	.112690	.114089	.068426	.012936	.045222	.128673	1.025091	.082597	.007419
32. BANKING + INSURANCE	.016553	.006255	.013135	.006862	.015204	.003189	.002460	.013594	.024153	1.020274	.000998
33. OTHER SERVICES	.079154	.035429	.069546	.071132	.028953	.057140	.101208	.050144	.053882	.050838	1.017926

TABLE B.4

DOMESTIC COEFFICIENTS MATRIX FOR EGYPT ,1963/64

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. AGRICULTURE	.183145	.966043	0.000000	.543118	.096125	0.000000	.009438	0.000000	0.000000
2. GINNING + PRESSING	.001062	0.000000	0.000000	.008921	0.000000	0.000000	.204805	0.000000	0.000000
3. MINING + QUARRYING	0.000000	0.000000	0.000000	.000216	.029125	0.000000	0.000000	0.000000	0.000000
4. FOOD PROCESSING	.012877	0.000000	0.000000	.161363	.077250	.001190	.002364	0.000000	0.000000
5. BEVERAGES MANUF.	0.000000	0.000000	0.000000	.000273	.020500	0.000000	0.000000	0.000000	0.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	0.000000	.003638	.004572	.002548	.000625	.004345	.316795	.429267	0.000000
8. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9. WOOD + CORK PRODS.	0.000000	0.000000	.007080	.000611	.000625	.001131	0.000000	.001496	0.000000
10. FURNITURE + FIXTURES	0.000000	0.000000	0.000000	.000353	.021875	0.000000	0.000000	0.000000	0.000000
11. PAPER + CARDBOARD	0.000000	0.000000	0.000000	.002373	.002250	.016905	.006006	.002346	0.000000
12. PRINTING + PUB.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. LEATHER + L. PRODS.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.130352	0.000000
14. RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001408	0.000000
15. CHEMICALS	.039044	.000014	.013774	.001598	.027000	.006726	.004723	.000235	0.000000
16. PETROLEUM + COAL	.011977	0.000000	.032183	.002229	.021250	.004345	.003076	0.000000	0.000000
17. NONMETALLIC MINERAL	0.000000	0.000000	.005546	.000535	.037500	0.000000	0.000000	0.000000	0.000000
18. BASIC METALS	0.000000	.000693	.003392	.000237	.001125	.002560	0.000000	0.000000	0.000000
19. METAL PRODUCTS	0.000000	.000333	.010655	.001741	.038750	0.000000	.002274	.000499	0.000000
20. MACH. EXCEPT ELCTRIC	0.000000	.000381	.002920	.000118	.001125	.000119	.000858	.000264	0.000000
21. ELECTRIC MACHINERY	0.000000	.000222	.003363	.000096	.001250	.003333	.001690	.000880	0.000000
22. TRANSP. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23. MISCELLANEOUS	0.000000	0.000000	.002595	0.000000	0.000000	0.000000	.001463	.003167	0.000000
24. ELECTRICITY	0.000000	.000249	.008879	.004006	.009500	.015179	.011639	.002610	0.000000
25. CONSTRUCTION + DWLNG	.000602	.000693	.005900	.000427	.012500	.011905	.001716	0.000000	.003448
26. TRANSP. + COMUNCTN.	.000602	.000090	.008791	.000316	.005250	.014881	.000824	.001642	.005517
27. OTHER SRRVICES	.020639	.022488	.031504	.048912	.207500	.045774	.051493	.059736	.042759

DELIVERING INDUSTRIES	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. AGRICULTURE	.068182	.024414	0.000000	0.000000	0.000000	.003084	0.000000	.007639	0.000000
2. GINNING + PRESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. MINING + QUARRYING	0.000000	.003793	0.000000	0.000000	0.000000	.022320	.116435	.025000	.044013
4. FOOD PROCESSING	0.000000	.005241	0.000000	.327103	0.000000	.016272	0.000000	0.000000	0.000000
5. BEVERAGES MANUF.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	.009652	.002690	.000151	.007757	.097912	.007425	0.000000	0.000000	0.000000
8. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9. WOOD + CORK PROD	.028977	0.000000	0.000000	0.000000	0.000000	.000749	0.000000	.002778	.002107
10. FURNITURE + FIXTURES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11. PAPER + CARDBOARD	.004363	.044966	.065585	.002617	.003626	.020659	0.000000	.038715	0.000000
12. PRINTING + PUB.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. LEATHER + L. PRODS.	.005284	0.000000	.000075	.135514	0.000000	0.000000	0.000000	0.000000	0.000000
14. RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000000	.007692	.001123	0.000000	0.000000	0.000000
15. CHEMICALS	.035398	.035655	.021887	.046822	.025824	.114057	.008843	.005035	.002618
16. PETROLEUM + COAL	0.000000	.020483	.013849	.007757	.005495	.034132	.023102	.115729	.064635
17. NONMETALLIC MINERAL	.012386	.000621	0.000000	0.000000	0.000000	.003922	0.000000	.039167	.003219
18. BASIC METALS	.003182	.002483	.009245	0.000000	.001758	.002725	.005417	.013819	.170863
19. METAL PRODUCTS	.049318	.004276	.001925	.005421	.013846	.004641	0.000000	.003715	.002082
20. MACH. EXCEPT ELCTRIC	0.000000	.008828	0.000000	0.000000	.000330	.001093	.001358	.001910	.003219
21. ELECTRIC MACHINERY	0.000000	.002069	.002981	0.000000	.001209	.002710	.004660	.042743	.001266
22. TRANSP. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23. MISCELLANEOUS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.003889	0.000000	.000794
24. ELECTRICITY	.022443	.020414	.002755	.000935	.081319	.076317	.007886	.061632	.013755
25. CONSTRUCTION + DWLNG	0.000000	.006897	.001509	.001869	.010989	.002994	.001543	.003472	.002146
26. TRANSP. + COMUNCTN.	.001477	.008966	.005962	.041215	.030879	.009476	.003194	.020160	.000923
27. OTHER SRRVICES	.056250	.092828	.077170	.074467	.082418	.069611	.005340	.134826	.043069

