ECONOMIC GROWTH CONSTRAINTS: THE CASES

OF LIBYA AND OTHER NORTH AFRICAN

COUNTRIES

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CHAPTER I

INTRODUCTION

Identification of economic growth constraints is considered a basic step in adopting successful economic policies. Economic growth constraints may include both internal and external factors. A large part of economic development literature is devoted to studying the connection between economic growth processes and international trade activities.[1] One approach to the study of this relationship is gap analysis.

The economies of Libya and other North African countries (Algeria, Egypt, Tunisia, Morocco) are heavily dependent on international trade. A report issued by the United Nations describes these countries as, "Open economies dependent upon World markets for exports and for supplies of a variety of goods and services required for development . . ."[2] Reliance on international trade activities can be traced historically. All these countries are located on the coast of the Mediterranean Sea connecting African countries with European countries.[3]

It is, however, important to determine whether international trade plays a significant role in the present economic development of these countries. Thus, we will ask whether the present constraints on development can be attributed to domestic factors or, be related to international trade.

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Gap analysis takes a macro-economic approach to the identification of economic development constraints. The basic idea of the gap approach is that economic development is a function of investment. As investment requires savings, the needed savings can be generated domestically or provided through foreign aid. However, even if domestic saving, which is generated by private savers or government taxation, is adequate, a lack of foreign exchange may inhibit investment. This is because foreign exchange is required to import capital. Under a system of fixed exchange rates, there is a limit to which domestic saving can be converted into needed foreign exchange.

This study will not be confined to gap analysis. It will explore other constraints imposed by lack of absorptive capacity. Absorptive capacity depends on natural resources, labor supply, the level of labor, technical and managerial skills, the efficiency of public administration, and so on. Such capacity sets a limit to the amount of efficient investment physically possible in the short run.

Nature of the Problem

As with other developing countries, Libya has experienced various constraints to economic growth. These constraints may be presented in a schema of stages. Chenery and Strout have introduced such schema: a skill limited stage, a saving limited stage, and a trade limited stage.[4] A similar schema may be applicable to recent Libyan history. Other North African countries did not, however, experience such drastic changes as Libya; they have faced one or more, but not all the

constraints. The problem is generally recognized in the governmental policies and plans of all these countries.

Limits to economic growth can be attributed to financial and non-financial constraints. Gap analysis has defined the financial constraints as saving and foreign exchange shortages, while nonfinancial constraints are indicated by lack of absorptive capacity. Financial constraints represent the lack of domestic funds or foreign exchange for investment; nonfinancial constraints provide performance indicators to assess the ability of the country to invest productively. Non-financial factors can represent the barriers toward capital accumulation and investment. And although these constraints can be lessened by further long-run investment, they represent a ceiling in the short run.

The Libyan economy has gone through major structural changes from 1957 to 1975. Different constraints have been binding at different points of time during this period. The fact that the country has been transformed from a very poor country with limited resources to an oil exporting country makes generalization impossible for the whole period. This study will analyze two stages or phases. The first phase is the period from 1957 to 1963. The second phase is the period from 1964 to 1975. Libya started to export oil in commercial quantities in 1963. The impact of oil exporting started to take place in 1964.

As far as other North African countries are concerned, only Algeria exports oil. Egypt, Morocco and Tunisia are the other three cases under study, and are not oil exporting countries, but generally they are raw-material exporting states.

The five countries have much in common. Past historical European colonization, geographical conditions, and social values, all of which may result in creating similar development barriers. But each country faces different problems which have resulted from its own unique internal conditions. Thus the constraints may tend to be different for each country and for each period under study in any one country. The usefulness of the multi-gap model stems from its two main objectives: first, the model can be used to determine the required capital inflows to achieve a specific growth rate; second, the model can diagnose the dominant gap, or gaps, from historical data. This study will utilize the model mainly to achieve the latter objective. The study will examine nonfinancial gaps as well in order to identify the two types of constraints.

Purpose of the Study

The study has five main objectives. The first is to determine the dominant financial constraints in Libya and the other North African countries. The second is to compare the impact of the changing economic structure on the nature of the constraints. The third objective is to identify major indicators of nonfinancial constraints, i.e., lack of absorptive capacity. The fourth objective is to examine the role of international trade in the development process in the cases under study. The fifth objective is to examine the role of regional integeration in offsetting the national constraints. The following questions will be answered in this study:

1. Were different constraints binding during different periods

of time in each country?

2. What constraints are relaxed or introduced by dependence on oil exports?

3. What constraints, if any, are related to changing oil prices?

4. What are the dominating nonfinancial constraints in these countries?

The answers to these questions will shed some light on the barriers to economic development process in each country. This will assist policy-makers and planners in identifying and eliminating bottle-necks. Planning for economic development needs to identify the persistent constraints.

The study will assist policy makers in the areas of integration or cooperation in this region which is politically a part of the Arab world. The study will utilize the results of identifying the constraints in each country to suggest a potential scope of economic integeration in the region. Although the study is conducted within the case-study approach, its results will be applicable to other countries, especially oil exporting countries and other Arab and African countries because the five countries provide cases of oil exporting countries, raw material exporting countries, and foreign aid recipient countries.

Significance of the Study

This study is conducted to determine the dominant obstacles to economic development in Libya and other North African countries. The study evaluates the situation in each country during different periods. This research is significant for the following considerations:

1. A review of related empirical studies revealed that this study

is the first one to be undertaken using gap analysis and examining the nonfinancial constraints in Libya, Algeria, Morroco, and Egypt.

2.   Being the first study of the region, this will be a stimulus for further studies. It will provide the basis for exploring the problem and provide a base for other studies.

3.   It will be one of the first studies that will use the linear programming approach to identify the dominant gap as a supporting evidence to the general regression approach.

4.   It will be concerned with nonfinancial constraints as well as financial constraints. An attempt to identify the determinants of non-financial constraints will be made.

5.   The value of the study is enhanced by the fact that planners and policy makers in this region need to identify the existing constraints for their plans and decisions. This study will be used as a guideline for this purpose.

6.   The study will compare the situation in the five countries. Hence, the case for greater regional cooperation may be recognized and appreciated. That will be based on the concept of offsetting each country's constraints.

Organization of the Study

This study consists of six chapters. Chapter I is an introductory chapter. It gives some idea of the nature of the problem, purpose of study, and significance of the research. The main questions that the study will answer are introduced in this chapter.

Chapter II presents the economic background to the problem. The general environment in which the problem exists is explored emphasizing

the development of this environment. The second part of this chapter
will examine the economic structural changes during the two periods
under study. Finally, the implications for planning policies are
explored. This part considers the problems such as the definitions of
the constraints in the Libyan case as well as for other North African
countries.

Chapter III introduces the theoretical framework of the study.
First, a review of less developing countries and the role of inter-
national trade in their economics is examined. Second, the literature
relating to gap analysis is reviewed. The financial gap models are
presented in the third part. Finally, the methodology for identifying
nonfinancial constraints is discussed.

Chapter IV focuses on the empirical investigation and the results
of various statistical tests.

Chapter V presents the interpretation of the results and the
analysis of financial and nonfinancial constraints for each country.
Chapter VI sets forth the major conclusions, the potential scope of
economic integeration in the region, and the policy recommendations of
the study.

FOOTNOTES

[1] G. Meier, _International Trade and Development_ (New York, 1963), p. 78.

[2] The United Nations, Economic Commission for Africa, _Economic Survey of Africa: Volume II. North Africa Sub-Region_ (New York, 1968), p. 65.

[3] N. Barbour (ed.), _A Survey of North West Africa_ (2nd ed., London, 1962), p. 124.

[4] H. Chenery and A. Strout, "Foreign Assistance and Economic Development," _American Economic Review_, 56 (1966), pp. 681-693.

CHAPTER II

ECONOMIC BACKGROUND

The purpose of this chapter is to introduce the economic back-
ground of the study. First, the general environment that includes the
significant related political, social and administrative aspects is
described. The second part will focus on structural changes in the
economy. The main variables examined are those related to the economic
growth constraints, such as population structure, manpower, changes in
national and per capita income and the role of international trade or
aid activities, or both. Two periods are differentiated: 1957-1963,
and 1964-1975. The two periods represent the situation in Libya before
and after oil exports and its impact on the economy. The problem of
economic growth constraints and its significant features are covered
in the third part, and this will set the scene for viewing the critical
problems within the cases under study.

The Libyan Case

General Environment: Political, Social
and Administrative Aspects

Libya since its independence in 1952, has had to face the problem

of imbalance in population and territory. The population of Libya, in 1952, was about one million persons, and occupied only 6% of the national territory. This has been a major factor in limiting participation in the political activities of a modern state.[1] Libya as a country, was established by the United Nations decision that ended about 40 years of different European affiliations. The country consisted of three provinces reflecting the difficulties of political integration. The provincial ties were more important than national ties at the time of independence due to the fact that the provincial system existed during long historical periods. By 1963, however, the country had been unified under one federal government and the provincial system had been abolished. In 1969, Libya became a republic after the Libyan Army led a successful revolution. Since that time, the country has adopted several objectives aimed at widening the political participation of the people. Human and geographical conditions have been the main factors affecting the political environment. The development of communication facilities and the diminishing of nomadic types of life has permitted the Libyan people to participate in political activities. Libyan society during the 50's was primarily nomadic in character. As E. Pritchard mentioned, "Urban population never dominated the country."[2] The tribal system was dominant during that period. As people started to migrate to urban centers due to changes in economic conditions, urban populations started to have their impact on changing social customs and values.

The percentage of illiteracy was very high, as high as 90%, at the time of independence. This rate decreased to 70% at the

beginning of the 1970's. There are several factors which have caused the high rate of illiteracy. Lack of education facilities before independence, scattered population, and the limited number of educated women were among those factors. Higgins wrote in 1958, "the country is in significant need of a big push in education facilities."[3]

The country has had a federal government even under the provincial system, but the federal government has had more power since 1963. However, the Federal (Central) government has become the most powerful body since 1969. All ministeries are located in Tripoli with small units in the regions. All financial resources are handled and controlled by the central government. Several attempts towards decentralization have taken place lately, such as the Muhafadat (States) Administrative System. The Muhafadat Administrative System is an administrative system where each Muhafadat is divided into municipalities. The country is divided into ten Muhafadat with semi-independent departments supervising different economic sectors.

Economic Structural Changes

Prior to the first period i.e. from the independence time of 1952 to 1957, Libya was a prototype of a poor backward country. Higgins was so pessimistic about the future, he wrote that,

> Libya combines within the boarders of one country virtually all the obstacles that can be found anywhere, . . . If Libya can be brought to a stage of sustained growth, there is hope for every country in the world.[4]

Per capita income was estimated to be only about $40 per year. Agriculture where three-fourths of the population lived was limited

by lack of water and climatic conditions. Skilled national labor
did not exist. Capital formation was extremely low. Thus there
appeared to be little hope that development could be based on domestic
resources alone. International aid, especially from the United Nations
program, assisted the country in improving social infrastructure such
as in health and education and economic infrastructure such as
communication, transportation, etc. Also there were some programs
aiming at the development of agriculture sector.

Libya was receiving foreign assistance on a bilateral basis to
provide needed capital for current government expenditures as well as
for some development projects. Thus, much of the growth generated
can be attributed to the impact of foreign technical and financial
assistance. But, by 1957, the impact of a new resource, crude oil, had
become perceptible.[5] Foreign private investments in exploration,
drilling and construction of oil facilities provided the economy with
other financial resources besides the bilateral and multilateral
government aid.

First Period: 1957-1963. We have summarized the country's
economic condition prior to 1957. The economic structure did not rely
heavily on the oil sector at the beginning of this period; other
sectors contributed more than oil to the gross domestic product. During
this period, however, Libya underwent structural changes related to
changes in population, labor force, contribution of sectors to gross
domestic product, and the role of international trade.

The Libyan population increased from 1,212,759 persons in 1957
to 1,504,388 in 1963. This makes the rate of population growth about

3.4% per year, and was largely due to the return of Libyan migrants from abroad. Most of the returning people came from neighboring Arab countries.[6] Independence of their home country as well as economic prosperity were the main motives for them to come back. The non-Libyan population increased from 46,000 in 1957 to 117,000 in 1963. The evolution of the total population was as follows in Table I.

TABLE I

CHANGES IN POPULATION: LIBYAN AND NON-LIBYAN

	1957	1963
Libyan Population	1,168,000	1,412,000
Non-Libyan Population	48,000	117,000
Total Population	1,214,000	1,509,000

Source: Statistical Abstract, 1972, Tripoli, Libya, p. 9.

The labor force (Libyan and Non-Libyan) also increased during this period, being estimated at 260,000 in 1958 and at 400,000 in 1964. Another phenomena related to the labor force is the decline in the relative importance of agriculture, which is shown in the following table.

TABLE II

CHANGE OF DISTRIBUTION OF LABOR FORCE AMONG SECTORS (%)

SECTOR	1958 % OF LABOR FORCE	1963 % OF LABOR FORCE
Agriculture	71.95	35.74
Mining (including oil)	1.28	3.52
Industry	4.55	7.25
Construction	1.83	7.76
Transport	2.64	5.61
Services and Others	17.75	40.12
Total	100.00	100.00

Source: Ministry of Labor, Libya, 1965.

The service sector has attracted more Libyan manpower during this period. Higher salaries and easy entrance to the job market within this sector was the main cause of manpower shift toward services. As the main activities of services were located in urban centers manpower from rural to cities increased migration.

Gross domestic product (GDP) has increased substantially during this period, from 45 million Libyan Dinars in 1957 to 245 million Libyan Dinars in 1963. Table III shows the annual change in GDP from 1957-1975. (This was in money terms. Price increases were estimated at 8% annually from 1957-1963 and at 12% annually from 1964-1975.) There was also a shift in the contribution of different sectors. While the agriculture sector was the largest sector in 1958, contributing 26.1 percent of the gross domestic product, it declined to 9.7 percent by 1962.

TABLE III

CHANGES OF GDP IN LIBYA (1957-1974)

Year	GDP (Million Libyan Dinars)	% Change	Year	GDP (Million Libyan Dinars)	% Change
1957	45.0	--	1966	557.0	19
1958	52.0	15	1967	619.0	11
1959	56.0	8	1968	835.0	35
1960	61.0	9	1969	947.0	13
1961	70.0	15	1970	993.0	5
1962	170.0	142	1971	1626.0	64
1963	244.0	44	1972	1798.0	11
1964	364.0	49	1973	2246.0	25
1965	468.0	29	1974	4005.0	78

Source: Government of Libya, Statistical Department (1957-1961)
Libyan Arab Republic: National Accounts (1962-1974)

The main characteristics of the structural changes during this period is the growth of the oil sector's contribution to GDP. The contribution of the commodity sectors, that include agriculture, oil, manufacturing and construction, has declined from 49.4% to 46.4%. This has occurred together with the rising contribution of the service sectors such as trade, defense and public administration. Per capita income increased during this period from $115 in 1957 to $530 in 1963 (in money terms, price increase is estimated at 8% annually during this period). Though this increase in per capita income has been described as uneven among different classes due to the dualistic character of the Libyan economy.[8]

The increases in GDP were accompanied by an increase in imports. At the beginning of the period, imports had increased drastically due

to the expansion in needed capital goods in the oil sector. The rate
of increase had, however, slowed by the end of the period. This decline
in average prospensity to import (Import $\div$ GDP) from 66.0% in 1958 to
42.8% by 1963, was due mainly to the fact that the domestic economy had
begun to develop certain activities to serve the oil sector.[9]

Exports increased from 41 million Libyan Dinar in 1957 to more than
130 million dinars in 1963. The main items exported in the early part
of this period were olive oil, groundnuts, live animals, and wool. In
1963, however, crude oil represented about 98% of the total exports.
Thus by the end of the period, the structure of the economy had changed
from reliance of foreign assistance to dependance on oil exports and
royalties. Also, there was a shift of manpower toward occupations
related to trade, ownership of real estate, banking and the government
service, rather than occupations in the agricultural and manufacturing
sectors.