DELIVERING INDUSTRIES	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
1. AGRICULTURE	0.000000	0.000000	0.000000	0.000000	.031847	0.000000	0.000000	.002207	.010027
2. GINNING + PRESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. MINING + QUARRYING	0.000000	0.000000	0.000000	0.000000	.006369	0.000000	.000708	0.000000	.000923
4. FOOD PROCESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014125
5. BEVERAGES MANUF.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	.006960	0.000000	.006432	.002949	.009936	0.000000	0.000000	0.000000	.002953
8. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002127
9. WOOD + CORK PRODS.	.002128	.004274	.001408	.000268	.001911	0.000000	.004344	.009876	.000205
10. FURNITURE + FIXTURES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.036165	.000817	.007049
11. PAPER + CARDBOARD	.004650	0.000000	.005211	.004424	.006178	0.000000	0.000000	.002697	.006035
12. PRINTING + PUB.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002481	.011585
13. LEATHER + L. PRODS.	.004438	.001453	0.000000	.003539	.025669	0.000000	0.000000	.000572	.000246
14. RUBBER PRODUCTS	.002796	.006667	.006667	.031903	0.000000	0.000000	0.000000	.012084	.001968
15. CHEMICALS	.036140	.013333	.033474	.011528	.023885	0.000000	.043925	.000601	.008106
16. PETROLEUM + COAL	.004134	.009231	0.000000	.005603	.002102	.223634	.013507	.049276	.004572
17. NONMETALLIC MINERAL	.007751	.001709	.016854	.015335	.052011	0.000000	.068050	.002312	.001668
18. BASIC METALS	.253951	.201111	.105869	.041151	.151975	0.000000	.004524	.005207	.000243
19. METAL PRODUCTS	.018723	.024872	.034131	.069973	.060573	0.000000	.000933	.014437	.002462
20. MACH. EXCEPT ELCTRIC	0.000000	.012393	0.000000	.006031	0.000000	.001163	0.000000	.000409	.000578
21. ELECTRIC MACHINERY	.001520	.005043	.046854	.020241	0.000000	.015262	.092497	.007239	.002065
22. TRANSP. EQUIPMENT	0.000000	0.000000	0.000000	.051475	0.000000	0.000000	0.000000	.001372	.012769
23. MISCELLANEOUS	.000699	.001282	.012019	.001821	.002933	0.000000	.001544	0.000000	.003977
24. ELECTRICITY	.035988	.018547	.020845	.011903	.005032	.025814	0.000000	.007811	.005152
25. CONSTRUCTION + DWLNG	.006079	.004274	.008939	.000268	.001274	.002907	0.000000	0.000000	.005712
26. TRANSP. + COMUNCTN.	.003161	.004359	.000939	.000021	.000955	.007384	.013745	.022837	.105973
27. OTHER SRRVICES	.051611	.048889	.062394	.067185	.063694	.080727	.126892	.063071	.146635

TABLE 8.5

IMPORT COEFFICIENTS MATRIX FOR EGYPT ,1963/64

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. AGRICULTURE	.001955	0.000000	0.000000	.078154	0.000000	.333333	.027027	0.000000	0.000000
2. GINNING + PRESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. MINING + QUARRYING	0.001045	[illegible]	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4. FOOD PROCESSING	[illegible]	[illegible]	0.000000	.011675	.000250	0.000000	0.000000	0.000000	0.000000
5. BEVERAGES MANUF.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	[illegible]	.001302	0.000000	.001004	0.000000	0.000000	.018447	.007478	0.000000
8. CLOTHING	[illegible]	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9. WOOD + CORK PRODS.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10. FURNITURE + FIXTURES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11. PAPER + CARDBOARD	0.000000	0.000000	0.000000	0.000000	.000625	.045238	0.000000	.003636	0.000000
12. PRINTING + PUB.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. LEATHER + L. PRODS.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002199	0.000000
14. RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15. CHEMICALS	[illegible]	0.000000	.005605	.000190	.002500	.002083	.019009	0.000000	0.000000
16. PETROLEUM + COAL	[illegible]	[illegible]	.005074	.000229	.001250	.000357	.001004	.000733	0.000000
17. NONMETALLIC MINERAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18. BASIC METALS	0.000000	.000243	.001032	.000090	0.000000	.007738	0.000000	0.000000	0.000000
19. METAL PRODUCTS	0.000000	.000125	.005664	.000577	.013000	0.000000	.001780	.000088	0.000000
20. MACH. EXCEPT ELCTRIC	0.000000	.002772	.005615	.000944	.011250	.001548	.006607	.001584	0.000000
21. ELECTRIC MACHINERY	0.000000	.000173	.005152	.000075	0.000000	.002976	.001695	.000762	0.000000
22. TRANSP. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23. MISCELLANEOUS	0.000000	.000005	.001858	0.000000	0.000000	0.000000	.001047	.002434	0.000000
24. ELECTRICITY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25. CONSTRUCTION + DWLNG	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. TRANSP. + COMUNCTN.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27. OTHER SERVICES	.000881	.000277	.001563	.003524	.001625	.016607	.003175	.000381	0.000000

DELIVERING INDUSTRIES	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. AGRICULTURE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2. GINNING + PRESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. MINING + QUARRYING	0.000000	0.000000	0.000000	0.000000	0.000000	.009476	.368287	.028090	.001888
4. FOOD PROCESSING	0.000000	0.000000	0.000000	.037383	0.000000	.053892	0.000000	0.000000	0.000000
5. BEVERAGES MANUF.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	0.000000	0.000000	0.000000	0.000000	0.000000	.003293	0.000000	0.000000	0.000000
8. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9. WOOD + CORK PRODS.	.251420	0.000000	0.000000	0.000000	0.000000	.004940	0.000000	0.000000	0.000000
10. FURNITURE + FIXTURES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11. PAPER + CARDBOARD	.009091	.227931	.151321	0.000000	0.000000	.007260	0.000000	0.000000	0.000000
12. PRINTING + PUB.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. LEATHER + L. PRODS.	0.000000	0.000000	0.000000	.002336	0.000000	0.000000	0.000000	0.000000	0.000000
14. RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000000	.180220	0.000000	0.000000	0.000000	0.000000
15. CHEMICALS	.005114	.016345	.055849	.038785	.023077	.036751	.003241	.010451	.002468
16. PETROLEUM + COAL	.005568	.001034	.001094	.000654	.001978	.001332	.000756	.001424	.029185
17. NONMETALLIC MINERAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18. BASIC METALS	.002386	0.000000	.003283	0.000000	0.000000	.000629	.001775	.004549	.169657
19. METAL PRODUCTS	.015909	.001379	.000491	.001682	.003846	.001557	0.000000	.001215	.002747
20. MACH. EXCEPT ELCTRIC	0.000000	.006207	0.000000	0.000000	.002198	.008009	.010648	.014583	.015451
21. ELECTRIC MACHINERY	0.000000	.002697	.002264	0.000000	.001209	.003069	.005324	.002465	.006867
22. TRANSP. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23. MISCELLANEOUS	0.000000	0.000000	.000003	0.000000	0.000000	0.000000	.002855	0.000000	.000644
24. ELECTRICITY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25. CONSTRUCTION + DWLNG	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. TRANSP. + COMUNCTN.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27. OTHER SERVICES	[illegible]	.010069	.009019	.003738	.008791	.005374	.009815	.002778	.009421

DELIVERING INDUSTRIES	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
1. AGRICULTURE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2. GINNING + PRESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. MINING + QUARRYING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4. FOOD PROCESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5. BEVERAGES MANUF.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9. WOOD + CORK PRODS.	.012310	[illegible]	.014085	.004021	.012739	0.000000	.007014	.000759	.000326
10. FURNITURE + FIXTURES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11. PAPER + CARDBOARD	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001614
12. PRINTING + PUB.	[illegible]	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001241
13. LEATHER + L. PRODS.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14. RUBBER PRODUCTS	.001269	.002991	.003521	.003753	0.000000	0.000000	0.000000	0.000000	0.000000
15. CHEMICALS	.009478	.001709	.026056	.002779	.009236	0.000000	0.000000	0.000000	.003936
16. PETROLEUM + COAL	.001404	.095470	.001174	.006836	.000318	.003081	0.000000	.009877	.000285
17. NONMETALLIC MINERAL	0.000000	0.000000	.001408	0.000000	.003503	0.000000	.003475	0.000000	.000103
18. BASIC METALS	.152280	.029467	.020000	.011716	.044331	0.000000	.000656	.000835	0.000000
19. METAL PRODUCTS	[illegible]	.010256	.021127	.141421	.010191	0.000000	0.000000	.010041	.001940
20. MACH. EXCEPT ELCTRIC	0.000000	.064103	0.000000	.073458	0.000000	.009884	0.000000	.003211	.004496
21. ELECTRIC MACHINERY	.003240	.013249	.110798	.014745	0.000000	.016517	.035843	.010508	.002136
22. TRANSP. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23. MISCELLANEOUS	[illegible]	.001111	.007746	.002011	.002229	0.000000	.000965	0.000000	.003899
24. ELECTRICITY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25. CONSTRUCTION + DWLNG	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. TRANSP. + COMUNCTN.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27. OTHER SERVICES	[illegible]	.007949	.008732	.010697	.003376	.001163	0.000000	.001477	.000843

TABLE B.6

INVERSE OF THE I-A MATRIX FOR EGYPT ,1963/64

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. AGRICULTURE	1.240837	1.200853	.003719	.019747	.197910	.005394	.383261	.208313	.001480
2. GINNING + PRESSING	.001706	1.002788	.001549	.012831	.002129	.001490	.300882	.130365	.000087
3. MINING + QUARRYING	.003558	.003612	1.005683	.003500	.038098	.003256	.002978	.002356	.000241
4. FOOD PROCESSING	.020794	.020624	.001287	1.207581	.103167	.002976	.012636	.066790	.000944
5. BEVERAGES MANUF.	.000001	.000001	.000000	.000066	1.020935	.000000	.000001	.000004	.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	.000991	.006488	.007487	.005803	.004873	.007118	1.466579	.632544	.000376
8. CLOTHING	.000080	.000136	.000099	.000206	.000610	.000139	.000245	1.000300	.000111
9. WOOD + CORK PRODS.	.000099	.000121	.007272	.000156	.002065	.001295	.000155	.001652	1.000058
10. FURNITURE + FIXTURES	.000324	.000543	.000579	.001190	.025000	.000941	.000977	.001137	.000516
11. PAPER + CARDBOARD	.001577	.001792	.001196	.004710	.008052	.018621	.010826	.008717	.000461
12. PRINTING + PUB.	.000451	.000763	.000576	.001152	.003421	.000815	.001373	.031680	.000633
13. LEATHER + L. PRODS.	.000041	.000069	.000203	.000111	.000647	.000084	.000201	.151065	.000054
14. RUBBER PRODUCTS	.000229	.000334	.000403	.000445	.001405	.000495	.000542	.002054	.000272
15. CHEMICALS	.055546	.054200	.017427	.040055	.348388	.010502	.027232	.023508	.000883
16. PETROLEUM + COAL	.019105	.019093	.039397	.018034	.043331	.013373	.017297	.012344	.001173
17. NONMETALLIC MINERAL	.000472	.000610	.006869	.001368	.043015	.001396	.000971	.001051	.000437
18. BASIC METALS	.000786	.002026	.010514	.002211	.018711	.029222	.003667	.003585	.000442
19. METAL PRODUCTS	.000628	.001160	.012148	.003043	.044599	.001124	.004776	.004449	.000436
20. MACH. EXCEPT ELCTRIC	.000141	.000554	.003155	.000328	.001792	.000356	.001586	.001066	.000047
21. ELECTRIC MACHINERY	.000612	.001034	.004944	.001038	.004985	.005564	.004018	.003245	.000606
22. TRANSP. EQUIPMENT	.000516	.000874	.000648	.001321	.003918	.000914	.001574	.001926	.000719
23. MISCELLANEOUS	.000247	.000370	.003061	.000497	.001561	.000445	.002754	.004777	.000229
24. ELECTRICITY	.005029	.005495	.012607	.009410	.022467	.018308	.021418	.014352	.000577
25. CONSTRUCTION + DWLNG	.001229	.002068	.006547	.001850	.015635	.012642	.003947	.002707	.003770
26. TRANSP. + COMUNCTN.	.005592	.008537	.014927	.012094	.039698	.023099	.014768	.018524	.011413
27. OTHER SRRVICES	.037694	.064000	.046541	.096828	.286803	.065375	.115363	.141056	.052189

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. AGRICULTURE	.893722	.041823	.006094	.317978	.042117	.026800	.001211	.017081	.002366
2. GINNING + PRESSING	.003412	.001308	.000370	.007902	.030021	.003087	.000258	.000479	.000238
3. MINING + QUARRYING	.004177	.009419	.004142	.004801	.005280	.033749	.120981	.045022	.064578
4. FOOD PROCESSING	.006466	.010348	.002974	.460169	.004061	.024615	.000611	.004087	.001427
5. BEVERAGES MANUF.	.000000	.000001	.000000	.000025	.000000	.000001	.000000	.000000	.000000
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	.015892	.005719	.001644	.016888	.146187	.013859	.001225	.002072	.001086
8. CLOTHING	.000186	.000273	.000225	.003304	.000275	.000243	.000034	.000401	.000150
9. WOOD + CORK PRODS.	.029251	.000254	.000146	.000227	.000282	.001235	.000926	.003421	.000571
10. FURNITURE + FIXTURES	1.000686	.001237	.000868	.001332	.001417	.001020	.000211	.001596	.000644
11. PAPER + CARDBOARD	.007855	1.049303	.078232	.007323	.006796	.025984	.000556	.044180	.000963
12. PRINTING + PUB.	.001046	.001546	1.001270	.001703	.001613	.001387	.000201	.002318	.000844
13. LEATHER + L. PRODS.	.006453	.000164	.000210	1.156939	.000240	.000166	.000164	.000256	.000141
14. RUBBER PRODUCTS	.000579	.000719	.000559	.000698	1.008774	.001942	.000192	.001198	.000367
15. CHEMICALS	.048324	.046830	.029688	.078776	.035655	1.134358	.013007	.013566	.006977
16. PETROLEUM + COAL	.014736	.033572	.021314	.022007	.033250	.066091	1.031996	.148355	.089522
17. NONMETALLIC MINERAL	.013973	.002045	.000839	.001401	.001783	.005756	.001389	1.042385	.005130
18. BASIC METALS	.020841	.006855	.013783	.004051	.009252	.008456	.010180	.023369	1.222083
19. METAL PRODUCTS	.051377	.006077	.003391	.008683	.016379	.007143	.002138	.006706	.004147
20. MACH. EXCEPT ELCTRIC	.000304	.001167	.000270	.000343	.000830	.001719	.001855	.002717	.004392
21. ELECTRIC MACHINERY	.001378	.004419	.004327	.001522	.005277	.006242	.006059	.006678	.003297
22. TRANSP. EQUIPMENT	.001197	.001761	.001448	.001952	.001807	.001576	.000225	.002517	.000967
23. MISCELLANEOUS	.000516	.000757	.000591	.000732	.000980	.000923	.004495	.001574	.001830
24. ELECTRICITY	.031131	.027688	.008139	.011286	.091337	.092453	.011164	.071966	.020312
25. CONSTRUCTION + DWLNG	.001456	.008418	.002843	.003866	.012763	.004975	.002541	.005903	.003711
26. TRANSP. + COMUNCTN.	.012756	.024667	.018780	.018504	.047601	.025252	.006537	.052717	.010188
27. OTHER SRRVICES	.087574	.128155	.105575	.143014	.129078	.114329	.015985	.188764	.070705