Second Period: 1964-1975. During the period from 1974 to 1975
Libya experienced the most drastic changes in its economic structure.
Gross domestic product, as well as national income, have increased
in absolute terms and, despite a high rate of population growth rate,
in per capita income (both in money and real terms).[10]

Libya's rate of population increase was estimated at about 3%
during this period. This rapid rate of growth can be attributed to
several factors. First is the public policy incentives (such as allow-
ances for children) aimed at increasing the birth rate. Second, there
was much more attention given to public health projects; leading to
lowering the mortality rate from 1.56% to 1.0% by 1970. Third, besides

the natural growth rate, migration of foreign labor with their
families has been another factor in increasing the total popula-
tion as well as labor force. The following table presents this
data.

TABLE IV

CHANGES IN POPULATION AND LABOR FORCE (LIBYAN, NON-LIBYAN)

	1964	1973
Population	1,564,369	2,257,000
Libyan	1,515,501	2,065,000
Non-Libyan	48,858	192,000
Labor Force	405,258	647,000
Libyan	387,699	529,000
Non-Libyan	17,559	118,000

Source: (1) Libyan Arab Rep., Industrial Research Center, 1974.
         (2) Statistical Abstract, Ministry of Planning, 1972.

Between 1964 and 1974, the gross domestic product of Libya, at
current prices, increased from Libyan Dinar 377.5 million to L.D.
4005 million. This rate of growth is exceptional by international
standards. The rapid growth achieved during this period is to a great
extent due to the production of petroleum in commercial quantities.[11]
Other sectors showed increases in absolute terms but a decline in

relative terms. The following table shows the contribution of each sector's share to GNP as well as the changing labor forces share in each sector in 1964.

TABLE V

DISTRIBUTION OF GNP AND LABOR FORCE IN 1964

SECTOR	VOLUME GNP OF THE SECTOR MILLION LD	PERCENTAGE TO GNP	LABOR FORCE	PERCENTAGE OF LABOR FORCE
Agriculture	18.5	3.1	144,853	35.74
Mining	358.8	60.1	14,259	3.52
Industry	15.3	2.6	29,377	7.25
Construction	38.6	6.5	31,434	7.75
Transport	23.3	3.9	22,749	5.60
Services	141.5	23.8	(a)162,587	40.14
TOTAL	594.0	100.0	405,258	100.00

Source: Ministry of Planning, National Accounts.
Libyan Dinar = $3.37.

According to Table V the mining sector contributes 60.1% of GNP while only 3.52% of the total labor force were employed in that sector. Agriculture sector's share in GDP was about 3.1% while its share of the labor force was 35.74%.

The situation changed during the period 1964-1975. In 1972, 29.3% of the total employment was in agriculture sector, the service

sector had 43% of total employment. Other sectors have had almost similar percentages of total employment, but the absolute number has increased from 405,258 in 1964 to almost 557,000 in 1972.

For the structure of gross domestic product, the contribution of each sector has changed as the following table shows:

TABLE VI

SECTORAL BREAKDOWN OF GNP: 1973

SECTORS	L.D.	PERCENTAGE TO GNP
Agriculture	64.7	1.6
Mining Including Oil	2389.4	61.1
Manufacturing	74.5	1.9
Construction	401.6	10.3
Transport	192.9	4.9
Services	788.2	20.2
TOTAL OF GNP	3908.3	100.0

Source: National Accounts, Libyan Arab Rep. February, 1976, p. 10.

The development of the mining sector had its impact on the structure of the Libyan economy while the Services sectors that include trace, ownership of dwellings, public services, and other services are affected by the oil sector's needs directly. Agriculture and manufacturing require time and capital to develop. The increase in

construction and transport sectors reflects the emphasis given to developing the physical infrastructure during this period.[12]

Exports have increased from 221.4 L.D. in 1964 to 2489.9 L.D. in 1974. Crude oil, has represented about 98% in 1964 and 99.2% in 1974. Government receipts have increased not only due to the increase in quantity of oil exports but also because of rising prices. Prices have risen from $2 a barrel in 1968 to about $4 in 1970 to about $12-14 in 1973-75.

Imports have also increased during this period. Imports can be characterized as follows:

1. A decline in the rate of increase in the imports during the end of the period as import substitution and government restriction began to take place.

2. A slowing in capital goods required in the mining sector is shown during the same period.

3. An increase in the imports of capital goods needed for development projects.

Figure 1 shows the increase in gross domestic product, exports, and imports during this period. Export has experienced the same increasing trends except in the period 1974-1975 due to government policies to limit oil production and exports. These policies were based on the principle of slowing the rate of exploiting this non-renewable resource.

The import substitutions industries cannot be evaluated through the import statistics because they do not take into account projects which are now being implemented.[13] A considerable increase in payments
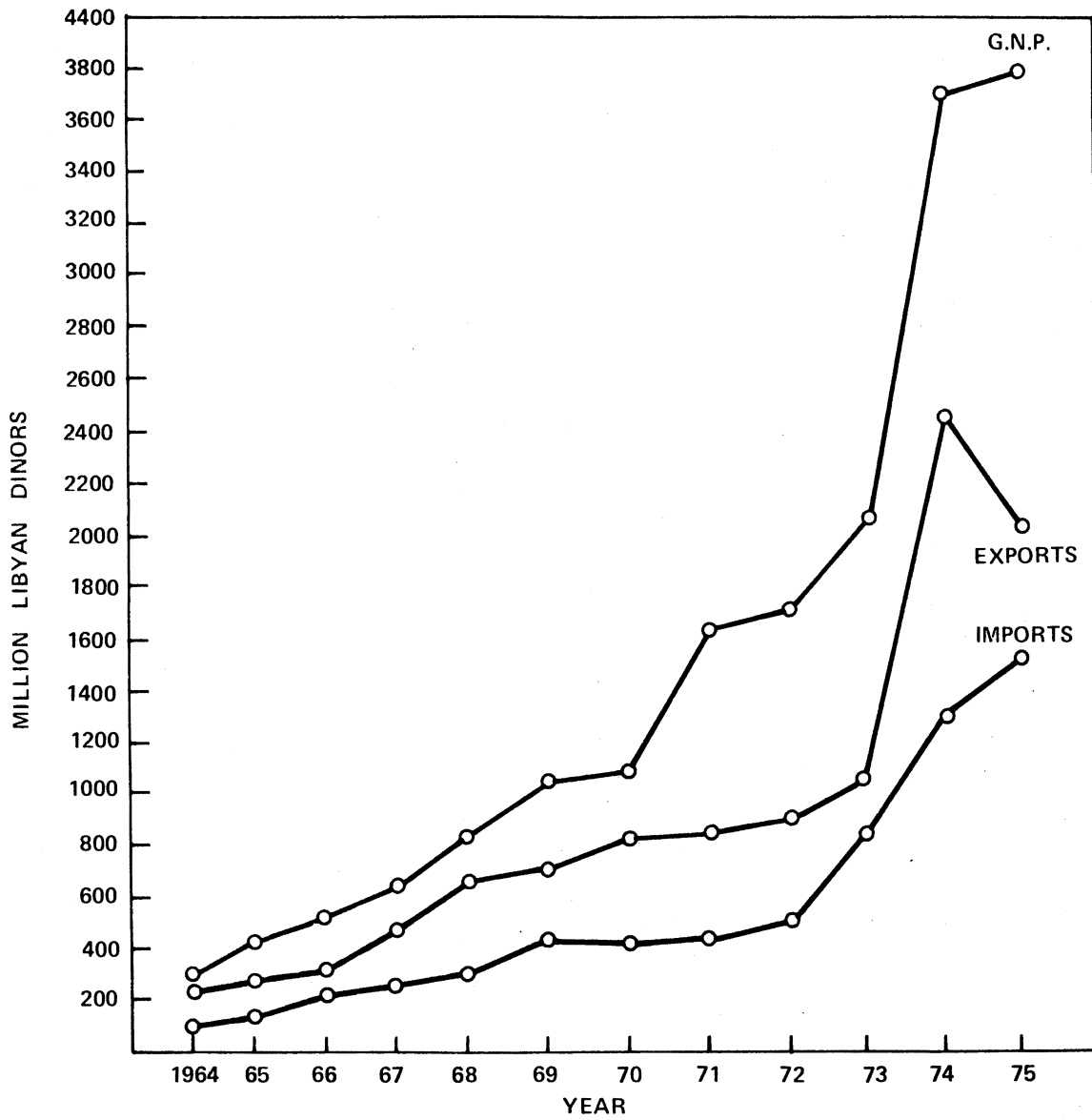
Figure 1. Changes of GDP, Exports and Imports in Libya (1964-1975)

abroad resulted from importation of not only goods but also technical services for the oil sector. By 1963, the oil sector came to dominate the Libyan balance of payments. The country for the first time had a favorable trade balance. The trade deficit in nonoil sectors, however, continued to exist at about 57.9 million dinars, but was offset by the favorable balance of 93.0 million pounds in the oil sector. Western countries were Libya's dominant trading partners during this period.[14]

The Problem of Economic Growth Constraints

The problem of economic growth constraints have been defined in the case of Libya as the governing consideration in its economic development. The World Bank Mission in 1960 identified some of the problems of Libya as,

> . . . the shortage of trained men, which limits the country and its capacity to absorb capital which is reflected in deficiencies in the organization of government, in extensive dependence on expatriate officials and experts, and in the low productivity of Libyan agriculture and industry.[15]

Another governmental report mentioned that the problems are the high costs, shortages and misallocation of labor, inadequacy of infra-structure, and the propensity for conspicious consumption.[16]

Thus the problem can be defined in different terms. This study is intended to identify the problem more precisely. However, there are several factors that must be considered first.

1. The lack of experience and entrepreneurship in the Libyan private sector has made implementation of projects slow and costly. The attractiveness of rapid profits in the service sectors makes

agriculture and industry lagging sectors in the economy. Because the oil sector is characterized by capital-intensive technology, employment of national labor was limited in this sector. All these represent critical problems because the country is fully dependent on one resource (oil). This resource is depletable and all activities connected to the oil sector cannot survive without it.

2. Inflation remained a persistent feature throughout the last period (1964-1975) stemming from the increases in the local expenditures of oil companies and by the government. External factors also were considered a contributing factor to inflation, i.e. inflation was partially imported.

3. The dual character of Libyan economy has had its impact on the economic as well as social and political aspects. From the economic point of view, two sectors, not completely integrated exist side by side. The traditional sectors consist of agriculture, small handicrafts and nomadic activities. The modern sectors include mining industries, construction and related service activities. The existence of a dualistic economy has limited the size of the Libyan domestic market. This is because the number of people engaged in the modern sector is quite low relative to the total population. The distinction between traditional and modern sectors becomes difficult to determine because of the interchange of population, services, technology in the later stage.[17]

4. The dependency of Libya on exports of oil and imports of capital and consumption commodities, makes the country face the

problem of international fluctuation of prices. This has led to more difficulties in implementing and evaluating the development projects.

The above factors shed some light on the problem, the barriers to economic development have never been identified through analytical research. The existence of the problem has been recognized in "follow-up" reports published by the Libyan Government. This study will identify the problem, taking into account the country's background.

The Case of Other North African Countries

General Environment

The countries of the North African region, besides Libya, are Egypt, Tunisia, Algeria, and Morocco. These four countries occupy about 3,990,000 sq km (1 km = .62 mile). The total population was estimated at 77.087 million people in 1975 or 19 persons per sq. km. Each country however differs from this point of view, as Table VII shows.

TABLE VII

NORTH AFRICAN COUNTRIES: AREAS, POPULATION

COUNTRY	AREA (1000 Sq. Km.)	POPULATION (1000)	DENSITY Person Per Sq. Km.
Egypt	1,000	37,233	37
Tunisia	163	5,772	7
Algeria	2,382	16,776	35
Morocco	446	17,305	39

Source: United Nations Statistical Year Books, New York, 1976.

Egypt, which has been a republic since 1952, is the largest country in terms of population. The political system is a multi-party system. Population settlements are highly concentrated along the course of the Nile River. This is in contrast to Libya (and the case of Tunisia, Algeria, and Morocco) because it has affected the political participation and modernization of Egypt.[18]

The British rule in Egypt ended in the beginning of the 20th Century. Thus its early self-rule has been fruitful in terms of many aspects of social and political advance. Also, the country has become a place that attracted migrants from the Arab World during their struggle for independence. Egypt was, and still is, the preeminent Arab cultural center, where large universities, publishing houses, and news medias exist and have their impact on residents of other countries in the Arab World.[19]

Tunisia, which became an independent state in 1956, is a presidential republic. The country was a French protectorate from 1881 to 1956. The dominating factors in the national politics in Tunisia are the presidential power and the single party system. Presidential power stems from the fact that there has been one president for the entire period since independence.[20] The single party system provides unchallengeable authority over opposition groups. The peoples participation is secured through joining the single party in the country. Foreign relations are guided by two factors, the historical relationship with France and Western Europe, and the regional ties with the Arab World, especially, the north African countries.

Algeria became an independent state in 1962, after 132 years of French rule and over seven years of bitter revolutionary war. The legislative and executive functions are embodied in the Council of Revolution and the Council of Ministers. The political system is influenced by the armed forces, technical administrators, and the only legal political party. The role of the technical administrators is highly regarded in the decision-making processes, political participating is articulated by small segments of urban populations who have had some formal education and political consciousness.[21] In foreign affairs, Algeria is in the non-aligned group of nations and is connected to both the Arab and African worlds. Eastern European countries as well as France have had particular importance in Algeria's foreign policies and relations.

Morocco regained its independence in 1956 after 44 years of French and Spanish colonization. The country is a kingdom, and has several political parties. The parliment and the Council of Ministers are the legislative and executive bodies. The population is spread over a larger portion of the country than is the case of the rest of North Africa. This is because of the availability of broad and watered coastal plains, a fact which has considerable impact on national politics.[22] Nevertheless, the traditional values and adherence to the political and religious power of the King has limited the full participation of people in political life. As far as foreign relations are concerned the country has ties to Western Europe and the U.S.A. as well as to the Arab World.

The last three countries, Tunisia, Algeria, and Morocco, together with Libya, are considered as one Arab block, the Maghreb.

They are held together by common threads of values and by cultural
and historical experiences. The concept of the Maghreb, primarily a
geographical expression, is used frequently as a political term.[23]

Egypt has the largest modern sector in North Africa, with the
most influential middle class. The class has traditionally exerted
demands for more modernization and secular values. The country has
the most advanced higher education system in the region, and female
education made greater progress compared to many other countries in the
region and in the African continent.

The three Maghreb countries, Tunisia, Algeria, Morocco, and to
some extent Libya, have had similar values and customs. Though, the
majority of the population are of Arab origin, there is another ethnic
minority, the Berber, which constitute about 20% of the total popu-
lation. The overall similarity between the Arabs and the Berbers makes
the distinction less significant.

In all three countries, part of the European population which had
settled during the French rule, migrated to Europe since independence.
This has affected several economic activities, and their replacement
by nationals is underway. Illiteracy rates in the three countries
is between 70%-80%, with the rate for women even higher. Enrollment
levels are rising, but shortages of facilities and funds for scholar-
ship is affecting the education system, which is adapted from the
French system with the Arab language being introduced gradually.
Algeria and Morocco, and to a lesser extent Tunisia, have tribal
systems. Most of the tribes live in the Atlas Mountains, where the

system has a great social and political influence. But as moderniza-
tion and urbanization progress, tribal systems are losing influence.

Economic Structural Changes

Economic structural change in the four countries will be examined
for the period 1964-1974. Structural changes are mirrored in the
development and distribution of the labor force by sectors, the
changes of composition of gross domestic product by sectors, and the
changing picture of exports and imports during the period.

The rate of the population's growth is as high as 2.8% per year.
This rate is not expected to decline because the North African countries,
like the rest of the African continent, are at a critical stage of
demographic development.[24] The death rate is declining as a result
of the application of medical and public health techniques, while the
birth rate remains high. The United Nations estimates that the total
population of the region will double between 1965 and 1990.[25] The
distribution of population by sex and age is very useful as an indica-
tor of the manpower supply and needed human infrastructure facili-
ties (health and education). In 1965, about 50% of the total popula-
tion were between 15 and 60 years of age. While 43% of the total
population was under 15 and only 6% was over 60 years. Compared
with developed countries, the under 15 years age group is larger in
the North African countries and the over 60 years of age group is
smaller. This implies that there is a heavy burden on the labor force
to support the group under 15 years of age. Also, the labor force
is smaller - the group between 15 and 60 - in the North African coun-
tries compared to the more advanced countries, i.e. Western Europe.

Although the sex composition of the population is almost a 50-50 ratio, the female segment has less chance to join the labor force. This naturally increases the burden on the labor force to support larger non-working groups.

Labor force distributions are different from one country to another as the following table shows.

TABLE VIII

DISTRIBUTION OF ACTIVE POPULATION BY SECTOR
(IN PERCENTAGE)

SECTORS	EGYPT 1966	ALGERIA 1966	TUNISIA 1966	MOROCCO 1971
Agriculture	53.3	50.4	41.0	50.0
Manufacturing	12.9	6.4	9.5	9.3
Mining	0.2	0.9	2.2	1.1
Services	26.8	22.9	31.3	22.8
Construction	2.5	5.0	5.4	4.3
Other	N.A.	3.3	6.9	3.9
Person seeking work for the first time	4.3	11.1	3.7	8.6

Source: Year Book of Labor Statistics, I.L.O., 1975

While 53% of the labor force in Egypt are engaged in agriculture, in Tunisia it is 41% and in Algeria and Morocco about 50%

each. Employment in the service sectors ranked the second in each country. Manufacturing attracts about 13% of the labor force in Egypt and less than that in other countries. The mining sector, oil and other minerals, has a larger share of total employment in the Maghreb countries than Egypt.

Egypt entered the period with the largest managerial and technical staff in the North African region. This was mainly due to the fact that educational and training facilities were more developed in Egypt than in any other North African country, although this situation is changing as foreign private investment, particularly in Algeria, provides opportunities for training.[26]

A United National report stated that, ". . . the composition of gross domestic product in Morocco, Algeria and Tunisia during the early 1960's is strikingly similar."[27] Agriculture accounted for 23-27%, manufacturing 11-17%, and the service sectors accounted for 46-56% during the beginning of the period. In Egypt agriculture has contributed 30% of GDP while industry amounts to about 20%, the services sector was about 45% of the GDP in the beginning of the period.

During the period, however, there were some changes, particularly in Algeria where mining started to take place. The following table shows the contribution of the main sectors to GDP. It also shows that while the services sector contributed the largest share in all the four countries, agriculture in Egypt and Morocco occupies the second largest sector and industry (including oil in Algeria) is the second largest sector in Tunisia and Algeria. Per capita income varied among the four countries during this period. In 1973, the

per capita of the four countries were as follows: $245 in Egypt,
$596 in Tunisia, $400 in Algeria, and $370 in Morocco. Also, the
dual economics of these countries have created gaps between per
capita income in traditional sectors and that of the modern sector.

TABLE IX

GROSS DOMESTIC PRODUCT BY MAJOR INDUSTRIAL ORIGIN
(IN PERCENTAGE)

SECTOR	EGYPT 1973	TUNISIA 1974	ALGERIA 1973	MOROCCO 1974
Agriculture	29%	19%	11.3%	28%
Industry	19%	23%	35.8%	25%
Construction	3%	7%	9.5%	6%
Services	37%	40%	43.4%	41%

Source: United Nations Statistical Year Book, 1976

International trade of the four countries has been determined by
the pattern of production and the general environment. They are
specialized in producing primary products.[28]

The increases in exports and imports reflects the stage of growth
of each country. Algeria had become one of the oil producing and ex-
porting countries by the end of the 1960's. In Egypt, while the

total export amounted to 548.6 million Egyptian pounds (E.P.) where cotton's export amounted to 201 E.P. million in 1974. This represents about 37% of the total export. In Algeria, crude oil represents about 86% of the total exports, while in Tunisia, crude oil and phosphate contribute about 54% of the total exports. In Morocco, phosphates represent about 56% of the total exports. Thus, raw materials and primary products continue to be the main item in exports in 1974.[29]

The Problem of Economic Growth Constraints

To define the problem of constraints in the context of North African countries framework, it is necessary to examine the major obstacles facing the developmental policies and implementation. The main problem of these countries can be stated as follows:

1. The economics of these countries rely heavily on exporting primary products and extraction of minerals for export. As a result the development of the physical infrastructure (roads, ports, telecommunication facilities) was to serve the needs of foreign trade rather than of the domestic sectors.[30] Thus the diversification of the economy will face the problem of overconcentration on one single sector.

2. The dependence of foreign trade makes the economics depend on the international price fluctuation in these primary products, crude oil, phosphate, etc. The funds that are channelled to developmental projects may lack the consistency and continuity if financial problems exist.

3. Unemployment is one of the critical problems in some of these countries. Disguised unemployment, especially in traditional sectors, also exist in these countries though. Unemployment is a result of economic growth constraints, but it creates other problems (low GDP and low saving).

4. The problem of the small size of monetized markets makes international trade more difficult. The smallness of a North African national market can be illustrated by comparison with some developed countries which have similar size populations.[31] In 1964 private consumption for Morocco, Tunisia, and Egypt was one-fifth of that of the Netherlands, one-ninth of that of Denmark and a little more than one-third of that of Spain.

5. The problems resulting from dualistic economy have taken place in these countries. In 1960, about 70% of the population were living in rural areas. Productivity is low in this traditional sector. Efforts to attract investment capital are handicapped by low productivity, small size of the market and thus by high cost of production. The share of modern sector to GDP is estimated at 70% in the 1960's.[32]

6. Dualism and low productivity have also led to low per capita incomes in the traditional sector and to lower living levels for the people. The unbalanced distribution of national income is still a barrier to economic and social development.

The problems that are mentioned in the government's and the United Nation's report involve constraints on the development and economic growth, namely limited size of saving, limitation of foreign exchange earnings and lack of absorptive capacity. This study will

identify which of these constraints was dominant at the period under study.

Summary

The economic background of the study was presented in this chapter. First, political and social aspects were introduced in order to explain the environment within which the economy existed. Second, economic structural changes were examined emphasizing the changes in population structure, manpower, gross domestic product and exports. The third part of this chapter focused on identification of the problem of economic growth constraints within the cases under study. The Libyan case was presented in the first part, then other North African countries were introduced in the latter part. While there is the problem of imbalance between the population and territory in Libyan case, this problem has not been experienced in the other countries. Libya and Algeria have similar economic conditions in the sense that both of them rely heavily on oil trade. Other countries are major oil-exporting countries. Human resources play an important role in the economic background in Libyan case more than in other North Africa countries. All countries have mixed economic systems, and they all adopted planning approaches to attain economic development objectives.

This chapter serves as an introduction to the other parts of the study. It provides the main factors affecting the existence of constraints on economic growth process in the countries under study.

FOOTNOTES

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[16] A. Bengur, "Financial Aspects of Libya's Oil Economy," *Finance and Development*, IV, (1967), p. 58.

[17] The United Nations, *Economic Survey of Africa*, Vol. II. *North African Sub-Region* (New York, 1968), p. 12.

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[19] C. Issawi, and M. Yeganeh, *The Economics of Middle Eastern Oil* (New York, 1962), p. 22.

[20] G. Duwagi, *Economic Development in Tunisia* (New York, 1967), p. 10.

[21] The United Nations, p. 87.

[22] The International Bank for Reconstruction and Development, *The Economic Development of Morocco* (Baltimore, 1966), p. 16.

[23] Mahgreb is Arabic Word for "West": The North African countries represent the western part of the Arab World. In recent years, Libya has often been included in this grouping.

[24] The United Nations: *National Accounts Reports 1964-1975*.

[25] The United Nations: *Economic Survey of Africa*, Vol. II, p. 12.

[26] Ibid, p. 16.

[27] Ibid, p. 8.

[28] Ibid, p. 65.

[29] *United Nations National Accounts*, 1975.

[30] F. Arkhurst, *Africa in the Seventies and Eighties* (New York, 1970), p. 372.

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CHAPTER III

THEORETICAL FRAMEWORK

This chapter introduces the concept of constraints on economic
development processes, reviews the related literatures concerning the
identification of these constraints, and examines the models that will
be utilized in this study. The chapter provides the theoretical frame-
work and is the basis for the subsequent chapters which present the
empirical analysis and interpretations of results.

Developing Countries and Growth Constraints

The rate of economic growth depends on the effectiveness with
which a country's resources are utilized. Less developed countries
(LDC's) suffer from the fact that their performance is far from their
potential.[1] Meier raised the following question, "What have been the
constraints on the attainable rates of development in the less devel-
oped countries?"[2] LDC's experience has proven that their problems
stem not only from the needs for new resources, but also from the
inefficient utilization of those which are already available. In
many cases, there are constraints which lead to waste of the available
resources.[3] Attention has, however, been directed toward obtaining
new resources, and not towards attempts to eliminate the constraints
on existing resources.

LDC's planning policies are aimed at methods of eliminating obstacles or constraints. The situation differs from that of developed countries. Mynt states that, "While the developed countries can rely on their growth to continue steadily into the future as an automatic and self-generating process, the underdeveloped cannot."[4] The rigidity of LDC's structure prevents the economic variables to switch to desirable paths. Lack of response of these variables makes the price system ineffective in many situations.

Hagan mentioned that LDC's face the question of allocating productive resources between consumption and investment. The choice is between present consumption and future consumption.[5] Due to the fact that other elements, besides market forces, such as the level and distribution of income, maintenance of the country's security and maintaining prestige and national currency value, affect decision making process and that has resulted in low domestic saving, and thus low capital accumulation.[6]

The role of domestic savings has been emphasized as a significant factor in the economic growth process. Arthur Lewis stated,

> The central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 percent of its national income or less, converts itself into an economy where voluntary saving is running at about 12 to 15 percent of national income or more.[7]

Domestic saving, though not the only element, is considered crucial in capital formation and economic growth. Lower saving levels in LDC's makes capital inflows particularly significant in their development process.

Capital inflows, enable the LDC's to import needed capital goods for economic development. Chenery and Strout have pointed out that a minimum level of imports is required to sustain a given level of output. This is due to the nature and limited flexibility of the productive system.[8] The accumulation of capital is restricted by absolute and relative obstacles in the LDC's. Absolute obstacles can be the existence of small monetized sector, and concentration of much of national income in the agricultural and mining sectors. While relative obstacles exist in lack of financial intermediary facilities, and the preference for commercial opportunities rather than development opportunities by savers and investors.[9] Foreign exchange receipts, thus, can supplement available saving. Capital inflows in LDC's are needed because saving may not make available the correct kind of resources. This is due to the fact that LDC's are generally unable to produce capital goods and need to utilize foreign exchange assets to import them.[10]

The nonsubstitutability of saving and foreign exchange is the core concept of multigap analysis. In neo-classical economic models. there is only one problem or gap, the shortage of productive resources. Since saving and foreign exchange are assumed to be substitutable, saving can be converted into productive capacity in two ways. Either directly saving is channeled into investment, or indirectly by releasing funds for foreign exchange to permit capital good imports.[11] The multigap model introduces foreign exchange and saving as independent constraints due to immobility and rigidity of the LDC's economic structures. As many LDC's adopt fixed exchange rates system there is

a limit to which domestic saving can be converted into needed foreign exchange.[12]

Gap analysis examine the economic growth process of an under-developed country as a process where three constraints -- saving, foreign exchange, and absorptive capacity -- play a different con-straining role at any given time, depending on the country's stage of development.

Multigap models of Chenery and Strouts and others, emphasize the financial gaps facing less developed countries. However, these coun-tries are confronting with other gaps, namely nonfinancial gaps. Nonfinancial gaps are defined in this study as those constraints that limit the absorptive capacity such as economic infrastructure, man-power conditions, and administrative institutions.

Review of Related Literature

There is vast literature on economic development that relates indirectly to the study of gap analysis. Most economic development theorists have been concerned with the role of foreign trade in econo-mic development process. But economists trained in empirical studies are the ones who have become concerned with testing the multigap model.

M. Chenery has done extensive research on gap analysis. His research with Bruno in 1962, on the role of foreign trade and alloca-tions of resources in Israel, is considered one of the first contribu-tions on this subject.[13] In this article Chenery and Bruno examined the productivity of foreign exchange during the period 1950-1959 in Israel. In their model they set alternative programs that includes

the feasible degree of variation in relevant variables, such as GDP,
consumption, foreign capital inflows, and the saving rate. They then
define the factors that may prove to be effective limits to growth.
The study identified three major factors: supply and demand of labor,
supply and demand of domestic capital, and the balance of payments.
The balance of payment, however, was the main factor which determines
the rate of growth in this study. The article pointed out also that
the productivity of aid is high if foreign exchange is the only binding
constraint.

Chenery and Adelman did a similar study of foreign aid and economic
development of Greece.[14] The crucial question, however, in their
article was to examine the policy problems resulted from the reliance
on external assistance in economic development. This study utilized
an economic model that was based on examining the consumption, invest-
ment, export, and import functions during the period 1950-1961. The
study showed the existence of a gap between required investment and
saving and between exports and needed imports. Both studies have
introduced the basic concepts of gap model using time series on single
country in each study.

A further important study was conducted by Chenery and Strout in
1966.[15] This study was a cross-section study which included 50 coun-
tries, and examined the impact of external resources on the growth
of an economy in terms of their contribution to the mobilization and
allocation of all productive resources. The study distinguished three
types of limitations: skill limitation, saving limitation, and import
limitation and showed that 19 countries would need economic aid in

1975, another 10 countries would face both saving and foreign exchange gaps, and three countries would face saving gaps. This study is considered the first study where the gap model is completely developed. Many later studies were conducted using the main concepts developed in this study.

Chenery and MacEwen have done another study applying gap analysis to the case of Pakistan.[17] Their objective was to examine the properties of optimal growth strategies in which the total and the pattern of external resources could be varied, so as to assess the productivity of foreign aid. The study showed that there is high productivity in the early stages due to rapid growth. The study advised that there should be concentration on the ability of the country to invest, not the ability to raise domestic saving. The role of foreign aid has been tested in three future periods in the Pakistani case. The first period is 1963-1975, where there is high level of investment and high level of foreign aid. The second is the period of 1977-1981, where there is a trade improvement due to the growth. The third period of 1982-1985 will be a period of sustained growth with no foreign aid. This study has taken a step forward in projecting future gaps rather than examining past performance and past gaps.

Recently, Chenery and Eckstein used the same approach for 16 Latin countries for the period of 1950-1965.[18] The objective was to examine past performance and to indicate requirements of accelerated growth rate. They concluded that the long-run costs of foreign aid is less than short-run costs. The authors also indicated that one-third of the growth in the various countries was financed by external resources.

All previous studies that were prepared by Chenery and others have been based on identifying particular indicators and examined the cases of study to observe which gap was dominant during specific periods. Time series as well as cross-section studies have been used to test gap analysis, to determine the required foreign exchange and its effectiveness.

Other economists have contributed in further empirical studies. Two studies have been conducted by Vanek, in his study of Colombia, and G. Papanek, in his study of 51 less developed countries.[19] The first study was a projection for the saving, investment, export, and import functions in order to estimate foreign resources needed for economic growth. The foreign exchange gap was estimated for the years 1965, 1970, and 1975. The second study was a cross-country regression analysis that applied to thirty-four countries for the 1950's and fifty-one countries for the 1960's. Foreign aid was deemed to have had a substantially greater effect than foreign investment and domestic saving on growth in these countries. While the first study was concentrated on foreign exchange as a supplement to domestic saving, the second study presented private foreign investment as well as foreign aid as a supplement to saving. Thus the two studies estimated the gaps between required investment and domestic saving.