	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
1. AGRICULTURE	.008210	.003729	.007869	.007984	.056471	.003214	.010855	.006194	.032930
2. GINNING + PRESSING	.002565	.000496	.002660	.002432	.003690	.000265	.000800	.000590	.001894
3. MINING + QUARRYING	.020284	.016254	.011157	.007420	.021678	.028377	.009024	.007569	.003931
4. FOOD PROCESSING	.004796	.002629	.003087	.004384	.015414	.001998	.004675	.001973	.021447
5. BEVERAGES MANUF.	.000000	.000000	.000000	.000000	.000001	.000000	.000000	.000000	.000001
6. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. SPINNING + WEAVING	.012272	.002287	.012815	.011642	.017054	.001191	.003647	.002763	.008143
8. CLOTHING	.000202	.000177	.000220	.000233	.000242	.000225	.000392	.000180	.002541
9. WOOD + CORK PRODS.	.002493	.004626	.001833	.000711	.002483	.000334	.005994	.001088	.000742
10. FURNITURE + FIXTURES	.000980	.000818	.000844	.000875	.000953	.000919	.037575	.001481	.008845
11. PAPER + CARDBOARD	.007206	.001470	.000728	.007717	.011039	.001123	.006565	.004147	.009726
12. PRINTING + PUB.	.001139	.001000	.001232	.001304	.001358	.001274	.002229	.003544	.014165
13. LEATHER + L. PRODS.	.005373	.001979	.000682	.004902	.030230	.000151	.000530	.000862	.001119
14. RUBBER PRODUCTS	.003391	.007345	.007652	.014792	.000720	.000654	.001663	.012954	.004565
15. CHEMICALS	.046092	.019810	.044844	.021904	.037343	.005191	.058975	.004364	.015326
16. PETROLEUM + COAL	.041738	.036250	.023779	.022715	.031992	.239292	.033187	.057410	.017349
17. NONMETALLIC MINERAL	.010596	.003950	.020687	.018896	.057036	.001210	.074282	.003205	.003823
18. BASIC METALS	.318048	.250830	.151184	.083214	.207822	.005739	.024022	.013794	.006619
19. METAL PRODUCTS	1.021298	.027610	.038941	.078035	.064122	.001895	.008503	.016418	.007383
20. MACH. EXCEPT ELCTRIC	.001372	1.013620	.000784	.006963	.001070	.001735	.000526	.000676	.000968
21. ELECTRIC MACHINERY	.004455	.007413	1.050981	.024008	.001999	.018646	.098865	.008800	.005069
22. TRANSP. EQUIPMENT	.001301	.001140	.001411	1.855762	.001554	.001451	.002537	.002633	.016273
23. MISCELLANEOUS	.001653	.002149	.013377	.002916	1.003843	.001673	.003669	.000721	.004978
24. ELECTRICITY	.040431	.027666	.032952	.024731	.018909	1.030635	.014988	.012106	.010725
25. CONSTRUCTION + DWLNG	.008083	.005965	.002747	.002376	.003536	.004230	1.001944	.001009	.007231
26. TRANSP. + COMUNCTN.	.015689	.015026	.014352	.014608	.016459	.020506	.037490	1.033598	.130528
27. OTHER SRRVICES	.094988	.083090	.103286	.109414	.113680	.105584	.184416	.084524	1.194773

TABLE 8.7

DOMESTIC COEFFICIENTS MATRIX FOR EGYPT ,1954

(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	.118460	.926717	0.000000	.438706	0.000000	.033752	0.000000	0.000000	.043725	0.000000
2. GINNING+PRESSING	.001921	0.000000	0.000000	.016278	0.000000	.173367	0.000000	0.000000	0.000000	0.000000
3. MINING+QUARRYING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007736	.323894
4. FOOD PROCESSING	.007086	0.000000	0.000000	.232210	.001832	.001493	0.000000	.196133	.003725	0.000000
5. TOBACCO	0.000000	0.000000	0.000000	0.000004	.418402	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	.003618	0.000000	0.000000	.004430	.000814	.348923	.344731	.005525	.013467	0.000000
7. CLOTHING	0.000000	.005628	0.000000	.000186	0.000000	.000806	.006978	0.000000	0.000000	0.000000
8. PAPER+P. PRODUCTS	0.000000	0.000000	.000766	.000720	.005089	.000346	.000698	.000110	.000573	.012327
9. CHEMICAL MANUF.	.012974	.003101	0.000000	.007022	.001018	.015436	.005583	.019337	.146991	.003491
10. COAL+PET. REFINING	.007036	.002069	.016092	.007239	0.000000	.002189	.000698	.005525	.009456	.003879
11. NONMETALLIC MANUF.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12. BASIC METALS	0.000000	0.000000	.000766	.000144	0.000000	0.000000	0.000000	0.000000	.010029	0.000000
13. METAL PRODUCTS	0.000000	.002527	.001533	.000324	.001221	0.000000	0.000000	0.000000	0.000000	0.000000
14. MACHINERY EXPT. ELCT	.001921	.006892	.016092	.003745	.001832	.005414	.000698	.002762	.003725	.022110
15. ELECRICITY	0.000000	.000345	.000766	.004286	.000407	.008640	.002094	0.000000	.002865	.002327
16. BLDG.+CONSTRUCTION	.000050	0.000000	0.000000	.000036	0.000000	.000230	0.000000	0.000000	0.000000	.001164
17. TRANSP.+COMMN.	.002744	.000115	.162452	.006050	.011398	.005184	.005583	.016575	.014900	.059348
18. OTHER SERVICES	.371074	.021789	.072797	.004270	.365968	.182583	.115143	.104972	.117192	.125291
19. WOOD+FURNITURE	.000025	0.000000	0.000000	.000072	.000204	0.000000	0.000000	0.000000	0.000000	0.000000
20. OTHER INDUSTRIES	.000474	0.000000	.002299	.003673	.013434	.002189	.199581	.162983	.005158	.007370

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	0.000000	0.000000	0.000000	.001946	0.000000	0.000000	0.000000	.000162	0.000000	.004058
2. GINNING+PRESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. MINING+QUARRYING	.019820	.034518	.014322	0.000000	0.000000	.024621	.000680	0.000000	0.000000	.012175
4. FOOD PROCESSING	0.000000	0.000000	0.000000	0.000000	.034733	0.000000	.006548	.010008	.001988	.092532
5. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000170	.000036	0.000000	.001623
7. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8. PAPER+P. PRODUCTS	.019820	0.000000	.000842	.030324	.000808	.000280	.000680	.001244	0.000000	.021645
9. CHEMICAL MANUF.	.005405	0.000000	.011794	.007785	.002423	.008554	.000935	.003246	.011928	.023539
10. COAL+PET. REFINING	.126126	.006091	.003370	.006822	.156704	.016828	.048554	.040884	.013917	.028950
11. NONMETALLIC MANUF.	0.000000	0.000000	0.000000	0.000000	0.000000	.059318	0.000000	0.000000	0.000000	.012716
12. BASIC METALS	0.000000	.119737	.137321	.036004	0.000000	.037302	.000085	0.000000	.045726	.044313
13. METAL PRODUCTS	0.000000	.041624	.052233	.038903	.008078	.026224	.004167	.000216	.004970	.001894
14. MACHINERY EXPT. ELCT	.001802	.046091	.007582	.216023	.013732	.048941	.013180	.002290	.036779	.005952
15. ELECRICITY	.063063	.023350	.011794	.010704	0.000000	.000421	.005697	.007772	.054672	.008117
16. BLDG.+CONSTRUCTION	0.000000	0.000000	0.000000	0.000000	.003231	0.000000	.001105	.005410	0.000000	.000541
17. TRANSP.+COMMN.	.018018	.049137	.009267	.019462	.001616	.019352	.021259	.052563	.008946	.010552
18. OTHER SERVICES	.149550	.095431	.099410	.126176	.094507	.123405	.076020	.051662	.077535	.093885
19. WOOD+FURNITURE	0.000000	0.000000	.000842	.001297	0.000000	.002805	.000255	.000505	.032603	.001594
20. OTHER INDUSTRIES	.046847	.007107	.016849	.031463	.002423	.042210	.003656	.002975	.061630	.080357