Landue examined the role of saving in his study of Latin America.[20] The study investigated two areas, the causes of variation of domestic saving either among countries or over time, and how domestic saving is affected by an inflow of foreign capital. The study utilized gap analisis to answer the second question, i.e., the impact of external resources

on saving. The study concluded that eight Latin American countries
have dominant trade gaps, four countries have dominant saving gaps,
and six countries have both gaps binding. The study utilized quanti-
tative indicators for each case (saving gap, trade gap, saving and
trade gap). This approach is a step further than Chenery and Strout
where there were no quantitative indicators in their table.

Another study was presented by T. Weisskopf in 1972.[21] Weisskopf's
study has developed another method of classification of several coun-
tries. The econometric technique used will be discussed in detail, as
it will be the basic approach of this study. Weisskopf applied his
statistical tests to forty-four underdeveloped countries, and classi-
fied them according to the relevant gaps involved. The advantage of
this study was the development of a systematic econometric model to
classify the countries according to their dominant constraint over
varying periods of time. M. Applegate, applied a two gap model to
the Dominican Republic to examine the importance of the export sector,[22]
and this study will benefit from the approach which he used. Blomquist
reviewed Wiesskopf's study and concluded that independent foreign
exchange is less significant than Weisskopf's study had indicated.
The Blomquist study was based on the extension of classical likelihood-
ratio methods in the case of regression parameters subject to linear
inquality constraints.

C. Michalopoulos presented another study that focused on examining
production and factor substitutions in gap analysis. The study was con-
cerned with the substitutability of saving and foreign exchange in
Argentina.[23] The study pointed out that in the case of countries

with "a somewhat developed industrial section," such as the Argentina case, saving and foreign exchange may substitute each other. This case, however, cannot be generalized to other less developed countries with less developed industrial sectors.

There are several criticisms of gap analysis, the following ones are the most important:

1. The first criticism was raised by Fei and Ranis. Fei and Ranis stated that the model's objective is to determine the dominant constraint rather than "how to facilitate the various learning processes (learning to save, to invest, to export, to engage in efficient import substitutions) with the help of foreign aid . . .".[24]

2. Maizels criticized the model in regard to its assumption that the saving gap is independent of the trade gap.[25] Bruton also raises a similar criticism about the inter-relationship between the two gaps.

3. The model does not cover nonfinancial constraints. Identification of such constraints may enrich the model. Many LDC's face such problems. This study will try to incorporate indicators of nonfinancial constraints into the results of gap analysis.

4. There is another criticism related to the faith in applications of models to LDC's situations. Lack of data is the main problem. This criticism should not deter further studies. Gap analysis deals with the few macro-variables that can be attained in the United Nation's National Account Reports.

Having listed the shortcomings of the model, the model still provides a base for exploring the bottlenecks faced by LDC's in the purpose of economic development. Identifying the constraints should lead to adopting suitable policies to eliminate them. The model is

more adaptable to LDC's than to the highly developed countries cases where saving and foreign exchange are not fully independent.

The General Approach

The basic concept of the model is that there are two factors limiting the economic growth of an underdeveloped country. The first constraint is the availability of domestic saving that is needed for investment. The second constraint is the availability of foreign exchange for importing necessary commodities required for the current level of production and investment.[26]

The model is an aggregative model that is based on standard macroeconomic accounting identities, an ex ante saving function, and an ex ante import function. The variables of the model are defined as follows:

Y: Gross Domestic Product

C: Total Consumption Expenditure

I: Total Investment Expenditure

M: Total Imports of Goods and Services

S: Total Observed Saving

E: Total Exports of Goods and Services

F: Net Foreign Capital Inflow defined as trade deficit (M-E)

S*: Ex ante (potential) saving

M*: Ex ante (required) Imports.

The model starts by introducing the following two identities that are accepted to be true for all the countries.

(1) $Y = C + I + E - M$

(2) $S = Y - C$

Net foreign capital inflows is assumed to be equal to the balance of trade deficit.

(3) $F = M - E$

If a country's domestic resources are to be supplemented from abroad, such flow of resources will appear in the accounting framework as an excess of imports over exports.

The ex ante saving is defined as the gross domestic saving potentially available for investment, though not necessarily realized, and is determined by the following behavioral equation.

(4) $S^* = a + bY + cF + dE$

Equation (4) assumed that saving depends not only on income but also on net foreign capital inflow and on exports. Net foreign capital inflows can be devoted to either consumption or investment activities. To the extent that these resources are used for increasing consumption saving will decline. The decision will depend upon the weighing of present benefits derived from current consumption and the future benefits to be derived from the investment of current saving. Thus, there is a reason to include foreign capital inflow in the ex ante saving function. Exports affect potential saving in the sense that it provides critical sources of private revenues or government revenues, or both.

Equation (5) specifies ex ante imports. It is defined as the minimum level of imports required to sustain the current level of production and investment.

(5) $M^* = \delta + {}_\beta Y + {}_\delta I$

This equation expresses desired imports as a function of income and investment.

The model treats exports and net foreign capital inflow as exogeneously determined variables:

(6) $E = \overline{E}$

(7) $F = \overline{F}$

The justification for treating exports and net foreign capital inflow as exogeneous can be traced to two elements. The first is the dependency of export earning of most underdeveloped countries on world demand, weather conditions and trade policies. Oil producing countries are examples of those countries where the price of oil depends on the supply and demand of oil. Thus it would appear inadequate to treat the level of export earnings as endogenous variables in the model. The second reason is related to net foreign capital inflow. Though theoretically it is a weak assumption, from practical points of view, there is evidence that in the short run, political and strategic factors affects aid, private investment and lending, thus the model treats them as exogeneous variables.

The model at this stage consists of nine variables and seven equations leaving two degrees of freedom (we assumped exports and net foreign capital inflow are exogeneously determined which closed two of the four degrees of freedom). The two degrees of freedom are limited by three inequalities.

(8) $S \leq S^*$

(9) $M \geq M^*$

(10) $Y \leq \overline{Y}$

Inequality represents the saving constraint which stated that actual saving can be no greater than potential or desired saving.[8] Inequality is the trade constraint which implies that actual imports have to be at least as great as the levels of imports required for current production and investment.[9] The last inequality is the capacity constraint which states that gross domestic product cannot exceed the exogeneously given productive capacity of the economy $(\overline{Y})$. This is because it is assumed that capacity is determined by past investment not current investment and therefore is exogeneously determined in the current period.

The model has, so far, one more equation or inequalities than there are endogenous variables. That means the model will be over-determined if all of the constraints are binding. This implies that only two of the three inequalities can solve to be equalities (binding) at any given point in time. Three situations can evolve. If equation (8) and equation (10) are binding, investment and income are constrained by domestic saving and capacity, this is identified as the saving constraint case. If on the other hand equation (9) and (10) are binding, investment and income are constrained by capacity and availability of foreign exchange. This case is identified as the trade constraint. The third case is where the economy is operating at less than full capacity and the saving and trade constraints are binding.

As the end result of substitution process, the system can be shown in reduced form. The set of three inequality constraints (8) to (10) can be expressed in terms of two endogenous variables (I and Y) and three exogenous variables $(\overline{Y}, \overline{F} \text{ and } \overline{E})$

The reduced form inequalities are as follows:

(8)´ $I - bY + a \leq (1 + c)\overline{F} + d\overline{E}$

(9)´ $I + \beta/\delta Y \leq -\frac{\alpha}{\delta} + (\frac{1}{\delta})\overline{F} + (\frac{1}{\delta})\overline{E}$

(10)´ $Y \leq \overline{Y}$

We now introduce the following non-negativity constraints:

$I \geq o$, $Y \geq o.$

The inequalities (8)´, (9)´, and (10)´ together with the two non-negativity constraints define a feasible region within the I - Y two dimensional space. The shaded area in Figure 2 indicates this feasible region.

(10)´ capacity constraint

(8)´ saving constraint
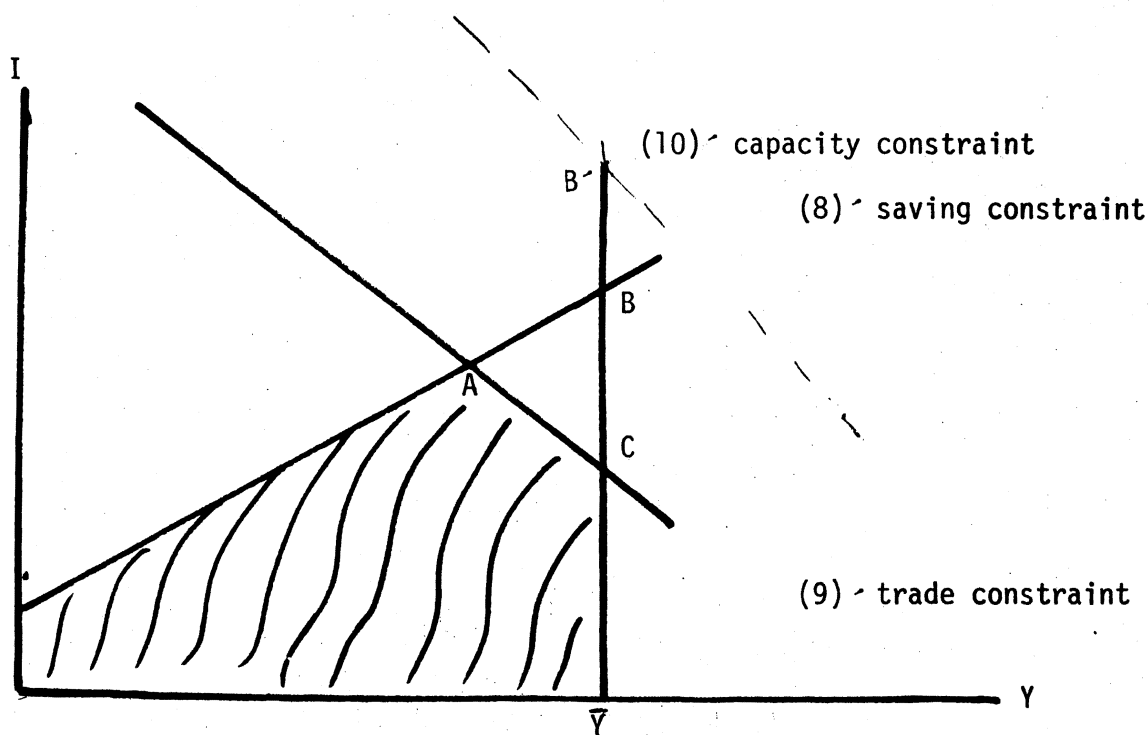
(9)´ trade constraint

Figure 2. Feasible Region of Multigap Model

In the diagram, the slope of saving constraint (8)´ is determined by the marginal propensity to save out of domestically earned income, (b), which will be non-negative. The slope of the trade constraint (9)´ is negative and downward sloping ($-\beta/\delta$) where β is the proportion of imported consumption goods and δ is the imported investment goods. Inequality (10) defines the capacity constraint.

The feasible region defines the set of all possible values of I and Y which satisfy all constraints. Based on these constraints there are three cases.

Case One: Where the saving and trade constraints are binding. Point A in the diagram.

Case Two: Where the saving and capacity constraints are binding. Point B´ in the diagram. (In this case the trade constraint would have to lie above point B as the dashed line does [See Figure 2.])

Case Three: Where the trade and capacity constrain are binding. Point C in the diagram.

The model and parameters estimater determine the feasible region. The slope of the implicit objective function determine which points (corners) within the feasible regions in the solution. The objective function characterize the decision making in the economy.

To get the first case where both saving and trade constraints are binding, inequalities (8)´ and (9)´ are considered as equalities. Then solving these two simultaneous equations for I, we get equation:

(13) $I = u = \theta_1 \bar{F} + \theta_2 \bar{E}$

      Where

$$u = (a\beta - b\delta) / (\beta + b\delta)$$

$$\theta_1 = ((1 + c)\beta + b) / (\beta + b\delta)$$

$$\theta_2 = (d\beta + b) / (\beta + b\delta)$$

In case two where equation (8) and (10) are being equalities we get:

(14) $I = a + b\overline{Y} + (1 + c)\overline{F} + d\overline{E}$

In case three, constraints (9)´ and (10)´ lead to:

(15) $I = a/\delta - (\beta/\delta)\overline{Y} + (\frac{1}{\delta})\overline{M}$

The coefficients of the three possible investment functions are shown in Table X. The examination of the range of permissible values for original coefficients b, c, d, β, δ, from equations (4) and (5) enables one to determine corresponding range values for the partial derivatives in the table below; these range values are shown in Table XI.

TABLE X

THE COEFFICIENTS OF THE THREE CASES

Case	$\delta I/\delta\,\overline{Y}$	$\delta I/\delta\,\overline{F}$	$\delta I/\delta\,\overline{E}$	$\delta I/\delta\,\overline{M}$
I		θ_1	θ_2	
II	b	1 + c	d	
III	$-\dfrac{\beta}{\delta}$			$\dfrac{1}{\delta}$

Where $\theta_1 = (1 + c)_\beta + b/\beta + b\,\delta$
       $\theta_2 = d\,\beta + b / \delta + b\,\delta$

Since the signs and magnitude of the partial derivative vary for each case, it is possible to test which case has been applicable over time by estimating the values of the coefficient and comparing the estimate values with those in Table XI.

TABLE XI

THE CORRESPONDING COEFFICIENT RANGE

Case	$\delta I / \delta \ \overline{Y}$	$\delta I / \delta \ \overline{F}$	$\delta I / \delta \ \overline{E}$	$\delta I / \delta \ \overline{M}$
I		>0	>0	
II	≥ 0	≤ 1	≥ 0	
III	<0			>1

To determine which constraints have been dominant in limiting investment, the following equation will be estimated.

(16) $\quad I_t = \theta_0 + \theta_1 \ Y_t + \theta_2 \ F_t + \theta_3 \ E_t + \theta_4 \ M_t + U_t$

The first approach will be to estimate these coefficient by linear regression. The next section will demonstrate how these coefficients can be estimated using linear programming.

Data for real values of the dependent and independent variables are available in the United Nation's National Account, International Financial Statistics, and various countries' national accounts reports.

Linear Programming Approach to

Estimation

This technique is used to supplement the linear regression approach
in estimating the coefficient in equation (16). It is based on utilizing
the extreme years rather than the average of all years as is done in
linear regression. This means the technique will enable us to choose
the years where the constraints were most binding. The model consists
of the following elements:

Objective Function:

Minimize $c' x$

Subject to $A x \geq 0$

and $x > 0$

To define the elements in objective function, the same notation is
applied as in linear regression approach. Thus the following matrices
and vectors are defined as follows:

$$X = \begin{vmatrix} \theta_0 \\ \theta_1 \\ \theta_2 \\ \theta_3 \\ \theta_4 \end{vmatrix}$$

$$5 \times 1$$

$$A = \begin{vmatrix} 1 & Y_1 & F_1 & E_1 & M_1 \\ 1 & & F_2 & E_2 & M_2 \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ 1 & Y_T & F_T & E_T & M_T \end{vmatrix} \quad T \times 5$$

$$b = \begin{vmatrix} I_1 \\ I_2 \\ . \\ . \\ . \\ I_T \end{vmatrix} \quad T \times 1$$

$$c = \begin{vmatrix} 1 \\ \overline{Y} \\ \overline{F} \\ \overline{E} \\ \overline{M} \end{vmatrix}$$

$$5 \times 1$$

The same estimated equation will be used as in the general approach. The equation

(16) $\quad I_t = \theta_0 + \theta_1 Y_t + \theta_2 F_t \; \theta_3 E_t + \theta_4 M_t + U_t$

This approach estimates the parameter of the previous equation (16) as an

alternative to regression analysis.

Using linear programming in addition to regression analysis has two advantages:

1. It provides a check on the results derived from the application of the first approach.

2. It permits the determination of dominant gaps for sub-periods. The technique determines the particular years in which the dominant gap was most binding. Then we use the model, to determine the next selected years and so on. This will allow different estimates for different short periods.

This study will be one of the first studies to incorporate both methods of estimation in gap model.

Identifying Nonfinancial Constraints

The gap models identify financial gaps. The models, which are based on the Chenery-Strout approach, have been critized for their lack of integration of both financial and nonfinancial constraints. The Chenery-Strout models, however, provide performance indicators of the investment capabilities of any country. These performance indicators will be utilized in this study as one element in determining the constraints to absorptive capacity. Absorptive capacity determines the limit to the rate of capital formation that can be carried out in any country.[27] The concept has been mentioned in regard to limitations in LDC's even if virtually unlimited resources are available. Technical and other limitations have been observed in many cases. It has not been possible to quantify the concept so far, but several approaches have been introduced to define and measure absorptive capacity. The

performance of investment approach adopted in the Chenery-Strout

Model is one of those approaches.[28]

Chenery and Strout considered absorptive capacity as a performance

indicator. They defined it as,

> The ability of a society as a whole to increase produc-
> tive capacity, measured by the past observable rate of
> increase in total investment that can be carried out at an
> an acceptable minimum level of productivity over a certain
> period.[29]

The model thus adopted a historical incremental investment spending

rate (highest previous five years) as the measure of absorptive

capacity. It did not, however, take into consideration other factors

beside the investment performance indicator.

This study will utilize other indicators in addition to the

investments performance indicators introduced by the Chenery-Strout

model. This is to supplement investment performance indicators,

taking into account the main factors affecting LDC's absorptive

capacity. The four indicators that will be used are:

1. Performance of investment

2. Manpower constraints

3. Economic infrastructure constraints

4. Administrative institution constraints

The first two indicators are an extension of the Chenery-Strout

model methodology applied to skill-limit phase. The last two indica-

tors are based on development planning of case studies.

The operational methodology will be as follows:

1. FIRST INDICATOR: Investment Performance:

The performance of investment is considered as subgroup of

indicators. First, this study will trace the past trends of investment

by examining the ratio of total investment to GDP and the rate of increase of investment. Second, the study will test the performance of investment by applying the following equation[30]:

$$\frac{I_0}{Y_0} \geq rK$$

where

I_0 = investment expenditure

Y_0 = gross national product

r = growth rate adopted by government as the target rate

K = capital/output ratio

This equation is based on Harrod/Domar model assumption where

$$\frac{I}{K} \geq r$$

which indicates that the warrant growth rate (r) should be reconcile to average saving (s) divided by capital/output ratio. In order to achieve the growth rate (r), the relation must hold. The test assume that investment equals saving.

The investment performance indicator may be expanded to calculate oil and non-oil sectors in the case of Libya.

2.   SECOND INDICATOR: Manpower Constraints

The study will examine the following trends related to manpower:

a.   Rate of increase of national labor force.

b.   Distribution of manpower among sectors.

To test this indicator, the following criteria will be applied:

National Labor Force = Required Labor Force

If national labor force is less than the required labor force, the country faces shortage of manpower.

3. THIRD INDICATOR: Economic Infra-Structure

The study will examine "follow-up reports" and other reports
to determine the following:

    a. Existence of needed roads and communication facilities
       according to these reports.

    b. Capabilities of executions of these facilities.

4. FOURTH INDICATOR: Administrative Institution

This indicator is also based on reports about implementation
and follow-up stages of planning authorities. The required insti-
tutions are expected to increase as more development projects are
executed.

It is clear that while the first two indicators can be quantified,
the last two are based on qualitative analysis. The nonfinancial gaps
analysis will cover the second period only, 1964-1973, due to the fact
that planning experience has started generally during this period.

Nonfinancial constraints will be examined according to their
impact on the growth process. The constraints thus can be divided into
three catagories:

    1. High impediments

    2. Medium impediments

    3. Low impediments

This will depend on time duration and intensity of each constraint.
If the constraint will exist for the whole second period and still
existed after that, this indicates "high impediment," on the other hand
if the constraint continues to exist only through the second period,
this will indicate a medium type of impediment. If the constraint

has only been for several years, then it will be categorized as low

impediment. The approach is illustrated in the following table.

TABLE XII

NONFINANCIAL CONSTRAINTS INDICATORS

CONSTRAINTS	HIGH	MEDIUM	LOW
Investment Performance			
Manpower Constraint			
Economic Infrastructure Constraint			
Institution Constraint			

This study will integrate the nonfinancial gap(s) with financial

gaps to identify each country's constraints.

Summary

This chapter presented the theoretical and operational framework

of the study. The first two parts cover the relevant literature about

the significance of capital inflows in less developed countries and gap

analysis. The objective was to provide the theoretical base for the

study.

The last two parts were focused on the operational methods to be adopted in the study. Two gap models have been presented in the third part to identify financial constraints. The fourth part examines the methods to identify nonfinancial constraints.

This chapter is connected to the next chapter, as it provides the operational framework for empirical analysis.

FOOTNOTES

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CHAPTER IV

EMPIRICAL ANALYSIS

This chapter presents the empirical analysis of financial con-
straints and nonfinancial constraints. Definition of variables and
sources of data are explained in the first section. Financial con-
straints are examined in the second section, to determine the dominant
gap or gaps in the two periods under study, 1957-1963 and 1964-1975,
in Libya and the other North African countries. While Egypt, Tunisia
and Morocco cases are examined in the two periods, the Algerian case
is explored only in the second period since national income data for
Algeria are available only after its independence in 1964. The third
part will present nonfinancial constraints results.

Definition of Variables and Sources of Data

The gap model introduced in Chapter III presents a test to deter-
mine the dominant financial gap during a period of time. The following
three equations will be estimated:

(1) $I_t = \theta_0 + \theta_1 Y_t + \theta_2 F_t + \theta_3 E_t + U_t$

(2) $I_t = \theta_0 + \theta_1 F_t + \theta_2 E_t + U_t$

(3) $I_t = \theta_0 + \theta_1 Y_t + \theta_2 M_t + U_t$

where

I_t = Gross investment expenditure

Y_t = Gross domestic product

F_t = Net foreign capital inflows

E_t = Total exports of goods and services

M_t = Total imports of goods and services

U_t = Error term

The model has defined different relationships between the dependent variable and the independent variables as indicators of the dominant gap or gaps, as shown in the following table.

TABLE XIII

COEFFICIENT'S RANGE

	$\partial I/\partial Y$ (θ_1)	$\partial I/\partial F$ (θ_2)	$\partial I/\partial E$ (θ_3)	$\partial I/\partial M$ (θ_4)
Case One: Binding Saving Const.	≥ 0	≤ 1	≥ 0	
Case Two: Binding Trade and Saving Const.		> 0	> 0	
Case Three: Binding Trade Const.	< 0			> 1

In each case the numerical values of the estimated coefficients are to be checked for consistency with the ranges shown in Table I. Thus there will be three different tests carried out for each country in each period. It is conceivable that a country may pass through different constraints in the two periods. Also the time series data may not be consistent with any of three cases or with more than one case.

A linear programming technique will be used to estimate the coefficients of the model by estimating the parameters of the following equation:

$$I_t = \theta_0 + \theta_1 Y_t + \theta_2 F_t + \theta_3 E_t + \theta_4 M_t + U_t$$

The following is the definition of variables and the main sources of data. The data are obtained at current prices and converted to constant prices by using a deflator that was based on the constant price real product index.

Investment

Gross investment is defined as the total of two items: Gross fixed capital formation and increase in stocks.[1] The annual data of this variable were obtained from International Financial Statistics which is published monthly by The International Monetary Fund. The other two sources are the United Nations Yearbook of National Accounts Statistics and national accounts statistics published by each country's statistical department.

Gross Domestic Product (Y)

The model defines (Y) as equal to the value of annual domestic

production (i.e. the total consumption expenditures (C) and saving (s)). The model, however, does not differentiate between the public and private sectors with regard to consumption and saving. The data on gross domestic product is obtained from the International Financial Statistics of the I.M.F., and the Yearbook of National Accounts Statistics of the U.N.

Net Foreign Capital Inflows (F)

This variable is defined as balance of trade deficit (imports-exports). The assumption of the gap model require that only years with positive net foreign capital inflows (+F) are included in the test. This means that the years where a surplus balance of payments existed are excluded from the analysis[2] It is concluded that for these years the saving constraint is binding. The data source for this variable is the same as for investment and gross domestic product.

Exports (E)

This variable is defined as the value of total exports of goods and services. The source of the data for this variable is the same source as for the other variables.

Imports (M)

This variable represents the value of total imports of goods and services. This study uses imports as an independent variable in the linear regression technique. The sources of data are the same as for all other variables.

Values for all variables were compiled at current domestic prices and converted to constant prices with the aid of a gross domestic product deflator for each country.[3]

The data for each country, except Algeria, was arranged according to the two periods under study: 1957-1963, and 1964-1975. These two periods represent the pre-oil era and after-oil era in Libya. For other countries, particularly Egypt, the periods represent eras of different economic policies era. The data was screened for each year to determine whether or not there was a net inflow of foreign capital. The regression was carried only for those years which showed net inflow of foreign capital.

Financial Constraint

Libyan Case

First Period: 1957-1963

Linear Regression Estimation. For this period, three separate regressions were carried out. The values of the estimated coefficient were then compared with the expected values in the table. Time series data from 1957 to 1963 were obtained for the dependent and independent variables. The equations and results of the three sets of regressions are as follows:

Case One:

In this case the following equation was estimated:

$$I_t = \theta_0 + \theta_1 Y_t + \theta_2 F_t + \theta_3 E_t + U_t$$

where

$$U_t \sim NID\ (0,\ I\ \sigma^2)$$

The result was:

$$I_t = -1271.980 + 0.39457Y + 0.01287F + 0.05674E$$

$$(-6.51624)\ (10.9555)\ (0.77757)\ (0.81514)$$

$$R^2 = 0.99966$$

Adjusted $R^2 = 0.99915$

$$d = 3.10932$$

The estimated coefficients in this equation conform to the case of binding saving and capacity constraints, where the estimated $\partial I/\partial Y$ is positive, and significant at the .05 level of significance which is expected in this case. Also the estimate for $\delta I/\delta F$ is positive and less than one as expected in this case. The equation was tested for serial correlation, because serial correlation results in biased estimates of the standard errors of the estimated coefficients and therefore biased (t) statistics. Both the Durbin Watson test and a (t) test of the first order autocorrelation were undertaken and it was concluded that there is no serial correlation at the 5% level.

Case Two:

This case involves investment (I) as the dependent variable and net capital inflow (F) and exports (E) as the independent variables. The following equation was estimated.

$$I_t = \theta_0 + \theta_1\ F_t + \theta_2\ E_t + U_t$$

where

$$U_t \sim NID\ (0,\ I\ \sigma^2)$$

The result of this regression was

$$* = 700.2450 + 0.01716F + 0.31600E$$

$$(0.2262)\ (7.0779)$$

$$R^2 = 0.99293$$

Adjusted $R^2 = 0.98822$

$$3 = 1.07539$$

The estimated coefficients conform to the case of binding trade and saving constraints. But as Weisskopf stated, this case represents a weak test and the first case will be accepted as long as income conforms to the sign of the first case. The equation was tested for serial correlation and the null hypothesis of no autocorrelation was accepted at the 5% level.

<u>Case Three</u>:

This case represents the pure case of binding trade and capacity constraints. The regression was undertaken with investment (I) as the independent variable and income (Y) and imports (M) as the inde-pendent variables. The following equation was estimated.

$$I_t = \theta_0 + \theta_1\ Y_t + \theta_2\ M_t + U_t$$

where

$$U_t \sim NID\ (0,\ I\ \sigma^2)$$

$$I = -1369.109 + 0.41702Y + 0.01154M$$

$$(38.27273)\ (0.74534)$$

$$R^2 = 0.99962$$

$$\text{Adjusted } R^2 = 0.99937$$

$$d = 2.01116$$

The results do not conform to the case of binding trade and capacity constraints. (Table I stated that the $\theta_1 < 0$ and $\theta_2 > 1$ in this case. But the result of the regression shows that $\theta_1 > 0$ ($\theta_1 = 0.41702$) and $\theta_2 < 1$ ($\theta_2 = 0.01154$).) The case was tested for serial correlation probability, and it was concluded that there is no autocorrelation.

Thus according to linear regression technique, the dominant gap in the Libyan case during the first period is the saving and capacity constraints. This was confirmed in the first case where (Y) income was highly significant and both (F) net capital inflow and (E) export have positive signs.

Linear Programming Technique. The objective of using linear programming techniques is to determine the binding constraint in a shorter period (four years in the case under study).

In the case of Libya, the same data are utilized, and the following years were the years where the constraints were the most binding, they are: 1958, 1960, 1961, and 1962. The estimating equation was the following.

The result was:

$$I = -10.42322 + 0.36295\cent + 0.00405F + 0.11365E$$

This result conforms to the first case in Table I, that is saving and capacity constraints are binding. This result confirms

the result reached by using the linear regression technique. The linear programming technique shows that this constraint has been more binding during these four years than the rest of the period.

Second Period: 1964-1975

This period covers the years 1964-1975. The main characteristic of this period is that there is a surplus balance of trade in all years.[4] According to gap analysis assumptions, only the saving constraint was binding during this period. The gap model only applies to financial constraints. Analysis of nonfinancial gap will be introduced in the next part. To sum the Libyan case up, saving constraints played a major role as financial constraints during the two periods.

The Case of Other North African Countries

The two techniques adopted to determine binding financial constraints are applied to each country during the two periods: 1957-1963 and 1964-1975.

Egypt - The First Period: 1957-1963

Linear Regression. Three sets of regression have been carried out. The results are summarized in the following table.

TABLE XIV

ESTIMATES OF COEFFICIENTS OF DIFFERENT CASES IN EGYPT
(FIRST PERIOD)

Regression	θ_0	θ_1 $\partial I/\partial Y$	θ_2 $\partial I/\partial F$	θ_3 $\partial I/E$	θ_4 $\partial I/\partial M$	R^2
1	-20059.71	0.152353 (3.308)	0.591495 (7.746)	0.69048 (12.436)	--	0.972
2	3098.563	--	0.564759 (4.626)	0.690731 (7.737)	--	0.928
3	-20189.82	0.156048 (3.204)	--	--	0.654690 (14.572)	0.968

Case One: d_1 = 3.014

Case Two: d_2 = 1.814

Case Three: d_3 = 2.574

The value of the estimated coefficients were compared with the expected values in Table I. Time series data from 1957 to 1963 was obtained for the dependent (I) and the independent variables (Y, F, E). The result conformed with the first case, i.e. saving and capacity were the binding constraints. The estimated coefficients for the second equation conforms with the second case also, but the methodology stated that we accept the first case whenever the (Y) income variable

is significant in the first test and the result conforms to the first test even if it conforms with the second test.[5] The second equation is similar to the first except that (Y) is dropped in the second case. The result does not indicate that autocorrelation exists.

The estimates of the parameters of the third equation do not conform to the expected values in the case three. The case assumes the existence of pure trade constraints. The result does not show serial correlation problems, so we accept the null hypothesis that no serial correlation exists.

Thus, for the first period in the Egyptian case, the binding constraint was the saving constraint based on the linear regression approach.

Linear Programming Technique. The same period has been tested using the linear programming technique. The following equation has been estimated:

$$I = 106.8456 + 0.11092Y + 0.68617F + 0.5640E + 0.0M$$

This technique permits results for a short period by selecting the years where the dominant gap was most binding. The years in the first period were: 1957, 1960, 1961 and 1963.

This indicates two conclusions: first, the result conforms that the first case of binding saving constraint was the dominant during the first period in Egypt. Second, imports (M) variable is not significant in the equation when exports (E) and net capital inflow (F) are included. The result of this technique support the results obtained by using linear regression approach; that is, Egypt during the first period, experienced a saving constraint as the dominant constraint in its growth process.