TABLE B.8

INVERSE OF THE I-A MATRIX FOR EGYPT ,1954

(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	1.147546	1.064547	.002154	.682191	.011499	.348289	.138324	.163218	.015577	.003420
2. GINNING+PRESSING	.003701	1.003982	.000092	.025079	.000827	.267337	.093767	.007693	.004441	.000157
3. MINING+QUARRYING	.003957	.004634	1.008730	.006526	.002682	.004575	.008255	.009486	.014475	.330005
4. FOOD PROCESSING	.017713	.017112	.003918	1.316307	.020525	.014745	.036183	.308402	.009891	.006133
5. TOBACCO	0.000000	0.000000	0.000000	0.000000	1.719636	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	.006969	.009565	.000139	.013511	.002717	1.540244	.535928	.013610	.024515	.000264
7. CLOTHING	.000030	.005701	.000081	.000392	.000011	.002772	1.008001	.000111	.000047	.000002
8. PAPER+P. PRODUCTS	.000788	.000835	.001311	.001887	.011262	.001502	.006858	1.092484	.001252	.003514
9. CHEMICAL MANUF.	.019776	.022381	.001216	.023641	.006429	.036521	.026891	.036746	1.174201	.005957
10. COAL+PET. REFINING	.011237	.012971	.025843	.018751	.006098	.012347	.014591	.019353	.014595	1.017330
11. NONMETALLIC MANUF.	.000193	.000212	.000110	.000246	.000613	.000271	.002969	.002599	.000163	.000295
12. BASIC METALS	.000844	.001791	.002792	.001729	.002692	.001969	.012608	.011320	.014385	.003153
13. METAL PRODUCTS	.000642	.003715	.003630	.001473	.003327	.002128	.002081	.001775	.001263	.002998
14. MACHINERY EXPT. ELCT	.005608	.014333	.024916	.011228	.008138	.017185	.010343	.010040	.007944	.038616
15. ELECRICITY	.004117	.004625	.003071	.009472	.007020	.017705	.012194	.005956	.005657	.005452
16. BLDG.+CONSTRUCTION	.002613	.002581	.000785	.002344	.003815	.002355	.002083	.001565	.000982	.002328
17. TRANSP.+COMMN.	.029969	.030074	.175143	.034633	.058707	.036399	.032123	.040185	.030799	.127399
18. OTHER SERVICES	.460751	.454787	.101312	.399979	.684311	.455144	.321293	.249479	.166730	.180919
19. WOOD+FURNITURE	.000301	.000313	.000148	.000373	.000821	.000306	.000642	.000573	.000127	.000214
20. OTHER INDUSTRIES	.003017	.004592	.005010	.008386	.030391	.007561	.223730	.197061	.000221	.012384

DELIVERING INDUSTRIES	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	.010570	.002652	.003545	.008511	.025579	.006123	.006176	.008544	.009411	.080226
2. GINNING+PRESSING	.000473	.000108	.000192	.000283	.000959	.000287	.000261	.000338	.000424	.003375
3. MINING+QUARRYING	.067249	.045141	.024814	.009048	.052744	.039397	.018005	.002228	.012733	.029211
4. FOOD PROCESSING	.019424	.004864	.006218	.010147	.049049	.010563	.011576	.015927	.016840	.143122
5. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	.000786	.000137	.000487	.000585	.000646	.000587	.000467	.000357	.000762	.005140
7. CLOTHING	.000007	.000002	.000003	.000004	.000015	.000004	.000004	.000005	.000006	.000049
8. PAPER+P. PRODUCTS	.023762	.000629	.001809	.002009	.001777	.003347	.001226	.001653	.002128	.026650
9. CHEMICAL MANUF.	.010604	.001930	.016307	.014994	.005550	.014196	.002431	.004746	.018284	.034633
10. COAL+PET. REFINING	.143207	.014436	.010308	.016316	.161265	.031593	.052492	.005819	.028871	.040665
11. NONMETALLIC MANUF.	1.000836	.000196	.000340	.000672	.000336	.060077	.000183	.000409	.000991	.014040
12. BASIC METALS	.003974	1.145297	.167942	.063795	.003238	.053516	.002251	.000949	.061637	.058039
13. METAL PRODUCTS	.001753	.051324	1.063477	.055888	.010110	.033306	.005648	.001013	.011150	.065754
14. MACHINERY EXPT. ELCT	.011224	.012283	.013957	1.279511	.024911	.067183	.019994	.005055	.052834	.013349
15. ELECRICITY	.056272	.028980	.018261	.018316	1.002519	.009026	.007283	.008929	.060665	.013957
16. BLDG.+CONSTRUCTION	.001610	.000881	.000891	.001242	.004272	1.001118	.001774	.005886	.000983	.001723
17. TRANSP.+COMMN.	.051351	.027353	.025033	.040849	.029466	.042178	1.034019	.058661	.023249	.032292
18. OTHER SERVICES	.210672	.135792	.144077	.201978	.148987	.180279	.100285	1.068831	.127037	.183357
19. WOOD+FURNITURE	.000261	.000164	.001074	.001978	.000157	.003235	.000375	.000609	1.034217	.002291
20. OTHER INDUSTRIES	.058254	.011269	.022589	.047020	.006511	.054396	.006124	.004687	.073374	1.096047

TABLE 8.9

DOMESTIC COEFFICIENTS MATRIX FOR EGYPT ,1963/64

(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	.183145	.966043	0.000000	.543118	0.000000	.009438	0.000000	.024414	.003084	0.000000
2. GINNING+PRESSING	.001062	0.000000	0.000000	.008921	0.000000	.204605	0.000000	0.000000	0.000000	0.000000
3. MINING+QUARRYING	0.000000	0.000000	0.000000	.000216	0.000000	0.000000	0.000000	.003793	.022320	.116435
4. FOOD PROCESSING	.012877	0.000000	0.000000	.161763	.001190	.002364	0.000000	.005241	.016272	0.000000
5. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	0.000000	.003638	.004572	.002588	.064345	.316795	.429267	.002690	.007425	0.000000
7. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000040	0.000000	0.000000	0.000000	0.000000
8. PAPER+P. PRODUCTS	0.000000	0.000000	0.000000	.002363	.016905	.006006	.002346	.044966	.020659	0.000000
9. CHEMICAL MANUF.	.039044	.000014	.013274	.001598	.006726	.004723	.000235	.035655	.114057	.008843
10. COAL+PET. REFINING	.011977	0.000000	.032183	.002229	.004345	.003076	0.000000	.020483	.034132	.023102
11. NONMETALLIC MANUF.	0.000000	0.000000	.005546	.000585	0.000000	0.000000	0.000000	.000621	.003922	0.000000
12. BASIC METALS	0.000000	.000693	.003392	.000297	.022560	0.000000	0.000000	.002483	.002725	.005417
13. METAL PRODUCTS	0.000000	.000333	.010855	.001741	0.000000	.002274	.000499	.004276	.004641	0.000000
14. MACHINERY EXPT. ELCT	0.000000	.000381	.002920	.000118	.000119	.000858	.000264	.000828	.001093	.001358
15. ELECRICITY	0.000000	.000249	.008879	.004006	.015179	.011639	.002610	.020414	.076317	.007886
16. BLDG.+CONSTRUCTION	.000502	.000693	.005900	.000427	.011985	.001716	0.000000	.006697	.002994	.001543
17. TRANSP.+COMMN.	.001602	.000090	.008791	.000310	.014881	.000824	.001642	.008966	.009476	.003194
18. OTHER SERVICES	.026639	.022480	.031584	.040912	.045774	.051493	.059736	.092828	.069611	.005340
19. WOOD+FURNITURE	0.000000	0.000000	.007880	.000363	.001131	0.000000	.001496	0.000000	.000749	0.000000
20. OTHER INDUSTRIES	0.000000	.000222	.005959	.000150	.003333	.003153	.135806	.002869	.003832	.000549

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	.007639	0.000000	0.000000	0.000000	0.000000	0.000000	.002207	.010027	.058537	.009868
2. GINNING+PRESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. MINING+QUARRYING	.025000	.044013	0.000000	0.000000	0.000000	.000708	0.000000	.000923	0.000000	.002589
4. FOOD PROCESSING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014125	0.000000	.032022
5. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	0.000000	0.000000	.006960	0.000000	0.000000	0.000000	0.000000	.002953	.008244	.010778
7. CLOTHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002127	0.000000	0.000000
8. PAPER+P. PRODUCTS	.038715	0.000000	.004650	0.000000	0.000000	0.000000	.002697	.006035	.004244	.017030
9. CHEMICAL MANUF.	.005035	.002618	.036140	.013333	0.000000	.043925	.000681	.008106	.030390	.023717
10. COAL+PET. REFINING	.115729	.064635	.004134	.009231	.223634	.013507	.049276	.004572	0.000000	.007092
11. NONMETALLIC MANUF.	.039167	.003219	.007751	.001709	0.000000	.068050	.002312	.001668	.010634	.015995
12. BASIC METALS	.013819	.178863	.253951	.281111	0.000000	.004524	.005267	.000243	.002732	.050124
13. METAL PRODUCTS	.003715	.002082	.018723	.024872	0.000000	.000933	.014437	.002462	.042341	.037582
14. MACHINERY EXPT. ELCT	.001910	.003219	0.000000	.012393	.001163	0.000000	.000409	.000578	0.000000	.001843
15. ELECRICITY	.061632	.013755	.035988	.018547	.025814	0.000000	.007811	.005152	.019268	.014510
16. BLDG.+CONSTRUCTION	.003472	.002146	.006079	.004274	.002987	0.000000	0.000000	.005712	.000488	.002411
17. TRANSP.+COMMN.	.028160	.000923	.003161	.004359	.007384	.013745	.022837	.105973	.002449	.004121
18. OTHER SERVICES	.134826	.043069	.051611	.048889	.000727	.126892	.063071	.146635	.054341	.078103
19. WOOD+FURNITURE	.002778	0.000000	.002128	.004274	0.000000	.040598	.001693	.007294	.024878	.001944
20. OTHER INDUSTRIES	.002743	.002060	.009453	.014444	.015262	.094041	.023748	.032611	.004537	.059844

TABLE 8.1()

INVERSE OF THE I-A MATRIX FOR EGYPT ,1963/64

(AGGREGATED)

RECEIVING INDUSTRIES

DELIVERING INDUSTRIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. AGRICULTURE	1.240899	1.200954	.004504	.019859	.005768	.383508	.173807	.042114	.027322	.001513
2. GINNING+PRESSING	.001704	1.002786	.001573	.012029	.001496	.300886	.129868	.001308	.003061	.000270
3. MINING+QUARRYING	.003562	.003617	1.005602	.003507	.003265	.002964	.003116	.009429	.033766	.120937
4. FOOD PROCESSING	.020859	.020732	.001613	1.207632	.003271	.012967	.013040	.010649	.025031	.000993
5. TOBACCO	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	.000980	.006476	.007589	.005789	.007132	1.466582	.632637	.005705	.013712	.001266
7. CLOTHING	.000080	.000136	.000100	.000206	.000139	.000246	1.000295	.000273	.000244	.000034
8. PAPER+P. PRODUCTS	.001576	.001789	.001325	.004698	.018633	.019869	.010702	1.049326	.025982	.000682
9. CHEMICAL MANUF.	.055551	.054206	.017688	.040065	.010516	.027219	.017986	.046822	1.134374	.012989
10. COAL+PET. REFINING	.019107	.019097	.039476	.018038	.013398	.017094	.012820	.033584	.066107	1.031991
11. NONMETALLIC MANUF.	.000475	.300616	.006854	.001376	.001412	.000899	.003284	.002055	.005789	.001232
12. BASIC METALS	.000761	.001985	.009998	.002191	.028915	.003179	.012961	.006622	.008174	.009248
13. METAL PRODUCTS	.000633	.001167	.012436	.003687	.001200	.004747	.008896	.006100	.007247	.002108
14. MACHINERY EXPT. ELCT	.000141	.000555	.003169	.008328	.000365	.001594	.001366	.001173	.001731	.001872
15. ELECRICITY	.005021	.005484	.012767	.009398	.018294	.021396	.016057	.027645	.092341	.011161
16. BLDG.+CONSTRUCTION	.001230	.002070	.006541	.001852	.012608	.003956	.002760	.008425	.004972	.002551
17. TRANSP.+COMMN.	.005593	.008540	.014965	.012096	.023124	.014794	.018673	.024685	.025246	.006581
18. OTHER SERVICES	.037722	.064046	.046982	.096874	.065542	.115505	.138682	.128291	.114521	.016176
19. WOOD+FURNITURE	.000427	.000669	.008045	.001350	.002274	.001143	.003099	.001504	.002297	.001166
20. OTHER INDUSTRIES	.002113	.003466	.009969	.004659	.008312	.018549	.[illegible]2863	.009398	.012334	.011458