Egypt - The Second Period: 1964-1974

Linear Regression Technique. The second period covers eleven years in the Egyptian case. No data are available for 1975. Three sets of regression have been applied. The following table shows the results.

TABLE XV

ESTIMATES OF COEFFICIENTS IN EGYPT
(SECOND PERIOD)

Case	θ_0	θ_1	θ_2	θ_3	θ_4	R^2
		$\partial I/\partial Y$	$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial M$	
1	20054.84	-0.01550 (0.5157)	0.19582 (1.389)	0.5544 (4.1801)	--	.8175
2	16339.55	--	0.17414 (1.2796)	0.5459 (4.0992)	--	0.8131
3	264797.03	-0.02001 (0.6151)	--	--.	0.38185 (5.7858)	0.782

Case One: d_1 = 1.873

Case Two: d_2 = 1.793

Case Three: d_3 = 1.314

The results of the regression do not conform with the expected values for the first case in Table I. The income (Y) variable is not significant at the 5% level. The test for autocorrelation problems indicated that there is no autocorrelation problem in this case.[6]

The results of the second regression conform to the second case, with saving and trade constraints binding, i.e. the under utilization of capacity. The test shows that the two independent variables are significant at the 5% level.

The third equation was estimated, and it did not indicate that the trade constraint was binding. Serial correlation was not a problem in this case.

In conclusion, Egypt had binding saving and trade constraints in the second period.

Linear Programming Techniques. Applying this approach to the second period, 1964-1974, two tests were conducted. The first includes the whole period to determine the four years in which the dominant gap was dominant. The second step was to exclude the first four years and carry out the test for the rest of the period.

The first run resulted in choosing the following years: 1966, 1967, 1972, and 1973. During these years, the estimated equation was as follows:

$$I = 558.81692 - 0.13343Y + 0.13343F + 0.49468E + 0.0M$$

The dominant gaps were saving and trade constraints, i.e., the second case is applicable here.

A second test was carried out after excluding the first four years. The second test resulted in choosing the following years: 1964, 1968, 1971 and 1974. The estimated equation was:

$$I = 245.19399 - 0.01638T + 0.21262F + 0.45481E$$

This equation also confirms the results reached by linear regression technique and the result of the first test using linear

programming, i.e. the saving and trade constraints were binding during the second period in the Egyptian case.

The case of both saving and trade constraints can be represented in the following diagram at point A.

This is the case where the country is in an under capacity situation due to lack of both saving and foreign exchange.

Tunisia - The First Period: 1957-1963

Linear Regression Technique. Three separate regressions were applied to this period. The following table summarizes the results:

TABLE XVI

ESTIMATES OF COEFFICIENTS IN TUNISIA
(FIRST PERIOD)

Regressions	θ_0	θ_1	θ_2	θ_3	θ_4	d	R^2
		$\partial I/Y$	$\partial I/F$	$\partial I/E$	$\partial I/M$		
1	-12081.09 (1.284)	0.54524 (1.251)	0.60390 (0.517)	-0.3092	--	2.205	.897
2	2196.525	--	1.19016 (6.831)	0.0521 (0.091)	--	2.496	.873
3	-23507.39	0.78043 (1.646)	--	--	0.3228 (0.603)	2.834	.856

The first regression was undertaken to check whether there was a binding saving constraint. The equation did not show that this was the case. Though income and net foreign inflows have positive signs as expected in case one, the exports variable have a negative sign and it was not significant at the 5% level. There was no indications of autocorrelation.

The second regression represents binding saving and trade constraints. The estimating equation lies in the expected ranges for this case but the test is weak due to the fact that exports are not highly significant and the coefficient has very small value (0.052). Thus this case will require more investigation.

The third test does not show that trade was the dominant constraint during this period. However, the values of the coefficients are not consistent with the ranges of coefficients values representing the pure trade constraints.

The tests for this period are weak tests. Though case two may be applicable, but the fact that income was a more significant variable than exports and exports were significant only after income is dropped makes the results inconclusive. This period has been covered by Weisskopf study, and he attributes the inconsistency of the Tunisian case during this period to lack of adequate data.

Linear Programming Technique. The same period, 1957-1963, has been tested using linear programming technique. The optimal solution provides the following equation:

$$I = 44.94463 + 0.14241Y + 1.07732F - 0.86760E$$

The estimated equation was identified with the following years: 1958, 1959, 1960, and 1961. The estimated equation shows that exports

have a negative coefficient, while income and net capital inflows have positive coefficients. The same results have been achieved using the linear regression approach. Exports can compete with domestic investment. Nevertheless, this conclusion cannot clearly be drawn without analyzing the whole Tunisian economy during this period. The results are inconclusive for the period with regard to financial constraints.

Tunisia - The Second Period: 1964-1975

Linear Regression Technique. The second period of the Tunisian case was also examined using linear regression technique. The following table shows the results.

TABLE XVII

ESTIMATES OF COEFFICIENTS IN TUNISIA (SECOND PERIOD)

Regression	θ_0	θ_1	θ_2	θ_3	θ_4	d	R^2
		$\partial I/\partial Y$	$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial M$		
1	21.40722	-0.1512 (-1.213)	0.74674 (7.028)	1.31817 (4.563)	--	2.714	0.997
2	-10.08162	--	0.78405 (6.814)	0.86644 (16.970)		2.893	0.995
3	-8.38111	-0.02142 (-0.513)	--	--	0.915660 (8.165)	3.112	0.995

The above table shows that only the second case is applicable during this period. The first test indicates that the income variable has a negative sign. That means, that the first case is not applicable. Case two is applicable, and net capital inflows and exports have positive signs in the first and the second tests. Thus, both saving and trade constraints are binding during this period. The case of pure trade constraints, case three, is rejected as the coefficient values do not conform to the expected range of values of coefficients presented in Table I.

Linear Programming Technique. The results of the application of this technique are the following:

1. First Test: Indicates that the following equation is applicable during these years - 1965, 1971, 1972, and 1975:

$$I = 89.23947 - 0.16452Y + 0.67014F + 1.02410$$

2. The Second Test which is carried out after the exclusion of the years in Test One, has resulted in the following equation:

$$I = 104.78224 = 0.10362Y + 0.42105F + 0.66875E$$

The estimated equation was related to the years: 1966, 1969, 1970 and 1973.

The two tests give the same results, that is binding saving and trade constraints. Though the first four years have experienced these constraints more than other years in the second period. These results which are conducted for shorter periods (four years), confirmed the results of linear regression approach. This period provides more conclusive results than the first period (1957-1963). Tunisia, during the second period, can be classified as being both binding saving and binding trade constraints. All tests resulted in the same conclusion.

Morocco - The First Period: 1957-1963

Linear Regression Technique. This technique is applied to the first period (1957-1963), according to the constraint that appears from the data to have been binding on Morocco's growth constraint. The following table summarized the results:

TABLE XVIII

ESTIMATES OF COEFFICIENTS IN MOROCCO (FIRST PERIOD)

Regression	θ_0	θ_1 $\partial I/\partial Y$	θ_2 $\partial I/\partial F$	θ_3 $\partial I/\partial E$	θ_4 $\partial I/\partial M$	R^2
1	-81.38706	0.20254 (1.544)	-0.4759 (-0.671)	0.03862 (0.125)	--	0.50
2	17.2812	--	0.2547 (0.408)	0.38937 (1.608)	--	0.30
3	-16.7053	0.15211 (1.205)	--	--	0.10033 (0.316)	0.43

Case One: $d = 2.87$

Case Two: $d = 1.82$

Case Three: $d = 2.57$

The data covers the period 1957-1963, excluding 1959, which there was a surplus balance of trade.

The first regression shows that two independent variables, income and exports, have a positive coefficient: the other independent variable has a negative sign. Thus the results are not consistent with the first case. Also the (R^2) is very low, indicating that the goodness of fit is low.[7]

The second regression lies within the range of coefficients values for the second case. But the R^2 is also very low, therefore, the result cannot be accepted as conclusive.

The third regression was carried out with investment as the dependent variable and income and imports as the independent variables. The values of the coefficient do not lie with the ranges required for this case. Thus we cannot accept the case as the applicable one.

The three regression sets presented in the table show low (R^2) degree of fit. This makes the results weak. The second case of binding saving and trade constraints is the only cases that may be applicable. The linear programming technique aims to check the results, particularly in inconclusive tests resulting from linear regression.

Linear Programming Technique. This technique aims to specify the dominant constraints and the years in which they are dominating. The result of this technique was the following equation.

$$I = 0.71396 + 0.18840Y - 1.07126F + 0.5191tE + 0.0M.$$

The results show that income has a positive sign indicating that income has positive impace on investment. Net capital inflow has a negative influence on investment trends. As net capital inflows increase (M-E), investment decreases. Exports has a positive sign in its coefficient. The years where this equation is more applicable were: 1958, 1961, 1962 and 1963. The results however do not conform to any

of the three cases presented in Table I. Wiesskopf has indicated that
some countries during specific periods may not have consistent results
with any of the three cases.[8] The case of Morocco during this period
may represent one of these countries. Though the second test in
regression analysis does conform with the case of binding saving and
trade constraint, we cannot accept this conclusion after the applica-
tion of the linear programming technique.

Financial gaps analysis, thus, does not identify the dominant
gap in the case of Morocco, though it shows that income is a signifi-
cant variable in all the tests that were carried out.

Morocco - The Second Period: 1964-1975

The following table shows the results of the regression for the
second period. The years 1964 and 1965 were excluded because a trade
surplus existed for those years.

The table shows that the economy of Morocco during the second
period has conformed to two cases. They are:

1. Saving and capacity constraints binding.

2. Saving and trade constraints binding.

The test, however, shows that the regression coefficient for the
income variable has a very low value whenever it is included. The
other coefficients in the first and second tests did not change
drastically. This indicates that the second case is more applicable.
The pure trade constraint of the third case is not applicable. The
degree of fit (R^2) is high in all three regressions. Also no auto-
correlation was indicated in the three regressions.

TABLE XIX

ESTIMATES OF COEFFICIENTS IN MOROCCO
(SECOND PERIOD)

Regression	θ_0	θ_1	θ_2	θ_3	θ_4	R^2
		$\partial I/\partial I$	$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial M$	
1	-0.70492	0.08139 (0.625)	0.54232 (4.297)	0.52154 (0.636)	--	0.997
2	0.56673	--	0.96047 (8.165)	0.48789 (4.172)	--	0.994
3	-0.50239	0.05928 (0.395)	-- --	-- --	0.56411 (1.84)	0.997

Case One: $d = 2.57$

Case Two: $d = 2.01$

Case Three: $d = 2.52$

The result of this technique is that the second case is the applicable one. This case may be explained by the fact that policymakers when faced with a foreign exchange constraint, would allocate all foreign exchange to investment until the domestic saving constraint also became binding.

Linear Programming Technique. The application of this technique has resulted in estimating the following equation.

$$I = 2.74637 - 0.0929.Y + 1.15587F + 0.3457E$$

Thus the equation provides the same conclusion reached by regression analysis. That is, the country faces both saving and trade constraints.

The following years were the only possible years reached by this technique as the years in which the constraints were most binding in the whole period: 1968, 1971, 1974, and 1975.

The only difference between the results of the two techniques in this period is the fact that income shows a negative sign coefficient in the linear programming approach while it has a positive sign in the first approach. However, the regression coefficient for the income variable had a very low value in the two approaches.

To sum up the case of Morocco, the first period does not show results consistent with any of the three cases, while the second period shows that both saving and trade constraints were binding during the period.

Algeria - 1964-1975

The Algerian case has been tested only for the second period: 1964-1975. No data is available for the first period because the country became an independent country only at the beginning of the second period. To determine which constraints have been dominant in limiting investment and growth in Algeria, the two techniques were applied.

Linear Regression. The following table shows the results of the three separate regressions that were carried out.

The first regression indicates that income is a significant variable and it has a positive coefficient. The net capital inflows and exports, however, are less significant. The values of the coefficients are not within the ranges of expected values in Table I. Thus the case of a binding pure saving constraint is not applicable. The

second regression gives results that indicate the second case is appli-
cable. This case is the case where both saving and trade constraints
are binding. The third case is not accepted as the values of the
regression coefficients do not conform with the expected values for
this case (the pure trade constraint).

TABLE XX

ESTIMATES OF COEFFICIENTS IN ALGERIA

Regressions	θ_0	θ_1	θ_2	θ_3	θ_4	R^2
		$\partial I/\partial Y$	$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial M$	
1	-1483.81	1.115386 (12.528)	-0.2524 (-1.321)	-0.43537 (-3.567)	--	.952
2.	-21.3385	--	1.79406 (3.985)	0.88436 (3.158)	--	0.981
3.	-1544.355	1.1486 (12.828)	--	--	-0.4133 (-3.201)	0.998

Case One: $d = 2.15$

Case Two: $d = 1.06$

Cast Three: $d = 2.26$

Linear Programming Technique. The estimated equation based on
this technique is the following:

$$I = -16.6722 + 1.27039Y - 0.69948F - 0.55567E$$

This equation does not conform to any of the three cases. Income is the most significant variable in the equation. Based on the regression analysis, the only case that was applied is the case where trade and saving constraints are binding. The Algerian case, however, does not fit in any of the cases, thus more data is needed to apply these techniques.

Summary of the Cases of Other North African Countries

To summarize the results of these countries, the tables on pages 88 and 89 show regression technique results and L.P. results.

The table on page 90 shows that only in the case of Egypt did we optain conclusive and consistent results for both periods. Tunisia and Morocco had consistent results during the second period only. The Algerian case cannot be classified by any of these tests. Lack of good data is one element that has proved to be highly important in these empirical studies. Egypt had established a system to collect appropriate data that cover the two periods.