DELIVERING INDUSTRIES	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1. AGRICULTURE	.017765	.002585	.007467	.004084	.004072	.014948	.006789	.034144	.001534	.050704
2. GINNING+PRESSING	.000485	.000242	.002465	.000336	.006291	.000944	.000296	.001882	.002993	.004303
3. MINING+QUARRYING	.045045	.064570	.020331	.016305	.028371	.008990	.007668	.004046	.003744	.010788
4. FOOD PROCESSING	.004568	.001664	.003342	.002681	.002868	.008725	.002799	.022815	.003934	.044624
5. TOBACCO	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. SPINNING+WEAVING	.002078	.001096	.011950	.001505	.001274	.004154	.001287	.008018	.014619	.018805
7. CLOTHING	.000402	.000151	.000202	.000177	.000225	.000396	.000180	.002542	.000177	.000262
8. PAPER+P. PRODUCTS	.044242	.001804	.007454	.001723	.001341	.007779	.004336	.009440	.007040	.021938
9. CHEMICAL MANUF.	.013681	.006981	.045978	.019884	.005062	.058154	.004355	.015523	.042458	.035976
10. COAL+PET. REFINING	.140406	.009527	.041765	.036264	.239326	.033362	.057362	.017400	.013138	.025724
11. NONMETALLIC MANUF.	1.042423	.005086	.016720	.004091	.001167	.074117	.003482	.003975	.012452	.019296
12. BASIC METALS	.023023	1.221723	.318244	.258851	.004418	.017244	.014326	.006901	.018732	.000386
13. METAL PRODUCTS	.006875	.004152	1.021626	.028038	.001952	.008812	.016879	.007398	.045467	.042577
14. MACHINERY EXPT. ELCT	.002728	.004399	.001395	1.013650	.001766	.000693	.000712	.000956	.000286	.002555
15. ELECRICITY	.071979	.020304	.048331	.027301	1.030494	.014208	.011288	.010681	.027525	.024795
16. BLDG.+CONSTRUCTION	.005907	.003717	.008065	.005912	.004259	1.002094	.000924	.007261	.001736	.004315
17. TRANSP.+COMMN.	.052745	.010208	.015641	.014884	.020611	.037993	1.033308	.130550	.012602	.019728
18. OTHER SERVICES	.189068	.070823	.095088	.083348	.105955	.186377	.084731	1.195314	.003310	.123398
19. WOOD+FURNITURE	.005117	.001235	.003558	.005587	.001260	.043654	.002636	.009647	1.026447	.003553
20. OTHER INDUSTRIES	.014731	.007503	.017107	.021312	.023834	.109143	.030179	.046487	.009726	1.070589

APPENDIX C

BASIC DATA FOR THE LINEAR PROGRAMMING MODEL

The basic data used for simulations based on the linear programming model are contained in Table C.1. The sources of the data and the procedure followed in obtaining them are included in the notes and sources to the table itself. It was not possible to estimate the matrix of inter-sectoral capital coefficients because of the absolute lack of the necessary data. The value of the stock-flow conversion factor was assumed to be .15. The units of measuring exports and imports were such that the corresponding foreign prices were unity. This implies that export and import prices are assumed to be constant over the planning period.

Table C.1

Basic Data for the Linear Programming Model

Industry	Consumption Expenditure Coefficients β_{oi} (1)	Employment-Output Coefficients γ_{oi} (2)	Domestic Capital Coefficients δ_{oi} (3)	Labour Cost Coefficients μ_{oi} (4)	Foreign Capital Coefficients ϕ_{oi} (5)	1959/60 Capacity Output (LE million) (6)
1. Agriculture	0.1633	0.6667	2.300	0.010	2.4154	574.0
2. Mining and quarrying	0.0002	0.2857	2.558	0.904	3.7734	22.0
3. Electricity	0.0036	0.3334	3.007	0.872	5.7867	18.3
4. Metals	0.0001	0.3334	2.257	0.856	4.6840	18.4
5. Metal products	0.0008	0.3334	2.257	0.856	4.6840	18.8
6. Cement	0.0000	0.2857	2.500	0.856	5.1874	8.3
7. Petroleum refining	0.0096	0.2500	3.000	0.900	6.2254	43.3
8. Machinery	0.0049	0.2500	1.100	1.000	2.2827	40.2
9. Basic chemicals	0.0001	0.2500	2.720	0.856	5.6434	6.4
10. Other chemicals	0.0107	0.2500	1.060	0.856	2.1993	24.8

Table C.1 (Continued)

Basic Data for the Linear Programming Model

Industry	Consumption Expenditure Coefficients β_{oi} (1)	Employment-Output Coefficients λ_{oi} (2)	Domestic Capital Coefficients δ_{oi} (3)	Labour Cost Coefficients μ_{oi} (4)	Foreign Capital Coefficients ϕ_{oi} (5)	1959/60 Capacity Output (LE million) (6)
11. Construction	0.0000	0.6667	3.000	0.344	6.2254	115.0
12. Meat products	0.0580	0.5000	2.530	0.856	5.2507	67.0
13. Dairy products	0.0351	0.5000	2.530	0.856	5.2507	62.9
14. Grain milling	0.0414	0.5000	2.530	0.856	5.2507	117.3
15. Bakery products	0.0717	0.5000	2.530	0.856	5.2507	83.8
16. Sugar	0.0207	0.3334	2.170	0.856	4.5034	29.3
17. Oils and fats	0.0119	0.5000	1.913	0.856	3.9240	21.0
18. Other food products	0.0202	0.5000	1.913	0.856	3.9240	37.7
19. Spinning and weaving	0.0544	0.2857	2.260	0.856	4.6907	160.3

Table C.1 (Continued)

Basic Data for the Linear Programming Model

Industry	Consumption Expenditure Coefficients β_{oi} (1)	Employment-Output Coefficients γ_{oi} (2)	Domestic Capital Coefficients δ_{oi} (3)	Labour Cost Coefficients μ_{oi} (4)	Foreign Capital Coefficients ϕ_{oi} (5)	1959/60 Capacity Output (LE million) (6)
20. Processing of cotton	0.0000	0.2857	2.992	0.856	6.2087	149.7
21. Clothing	0.0168	0.5000	2.530	0.856	5.2507	28.9
22. Paper and paper products	0.0016	0.2857	1.667	0.856	3.4587	23.2
23. Tobacco	0.0415	0.2500	2.530	0.856	5.2507	60.3
24. Wood and furniture	0.0081	0.5000	2.530	0.856	5.2507	17.1
25. Fertilizers	0.0000	0.2857	1.500	0.856	3.1127	10.0
26. Other industries	0.0350	0.5000	1.711	0.856	3.5507	51.8
27. Transportation and communications	0.0459	0.5000	4.000	0.883	5.9000	135.0
28. Suez Canal	0.0000	0.5000	4.000	1.000	4.7000	80.0

Table C.1 (Continued)

Basic Data for the Linear Programming Model

Industry	Consumption Expenditure Coefficients β_{oi} (1)	Employment-Output Coefficients γ_{oi} (2)	Domestic Capital Coefficients δ_{oi} (3)	Labour Cost Coefficients μ_{oi} (4)	Foreign Capital Coefficients ϕ_{oi} (5)	1959/60 Capacity Output (LE million) (6)
29. Education	0.0051	0.5000	5.000	1.000	4.3754	61.0
30. Medical services	0.0105	0.5000	5.000	1.000	4.3754	21.0
31. Trade and finance	0.1191	0.5000	10.000	1.000	8.7500	163.0
32. Banking and Insurance	0.0039	0.5000	10.000	1.000	8.7500	21.0
33. Other services	0.1476	1.0000	5.000	0.797	4.3754	271.4

Notes and Sources:

The figures in column (1) are computed from the input-output table for 1954 by dividing the household consumption of any industry's output by total household consumption.

The figures in column (2) are based on comparable data for developed and less-developed countries given in Joseph McGovern and Norman Uphoff, estimating "Expansion of Employment Accompanying Changes in National Product," Woodrow Wilson School of Public and International Affairs, Princeton University (May 1966).

Notes and Sources (Continued):

The figures in column (3) are based on data on the capital-output ratios for 15 sectors in M. M. El-Imam, "Models Used in Drafting the 20-Years Plan (1959-1978)", Memo. no. 255 (Cairo: I.N.P., Dec. 3 1962).

The figures in column (4) are estimated according to the procedure outlined in Appendix D.

The figures in column (5) are derived according to the procedure outlined in Appendix E.

The figures in column (6) are derived on the basis of data given in the *Plan Frame*, Tables 18 and 20.