Nonfinancial Constraints

Libyan Case

Four indicators will be tested as outlined in the theoretical framework, they are:

1. Investment performance
2. Manpower constraints

TABLE XXI

SUMMARY OF RESULTS OF LINEAR REGRESSION TECHNIQUES FOR NORTH AFRICAN COUNTRIES

COUNTRY	FIRST PERIOD					SECOND PERIOD				
	θ_0	θ_1	θ_2	θ_3	θ_4	θ_0	θ_1	θ_2	θ_3	θ_4
		$\partial I/\partial Y$	$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial M$		$\partial I/\partial Y$	$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial M$
Egypt										
(a)	-20059.71	0.152	0.591	0.690	--	20054.84	-0.015	0.195	0.554	--
(b)	3098.56	--	0.564	0.690	--	16339.55	--	0.174	0.545	--
(c)	-20189.82	0.156	--	--	0.654	26497.03	-0.020	--	--	0.381
Tunisia										
(a)	-12081.09	0.545	0.603	-0.309	--	21.407	-0.151	0746	1.318	--
(b)	2196.52	--	1.190	0.052	--	-10.081	--	0.784	0.866	--
(c)	-23507.39	0.780	--	--	0.322	- 8.381	-0.021	--	--	0.9:5
Morocco										
(a)	-81.387	0.202	-0.475	0.0386	--	-0.7049	0.081	0.542	0.521	--
(b)	17.281	--	0.254	0.389	--	0.566	--	0.960	0.487	--
(c)	-16.705	0.152	--	--	0.100	-0.502	0.059	--	--	0.564
Algeria*										
(a)	--	--	--	--	--	-1483.81	1.115	-0.252	0.435	--
(b)	--	--	--	--	--	-21.33	--	1.794	0.884	--
(c)	--	--	--	--	--	-1544.35	1.148	--	--

TABLE XXII

SUMMARY OF RESULTS OF L.P. OF NORTH AFRICAN COUNTRIES

COUNTRY	FIRST PERIOD					SECOND PERIOD				
	θ_0	θ_1	θ_2	θ_3	θ_4	θ_0	θ_1	θ_2	θ_3	θ_4
		$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial E$	$\partial I/\partial M$		$\partial I/\partial Y$	$\partial I/\partial F$	$\partial I/\partial E$	$\partial I/\partial M$
Egypt										
(a)	106.89	0.110	0.686	0.564	0	539.81	0.133	6.133	0.494	0
(b)	--	--	--	--	--	245.19	-0.163	0.212	0.454	0
Tunisia										
(a)	44.94	0.142	1.077	-0.867	0	89.23	0.164	0.670	1.024	0
(b)	--	--	--	--	--	104.78	0.1036	0.421	0.668	0
Morocco										
(a)	0.713	0.188	1.071	0.519	0	2.746	0.092	1.155	0.345	0
(b)	--	--	--	--	--	--	--	--	--	--
Algeria										
(a)	--	--	--	--	--	16.672	1.270	.699	0.556	0
(b)	--	--	--	--	--	--	--	--	--	--

TABLE XXIII

SUMMARY OF FINANCIAL GAPS

COUNTRY	FIRST PERIOD Regression	L.P.	SECOND PERIOD Regression	L.P.
Egypt	Saving Const.	Saving Const.	Saving & Trade	Saving & Trade
Tunisia	Saving & Trade	Not Conclusive	Saving & Trade	Saving & Trade
Morocco	Not Conclusive	Not Conclusive	Saving & Trade	Saving & Trade
Algeria	N/A	N/A	Saving & Trade	Not Conclusive

3. Economic infra-structure constraints

4. Administrative institutions constraints

Investment Performance

To test investment performance we will compare the ratio of investment to GDP with rate of growth multiplied by capital/output ratio. This is obtained from Harrod/Domar model as an indicator of the ability of the economy to invest. The growth rate is assumed to be 18%. This high rate is due to the fact that the country depends on oil which is a nonrenewable resource. The following equation will be tested

$$\frac{Io}{Yo} \geq \bar{r} \ K$$

Where

Io = Investment during the period

Yo = Gross national income during the period

$\bar{r}$ = Growth rate adopted by government planning authorities

K = Capital/output ratio

This test will be conducted in a way that reflects the nature of the Libyan economy. This economy is characterized by having dual nature (oil sector and nonoil sectors). The analysis thus will reflect that. The test will be as follows:

1. Test for the whole period for all sectors.

2. Test for the whole period for nonoil sectors only.

In order to define the constraints as high, medium, or low impediment, the period will be divided into subperiods.

The hypothesis can be stated that if investment performance is not considered as constraint, the following conditions must be applied:

$$\frac{Io}{Yo} \leq K \bar{r}$$

The test for the whole period for the total economy was as follows:

$$0.26 \geq 1.38 \ (.18)$$

$$0.26 \geq .25$$

The results for the two periods indicate that the performance of investment in the period 1964-69 is higher than the period of 1970-1975. This was because the total of investment in the first period in the oil sector was more concentrated.

If we examine the non-oil sectors for the entire period, the performance of investment test results in the following:

$$\frac{Io}{Yo} \geq K \bar{r}$$

$$0.46 \geq (2.42) \ (.18)$$

$$0.46 \geq .44$$

The results also did not show the investment to be a binding constraint for the whole period. For shorter periods, the results were as follows:

1964-1969: $\dfrac{Io}{Yo} \geq K \bar{r}$

$$0.36 \geq 2.28 \ (.18)$$

$$0.36 \geq 0.41$$

1970-1975: $\dfrac{Io}{Yo} \geq K \bar{r}$

$$0.51 \geq (2.46) \ (.18)$$

$$0.49 \geq 0.44$$

Manpower Constraints

The test will be conducted as follows:

National Labor Force $\approx$ Required Labor Force

The importation of non-Libyan labor force was taken as indicator of
the country's needs of greater labor force than its National Labor
Force. The following table shows the trends.

TABLE XXIV

TRENDS IN THE LABOR FORCE

YEARS	NATIONAL LABOR FORCE	TOTAL LABOR FORCE	DEFICIT
1964	348.2	365.3	17.1
1965	359.1	382.6	23.5
1966	370.4	400.8	30.4
1967	382.1	419.7	37.6
1968	394.3	439.9	45.6
1969	415.8	461.4	45.6
1970	438.4	484.0	45.6
1971	432.8	498.0	66.0
1972	434.0	507.0	73.0
1973	437.0	558.4	121.4
1974	450.9	624.1	173.2

Source: Libyan Arab Republic, Ministry of Planning (Planning
Document -7: National Economic Structure, 1972, 1976).

The table shows that the deficit is increasing during each year in the period. If we examine the period of 1964-1969 the rate of increase of total labor force was 27.0%, while the national labor force has increased by only 19.25%. The deficit has increased by 167%.

Economic Infrastructure and
Administrative Institutions

These two factors will be analyzed in the next chapter by reviewing the government follow-up reports. This is to indicate whether the factors are constraints to economic growth or not.

Case of Other North African Countries

Performance of Investment

To test the performance, the following equation will be utilized:

$$\frac{Io}{Yo} \geq K\ \bar{r}$$

The result of the four countries was as follows:

(1) Egypt:

$.17 \leq 2.32\ (.10)$

$.17 \leq .23$

(2) Tunisia:

$.23 \leq 2.84\ (.10)$

$.23 \leq .28$

(3) Morocco:

$.15 \leq 1.98\ (.10)$

$.15 \leq .20$

(4) Algeria:

$$.34 \geq 2.77 \ (.10)$$

$$.34 \geq .28$$

The cases of Egypt, Tunisia and Morocco show lack of performance of investment. We assumed that the target of growth of these countries is .10 annually. Algeria, though, shows a reasonable investment performance; however, if we recognized the financial resources of this country, its performance is barely accepted.

Other Nonfinancial Indicators

The other indicators include:

1. Manpower constraints

2. Economic infrastructure

3. Administrative institutions

These factors, for which quantitative data is not available, will be analyzed in the next chapter. The analysis will rely on information obtained from U.N. reports.

Summary

This chapter presented the empirical analysis of financial and nonfinancial constraints in all of the five cases. Two techniques to test financial constraints have been applied in each case during the two periods under study: 1957-1963 and 1964-1975. Financial gaps have been determined in each case based on the tests and the applicable case. The three cases were:

1. Saving and capacity constraints

2. Saving and trade constraints

3. Trade and capacity constraints.

The countries have been classified according to which financial gap was dominant. In some cases, there was no conclusive results. As far as nonfinancial constraints, empirical tests have been conducted to test the investment performance and manpower constraints in Libyan case. The other indicators will be analyzed in the next chapter. The investment performance, also, has been tested for other North African countries. The next chapter will interprete and integerate the empirical analysis which was conducted in this chapter.

FOOTNOTES

[1] Investment is defined the same way in similar gap empirical studies refer to M. Applegate and Weisskopf studies cited before. The same definitions as used in all parts of the study.

[2] T. Weisskopf, "An Econometric Test for Alternative Constraint on the Growth of Underdeveloped Countries," Review of Economic and Statistics, 54 (1972), p. 73.

[3] The deflator which is used is the constant price and product indices given in O.E.C.D., National Accounts of Less Developed Countries (Paris: 1968, table 4) for Years 1957-1963. Then the real product indices in the U.N. National Account Book for the years 1964-1975.

[4] Oil exports started in 1962, but the impact on balance of trade to be favorable started in 1963.

[5] Weisskopf, p. 74.

[6] Two tests have been carried out to detect autocorrelation: Durbin Watson and the test for first autocorrelation error.

[7] J. Kmenta, Elements of Econometrics (New York, 1971), p. 233.

[8] Weisskopf, p. 73.

CHAPTER V

INTERPRETATION OF EMPIRICAL RESULTS

This chapter will examine and interpret the empirical results
presented in Chapter IV. The gap model was concerned with financial
constraints; thus, the first part of this chapter will concentrate
on these. The second part will discuss nonfinancial gaps which
limit absorptive capacity. The third part integrates the financial
and nonfinancial constraints in an analysis of the general outlook
for the economics involved. First, the Libyan case is presented,
then the other North African countries are examined. The interpre-
tation includes the following: what the empirical results imply,
what the results for different periods of time mean, and what expla-
nations and supporting evidences are there for the results. The
scope of potential economic cooperation in North African region which
this study reveals will be also presented. This part culminates
the analysis by presenting a suggested body for integerating the
economics of these countries. This will take into consideration
the dominant gap or gaps in each country, and the potential resources
of the region as a whole.

Financial Constraints

The Libyan Case

The empirical results show that Libya experienced binding saving

constraints in the period, 1957-1963. This finding has been determined
by both the linear regression technique and the linear programming
approach. Though the country had limited opportunities in obtaining
foreign exchange from exports, it had foreign exchange from foreign
assistance and grants-in-aid. The potential for increasing public
revenue through taxation was severely limited by the narrowness of the
income base and, throughout this period, customs duties formed substan-
tial revenue. The results also imply that the country was unable to
execute most of the desired projects due to incapabilities of its imple-
mentation organizations. World Bank report refers to this fact in
1961.[1] Lack of absorptive capacity has limited the government ability
to spend and in 1955 there was a surplus in the budget. This lack of
absorptive capacity in turn has resulted in lack of private saving as
income was not generated.[2]

As far as the second period (1964-1975) is concerned, the saving
constraint is also assumed to be binding. This is because during the
period, the country had a surplus in its balance of trade, i.e., no
trade gap.

Saving, thus, is the major element in the financial gaps in the
Libyan case. To examine the saving behavior, we will estimate the
saving function based on the following equation:

(1) $\quad S = \theta_0 + \theta_1 Y + \theta_2 F + \theta_3 E$

$\quad$ S = Saving

$\quad$ Y = Gross national income

$\quad$ F = Net capital inflow

$\quad$ E = Exports

The estimated equation in the Libyan Case for the period 1957-1975 was as follows:

$$S = -374.25 + 0.14857 \ Y - 0.31576 \ F + 0.65129 \ E$$

$$(1.91) \qquad (-2.99) \qquad (4.02)$$

$$R^2 = 0.9843$$

Adjusted $R^2 = 0.978$

$$d = 1.494$$

The equation shows that saving depends on income and to a large extent on exports. Net capital inflow (which was negative during the whole period = E>M), has a negative relationship with saving which is consistent with our previous assumptions. This implies that some of net capital inflow was used to finance consumption. The equation does not indicate autocorrelation problem.

The results show that savings depend on export. This is due to the fact that a large portion of saving is public saving. The country exports one main product (oil) where the government receives the revenues and directs the spending procedures.

The results indicate that saving shortages have been the major financial constraint facing Libya in the first and the second period; thus, this variable has to be explained in more detail. Actually, Libya faced not only the problem of establishing private sector saving behavior but also lack of financial intermediaries in which saving is transformed into capital formation.

The income was not evenly distributed among population where a large portion is still at low levels of income. The Family Budget Survey of 1961 showed that about 61% of rural families earned less than $500 a year. In some areas (the southern part of the country).

the estimated percentage was 86%. Only 2% earn more than $1500 annually.[3] Instability of income and inflation accentuated the problem. Nevertheless, revenues from oil taxes and royalties increased sharply. To channel these revenues into productive investment through the private sector has proved to be a difficult task. This was due to shortage of enterpeneurs in the Libyan population and the fact that most of Libyan private sector is engaged in commercial and service activities.

The second problem Libya faces is the lack of the ways of transforming available saving into capital formation. The expenditures side of the economy is divided into consumption expenditures and capital formation expenditures. Consumption expenditures as a percent to GDP at current prices have declined from 73.5% in 1963, to 68.3% in 1967, to 67.9% in 1973. But if we take into account inflation, the real consumption share has decreased only from 73.6% in 1963 to 70.4% in 1967 to 70.0% in 1973. The private sector share of capital formation has declined from 19.0% in 1963 to 14.2% in 1967, while the public sector shares have increased from 6.9% to 17% during the same period. Although there is no detailed data for later years, public sector nationalization laws have made the public sector share larger. The oil companies account for 80% of the total private sector investment expenditures in 1972. Thus oil sector has received more expenditures than other sectors. This indicates that financial resources for investment are either concentrated in public sectors or oil companies. Also, in Libya most of investment projects depended on importing capital goods from abroad, the costs of investment project has increased more than other projects which depend on local resources. This is due to world inflationary trends, transportation costs, and higher prices of capital

goods. As investment projects require a higher level of expertise that was generally lacking in the country, this in turn caused such projects to be more expensive than similar projects in advanced countries. Thus it is important to differentiate between how much was allocated for investment projects and how much was implemented. This has been stated in many follow-up reports of the Ministry of Planning.[4]

Investment abroad has started to take place. The figure was (-$150) million in 1962 and became $115.5 million in 1967 to about $200 million in 1970. This indicates that during the first period, the country has used all its domestic financial resources to develop its infrastructure projects, but later, investment opportunities in the later period became limited inside Libya.

The implications of the financial constraint analysis, is that while financial resources were the pivotal elements of economic growth in the first period (1957-1963), they became only one element among others during the second period. The problem was not the size of saving as such, it was a problem of the composition of saving. Public saving cannot always substitute for the private enterpeneur in establishing more productive projects. The public sector in LDC's suffers from inefficiency in implementation, and this has made investment projects more expensive and less effective. Libya does not face a problem of limited foreign exchange. However, the country imports a large part of its consumption goods which means that the country spends relatively less on capital goods.

The Case of Other North African Countries

The empirical results of the gap model indicate that in the first period (1957-1963), saving was the binding constraint in Egypt, while results for the other three countries were not conclusive. During the second period (1964-1975), however, all countries have experienced the case of binding saving and trade constraints, which implies under utilization of capacity.

As far as the Egyptian case, the rates of growth of consumption accelerated between 1957 and 1963.[5] However, the share of consumer goods in total imports decreased from 41% in 1954 to 30% in 1961. Thus during the period, a larger part of the income has been devoted to consumption relative to saving. Table XXV shows the percentage of saving to disposable income in selected years. Saving as a ratio to disposable income indicates that domestic saving in Egypt decreased in every year after 1966, except in 1973. The need for foreign resources to meet capital formation requirements in Egypt has increased. Thus as investment increases, the balance of payment deficit grew.

As far as other countries are concerned, the binding constraints were saving and trade in the second period (while no conclusive results emerged for the first period) this situation indicates less than full capacity economics. Table XXVI shows the trends in saving during selected years.

TABLE XXV

SAVING AS % OF INCOME IN EGYPT

YEARS	SAVING AS % OF NATIONAL DISPOSAL INCOME
1960	14.0
1963	12.2
1965	12.6
1966	14.8
1967	10.4
1968	12.2
1969	12.9
1970	10.7
1971	10.1
1972	11.9
1973	13.9

Source: United Nations - National Accounts

TABLE XXVI

SAVING AS % OF INCOME IN MOROCCO AND TUNISIA

| YEAR | SAVING AS % OF NATIONAL DISPOSABLE INCOME | |
	Tunisia	Morocco
1965	10.6	9.1
1966	12.2	7.8
1967	10.1	9.4
1968	13.6	8.0
1969	11.5	9.8
1970	9.5	12.4
1971	14.0	10.8
1972	12.0	9.6
1973	11.7	11.3
1974	15.0	12.7

Source: Calculated base on data from the National Accounts, U.N., 1975.

As Table XXVI shows, there are fluctuations in saving trends. This makes these countries unstable in a financial sense if they must rely on domestic saving. The Algerian case does not provide adequate data, but as a country that exports substantial quantities of revenues will constitute the major source financing capital formation in Algeria.

Foreign trade is considered the main source of foreign exchange in these countries. The relative weight of exports and imports in the North African economies, except Libya, are not higher than in most developed countries, (In European countries, export and import represent 25-30% of GDP). However, as the production of capital goods is limited, most of these goods are imported, and thus the growth rate depends on how the country manages to obtain these goods. The following table shows basic data on foreign trade in selected years.