APPENDIX D

ESTIMATING THE COEFFICIENTS
OF EDUCATION AND TRAINING

In this appendix we estimate the μ_{oj} coefficients, which represent the cost of education and training per member of the labour force. Ideally, the μ_{oj} would also include the cost involved in relocating labour. However, relocation cost cannot be estimated because the necessary information is not available. Relocation costs do not vary much by industry and hence will not affect the order of the choice of industries for expansion. Since we have fixed coefficicients in production, the underestimation of labour cost will not lead to a bias in favour of labour-intensive projects. It will rather lead to an overestimation of possible consumption and, perhaps, render feasible solutions which otherwise would not be feasible.

Data are available, though in a rough form, about the average cost per pupil or student for different levels of education. Such data are not available for Egypt, but are available for some countries with more or less similar conditions such as India. These data are displayed in Table D.1. If the data of Table D.1 are assumed to hold approximately for Egypt, they can be supplemented with data about the occupational structure by major branches of economic activity and about the occupational requirements of each industry, along with some assumptions about the length of schooling required by different occupations, in order to obtain cost data by industry.

Table D.1

India: Unit Costs per Pupil
and by Level

(in Rupees)

Level of Education	1950/51		1965/66	
	teacher costs	recurrent unit cost	teacher costs	recurrent unit costs
Pre-primary	37	55	35	55
Primary (part 1)	16	20	27	30
Primary (part 2)	28	37	40	45
Secondary	50	73	78	107
Vocational and technical	106	197	208	417
Special	55	109	81	135
Higher (colleges)	133	231	200	328

Source: J. Hallak, The Analysis of Educational Costs and Expenditure. Fundamentals of Educational Planning Series, no. 10 UNESCO: IIEP, 1969, p. 30.

Table D.2 gives an occupational breakdown of the labour force in each of the major branches of economic activity in Egypt. In this tabl· five occupation categories are distinguished: professional, technical administrative and managerial; clerical and sales workers; farmers and related workers; miners, quarrymen, transport and communication workers; and craftsmen, production process workers, services, sports, recreation and others. Nine major branches of economic activity are distinguished: agriculture; mining; manufacturing; construction; electricity; communica-

Table D.2

Occupational Structure in Egypt, 1960

(in percentage)

Branch → / ↓ Occupation	agriculture (0)	mining (1)	manufacturing (2-3)	construction (4)	electricity (5)	communication (6)	transport (7)	services (8)	other (9)
Professional, technical, administrative & managerial (0+1)	0.08	5.18	2.32	5.92	4.27	1.93	3.74	18.66	0.28
Clerical and sales worker (2,3)	0.23	5.02	4.38	1.91	9.26	93.09	8.25	3.95	10.86
Farmers and related workers (4)	98.77	0.18	0.16	0.07	1.33	0.39	0.22	1.33	0.19
Miners, quarrymen, transportation and communication (5,6)	0.13	57.33	0.87	0.78	4.00	0.81	56.75	3.17	2.13
Craftsmen, production process workers; services, sports, recreation & others (7-X)	0.78	32.30	86.26	90.68	81.10	3.64	30.29	64.55	84.41
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source to Table D.2: Table D.2 is derived from OECD, Statistics of the Occupational and Educational Structure of the Labour Force in 53 Countries (Paris, 1969), p. 142, Table I.A.

tions; transport, services and others. Occupations and economic activity branches are given the corresponding numbers in parentheses. From the table it is clear that the majority of employment in agriculture represents farmers and related workers, while those in mining and quarrying are mainly miners and quarrymen. For employment in manufacturing, construction and electricity the majority lies in craftsmen, production process workers, service workers, sports and recreation and other workers. The majority of commerce employment represents clerical and sales workers. Finally, the majority of employment in transport belong to occupational groups 5 and 6, and those in services and others belong to occupational groups 7 - X.

In order to be able to translate the occupational specification into years of schooling and hence relate them to the cost of education and training some further assumptions are needed.

(a) Professional, technical and administrative workers require at least a university degree.

(b) Clerical and sales workers require special education.

(c) Farmers and related workers require primary schooling.

(d) Miners, quarrymen and transport workers require vocational training and education.

(e) Craftsmen, production-process workers, services, sports, recreation and other workers require vocational and technical training.

If the percentages in Table D.2 are then used as weights to the corresponding recurrent cost figures in Table D.1, a set of cost coefficients per member of the labour force by major branch of economic activity may be arrived at. These are recurrent cost figures. They are recorded in the first row of Table D.3. To arrive at the total (recurrent plus capital) cost, it is further assumed that the capital part is proportional to the recurrent one, with a factor of proportionality between 1 and 2, perhaps closer to 1. If a factor of proportionality of 1.3 is applied, one obtains the figures indicated in the second row of Table D.3. These figures provide a rough guideline for the derivation of the coefficient of the cost of training and education used in the linear programming simulations of Chapter V. The practice generally followed here was to assign to the individual industries of either the 1954 or the 1963/64 classifications the value of the coefficient of the major branch of economic activity to which the industry belongs.

Table D.3

Cost of Education and Training
per Unit of the Labour Force

(in Egyptian Pounds)

Unit cost of labour	agriculture (0)	mining (1)	manufacturing (2-3)	construction (4)	electricity (5)	communication (6)	transport (7)	services (8)	other (9)
Recurrent cost	4.4	395.5	374.5	403.4	381.4	150.6	386.4	348.9	376.5
Total cost	10.0	904.2	856.1	922.1	871.8	344.2	883.2	797.7	860.6

Sources and Notes: Derived in the manner explained in the text, using the unit cost for 1965/66 from Table D.1.

APPENDIX E

ON THE ESTIMATION OF THE COEFFICIENT OF IMPORTED CAPITAL PER UNIT OF CAPACITY OUTPUT

The coefficient of capital from foreign sources per unit of capacity output, denoted ϕ_{oj}, is estimated in a roundabout fashion. The Plan Frame (Table 2, p. 28) gives investment in a number of aggregate sectors divided into four major categories: land, construction, machinery and equipment and transport equipment. Land accounts, with a few exceptions, to only a minute proportion of total investment and hence will be ignored here. It is assumed that construction is supplied totally from domestic sources. That leaves the two other categories, machinery and equipment and transport equipment, which we assume to be totally supplied from imports. Table E.1 gives the proportion of imported capital, which is composed of machinery and equipment and transport equipment, to total investment. The ratios derived in this table are then multiplied by the corresponding capital-output coefficients in Table C.1. For example the capital-output coefficients in industries 4-10 and 12-16 are multiplied by the ratio of 0.83 for imported capital. Finally, the resulting figures are converted into foreign currency by multiplying them through by the foreign exchange. The rate used is that of LE = $ 2.5. The outcome of the preceding steps is the figures in column (5) of Table C.1.

Table E.1

Proportion of Imported Capital to Sectoral Investment

No.	Aggregate Sector	No. in the 1954 Input-Output Table	No. in the 1963/64 Input-Output Table	Ratio of Imported Capital to Total Sectoral Investment
1	Agriculture	1	1	0.42
2	Electricity	3	24	0.77
3	Manufacturing	4-10, 12-26	2, 4-23	0.83
4	Transport, Communications and Storage	2, 27	26	0.59
5	Suez Canal	28		0.47
6	Public Utilities	29-33	27	0.36
7	Services			
	Total Average			0.51

Source: Derived from Table 2 of Plan Frame, p. 28.

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