TABLE XXVII

NORTH AFRICAN COUNTRIES EXPORTS AND IMPORTS AS % OF GDP IN SELECTED YEARS

COUNTRY	Exports				Imports			
	1964	1968	1972	1974	1964	1970	1972	1974
Morocco	22.1	19.9	20.8	26.0	21.7	21.6	22.6	32.7
Algeria	26.0	24.6	23.6	42.9	26.1	25.0	30.6	40.6
Tunisia	19.4	23.1	21.9	25.8	31.0	26.4	26.4	33.2
Egypt	18.9	12.4	14.3	19.8	25.9	17.5	18.4	28.6

Source: International Monetary Funds: International Financial Statistics

The extent to which each country's economic development was determined by external stimuli can be grasped by looking at the reliance and increasing rate of exports and imports shown in the above table. Algeria in the later period, became more involved in foreign trade as oil exports started to occupy larger shares. Other countries have to supplement their exports by obtaining multilateral and bilateral loans to be able to import needed goods. Egypt has been by far the most deficit prone nation in the region. The cumulated foreign deficit from 1950 to 1967 was about $500 million. The same situation is applicable to a lesser degree to Tunisia and Morocco. To finance the deficit, these countries have to seek foreign loans decrease foreign exchange reserves, and to let the reserve of gold and foreign exchange be brought down to a minimum, as in the case of Egypt in 1960.[6]

The North African countries have to cope with limited financial resources. The shortages of both saving and foreign exchange have resulted in creating structural problems, such as unemployment and a slow rate of growth of the commodity sectors (agriculture and manufacturing). The main cause of the shortage in saving was the inability of the private sector to generate savings, the inefficiency of the public sector in creating saving, and the increase in consumption trends in these countries. The shortage of foreign exchange was due mainly to the heavy dependence of exporting one main commodity in each country (cotton, phosphates, oil). The prices of these commodities, as in the case of most raw material, did not increase relative to imported manufactured goods.

Financial constraints, particularly foreign exchange, are affecting these countries economies more than in the case of Libya, when

foreign exchange is not a serious problem.

Nonfinancial Constraints

The Case of Libya

In this section, we will expand the economic growth constraints
to include nonfinancial constraints. These constraints as mentioned
in Chapter III, are considered the cause of the existance of absorptive
capacity limitations. Four indicators will be examined as outlined in
the theoretical framework, they are:

1. Investment performance

2. Manpower constraints

3. Economic infra-structure constraints

4. Administrative institutional constraints

To evaluate these constraints, we will categorize each as a high,
medium, or low impediment according to its time duration and inten-
sity. This means that if a particular impediment continues to exist
and does not decline, it is considered as a high impediment. How-
ever, if the problem has existed most of the period but there is a
decline in the trend, it is a medium impediment. If the problem
had existed only for a short period and it has been reduced, it is
considered as low impediment in this study. The second period will
be examined only because the experience with planning started in 1963.

Investment Performance

In Libya, investment for development purposes has become the public

sector's responsibility. Investment performance can be examined with respect to share of investment in gross national product, and the rate of increases of investment in the second period. Table XXVIII shows the share of investment in GNP.

TABLE XXVIII

SHARE OF INVESTMENT IN GNP

Year	I as % of GNP
1964	36.08
1965	34.76
1966	34.84
1967	33.62
1968	33.59
1969	30.73
1970	22.12
1971	17.68
1972	24.28
1973	28.32
1974	24.65
1975	27.79

Source: Prepared based on data: National Accounts, Libyan Arab Republic, (1962-1971), (1971-1975).

Table XXVIII shows that while investment has increased in the absolute terms, its percentage share has declined during the 1970's. The first two years decline were mainly due to the revisions of the planning system by the new political system which came to power in 1969. Also it is due to the fact that the country has invested heavily in infrastructure projects (both social and physical: education, health, roads, communication facilities) in the beginning of the period as the country was in short of them.

The second indicator is the annual rate of increase of investment during this period, as shown in the following table.

TABLE XXIX

ANNUAL RATE OF GROWTH OF INVESTMENT: 1954-1975

YEARS	RATE OF GROWTH %	INVESTMENT (L.D.)
1964	41	110.6
1965	37	151.4
1966	29	195.0
1967	12	218.0
1968	36	296.4
1969	9	323.7
1970	-24	246.3
1971	17	287.9
1972	48	436.6
1973	46	636.2
1974	54	979.2
1975	11	1083.1

SOURCE: National Accounts, Libyan Arab Republic (prepared based on
           date: 1963-1975).
   L.D.: Libyan Dinar

The two tables show that there is a decline in the growth of invest-
ment was a constraint during the period 1964-1969 (for nonoil sectors).
Later on, (1970-1975), the performance of investment was acceptable as
the country established more infrastructure to facilitate the implemen-
tation of development projects.

The implication of the test is that investment as a performance
indicator was not highly significant contraint in Libyan economy. The
nonoil sectors, however, were different from oil sectors. The per-
formance of investment in these sectors was less efficient than the
oil sector. The oil sector is a highly modernized sector where foreign
private investment has occurred, and technology, innovation, and
skilled manpower are brought from abroad. While the nonoil sectors
could not absorb these elements (technology, innovation, etc.) as
effectively as in the oil sector.

In general, if the other sectors started to develop more effi-
ciently, investment performance in them may surpass the oil sector
recent performance. The problem would be eliminated if linkages
between the highly advanced sector (oil) and other sectors could be
developed. This constraint is considered a low impediment as the
duration and extent is limited.

Manpower Constraints

Manpower is a limiting factor on absorptive capacity if the supply
of the appropriate quantity and quality of labor from the national
labor force is less than the country's demand for labor. To test this
indicator, the national labor force was compared to the total labor
force used during the period 1964-1975. The test in Chapter IV

indicated that the required labor force is more than the national labor force. Also the deficit is increasing during each year in the period. The rate of increase between 1970-1974 of the total labor force was 28%, while this rate for the national labor force was only 3%. Thus, the national labor force did not increase as much as the total labor force.

However, the Libyan case, unemployment in the national labor force was about 3%. This means that a part of labor force cannot satisfy the requirements of job market demand. Lack of skill and/or training is a problem facing the fast changing job market in Libya. The size of the labor force in the oil sector was about 1.7% of the total employed labor force in 1974. The nonoil sectors employ 98.3% of total employment.

Lack of manpower is considered a high impediment in the Libyan case. The main reason is the inability of the national labor force to meet the labor force requirements in all sectors of the economy. Furthermore, Libyan experience shows that the reliance of foreign labor is an unstable solution, especially in the long run.[7]

Economic Infrastructure

Certain sectors, including transportation, communications, and public works sectors, were recognized in Libyan plans to be vital to the development of the whole economy. Two main difficulties confronted Libya in these sectors. The first was the size of the country, and the second was the scattered nature of the population.[8]

These sectors were highly underdeveloped when the country was estab-

lished. These sectors were heavily damaged during World War II.

Harbors, roads, bridges and railroads had all suffered from damages and

neglect. As the oil began to be discovered and new economic growth

prospects were created, massive infrastructure development was required.

A number of variables have to be taken into consideration in relation

to the present infrastructure inadequacies and future planned develop-

ment. The following are the most important variables.

1. Population growth is assumed to be 3%, thus the total popula-

tion will be about 2,500,000 in 1980. Future growth will be concen-

trated in the cities and other centers which will require expansion in

the demand for transportation and communication.

2. Agricultural production by the year 2000 is expected to be

double the 1964 level. This will require expansion in all infrastruc-

ture projects.

3. Heavy concentration of industrial projects in Tripoli,

Benghazi and other urban centers will necessitate an increase in infra-

structure facilities.

4. Increases in imports due to increase in income will require

expansion of port facilities.

The implication of these projections is that roads have to be

improved and provided, tele-communications networks modernized, and

harbors and airports reconstructed. Table XXX on page 114 shows

selected forecasts of transportation facilities prepared by the

TABLE XXX

SELECTED FORECASTS PERTINENT TO TRANSPORTATION DEVELOPMENT

	1972	1987
Private passenger cars	134,000	343,000
Total daily passenger movement within:		
(Tripolitania) Western Region	24,200	90,900
(Cyrenaica) Eastern Region	14,350	53,900
Tripolitani-Cyrenaica	770	2,900

Increase in total daily passenger movement within:	(1964-72)	(1972-87)
Tripolitania	106%	275%
Cyrenaica	109%	275%
Tripolitania-Cyrenaica	250%	276%

Imports by port 1972, 1987

    (000 metric tons):

	1972	1987
(Tripoli and Benghazi)	3,970	6,640
Passenger arrivals and departures		
(Tripoli and Benina)	395,000	N.A.

Source: Kingdom of Libya, Ministry of Planning and Development,
Transport in Libya, A General Survey and Study of the
Means of Communications, Preliminary Report, Doxiadis
Associates, Consultants on Development and Ekistics
(2 vols.; Athens: Doxiadis Associates), 1964.

Ministry of Planning. These expansions require the spending of 17% of the development budgets. Financial resources can help in allocating the needed budgets but implementation of the infrastructure projects require labor, technology and highly experienced companies in these areas. This makes the infrastructure a physical constraint to the development of other sectors. The problem needs will take time to solve, as the country has started from a very low level of infrastructure. More roads, communication facilities, airports, and other infrastructure projects are expected to be needed when the planned agricultural and industrial projects are implemented. The problem is considered a medium impediment as more projects have been implemented during the previous economic development plans.

Administrative Institutions

Administrative institutions can create serious bottlenecks in all sectors of the economy if an inefficient administrative machinery causes a lack of coordination in policy making and implementation. The existing administrative organizations have been described as traditional, a remnant of the colonial past, and an important element in constraining the absorptive capacity in Libya. R. Farley stated about the planning experience in Libya, "Planning institutionalization was there, but not the critical minimum number of planning administrators, technicians, and expertise."[9] The National Planning Council document mentioned that, "There is no evidence that the ministeries concerned are making serious efforts for collection and use of data in planning and implementation."[10] The problem is observed when developmental projects are completed, but

development administration organization had not established to use them,

such in cases of hospitals, schools and large industrial projects.

In general the situation in Libya can be described, as Waterson

says, as one in which the less developed countries have,

> . . . administrative machines which are suitable enough for
> carrying out police, judicial, and revenue collecting func-
> tions of government, but are not effective in performing
> functions required in dynamically developed societies.[11]

In fact, the economic changes which are occurring in Libya have been

handicapped by the absence of rules or set procedures and needed

organization for these changes. Thus the implementation of several

development projects was delayed due to lack of administrative insti-

tutions. This is one of the major problems influenced by social values

and the educational system. As the problem requires a long time to

solve, administrative organization is considered a high impediment.

The Case of Other North African Countries:

The following aspects will be covered as indicators of nonfinancial

constraints:

1. Performance of investment

2. Manpower constraints

3. Economic infrastructure

4. Administrative institutions.

Performance of Investment

The investment trends in these countries are presented in

Table XXXI which shows investment as a percentage of GDP in selected

years in the four countries.

TABLE XXXI

INVESTMENT AS % OF GDP IN SELECTED YEARS

COUNTRY	1964	1968	1970	1974
Egypt	16.7	13.5	13.7	18.5
Tunisia	21.0	20.0	21.9	22.2
Algeria	11.8	15.9	14.7	16.8
Morocco	13.5	22.1	30.1	32.2

Source: Calculated from data, U.N. National Accounts

The trends are different in each country. The Egyptian case is characterized by a slowing down in investment due to an increase in consumption trends. The Algerian trends should be examined with the understanding that the GDP has increased substantially in absolute terms, so investment percentages may not represent the trends. Tunisia has a stable trend. Morocco has an increasing trend as more investment opportunities in the mineral sector started to take place in the 1970's.

The tests in Chapter IV indicated that the cases of Egypt, Tunisia and Morocco show lack of performance of investment, which means that these countries investment did not achieve their targets. Algeria on the other hand shows a reasonable investment performance; however, if we recognized the financial resources of this country and assume 12% instead of 10%, as a target rate, the performance will be barely

acceptable. Thus this constraint is applicable to the first three countries and to a less extent to the Algerian case. The problem is considered high impediment as it requires a long time to be solved.

Manpower Constraints

The manpower problems faced the other North African countries differ from those which exist in Libya. Unemployment is a major problem in these countries; unemployment was estimated in Egypt, Tunisia, Algeria and Morocco: 11%, 10%, 8%, and 10%. Under-employment is another general phenomenon in Egypt and Morocco particularly in rural areas.[12] It was estimated that in these countries, there is unemployment in agriculture that amounts to 30% of the labor force. In the region as a whole the supply of labor exceeds the demand in all sectors, except in Libya.[13] The lack of employment in some countries has led to internal and external migration. The largest migratory movements in recent years being recorded in Algeria, Morocco, and Tunisia. There were about 800 thousand people from these three countries in France in 1964 and most of them originated from rural areas in their countries.

Thus the problem can be defined as not shortage of manpower, but rather unemployment and under-employment problems. Some skilled manpower in these countries, however, have migrated to more advanced countries because of brain drain pehnomenon between developed and less developed countries. This problem, however, is classified as a medium impediment.

Economic Infrastructure

The most striking feature of investment strategy in North Africa is the leading role of the public sector in the promotion of economic

development. One reason behind this policy is a desire to direct
investment in those economic activities considered of particular
importance to future economic growth. The most productive areas
in the North African countries are limited to a relative narrow,
horizontal strip lying between the Mediterranean coast and the Oasis
in Sahara. And, due to the fact that ex-metropolitan powers have
invested heavily in the infrastructure of these areas, there exists
a reasonably adequate system of roads, railways, and harbors. But in
other parts of the region particularly in the southern mountains and
deserts, such facilities are inadequate. No recent quantified indi-
cators are available, but the United Nations reports stated that,
"By and large, the existing transport infrastructure adequately
serves the present needs, in spite of the deficiencies imposed by
natural conditions."[14] Thus this constraint is a low impediment for
development in these countries.

Administrative Institutions

There is a divergence between the objectives of policy making
and actual results. The role of government is important in investment
programs in these countries, either in government administration or
government enterprises. The private sector is also affected through
licensing systems (import, export, manufacturing, services licensing,
etc.) with license issued by government departments. Thus the role
of administrative institutions is of great significance.[15]

Algeria, Morocco, and Tunisia have had to deal with a situation
where a considerable proportion of their administrators employed in
particular institutions left suddenly after independence. Though they

were replaced at a later date, the vacuum created could not be filled easily. This was not a problem experienced in Egypt and Libya.

Administrative expansions and organization building are necessary to make the surrounding economic development possible in all the countries of the region. Only at later implementation stages were these problems fully recognized. As in Libya, the problem is highly important and is considered as a high impediment in those countries.

General Framework: Financial and
Nonfinancial Constraints

Libyan Case

The Libyan case is a case where both financial and nonfinancial constraints exist and are considered as barriers to growth. Financial constraints are represented by binding domestic saving. Investment performance is the linkage between financial and nonfinancial constraints. The low level of investment performance has affected, to some extent, the level of saving and limited its increase.

Nonfinancial constraints have been expanded to include other factors besides investment performance. They are manpower, economic infrastructure, and administrative institutions. The table on page 121 shows the classification of nonfinancial constraints as high, medium, and low impediments to economic growth according to duration and intensity of the constraints.

While investment performance is considered a problem in the short run, in the long run, the solution can be provided. The economic infrastructure however is a medium impediment as it declines over

time. Manpower and administrative institution are the most critical problems in the long run. R. Farley stated that, "The shortage of a critical minimum of skilled manpower resources remains the most crucial constraints to optimizing the development function even under conditions of capital surpluses."[16] This will condition Libya's domestic economic growth as well as the country's international relations.

TABLE XXXII

THE RANGE OF NONFINANCIAL CONSTRAINTS IN LIBYA

CONSTRAINTS	HIGH	MEDIUM	LOW
Performance			X
Manpower	X		
Economic infrastructure		X	
Administrative Institution	X		

The Case of Other North African Countries

The cases of other North African countries indicate that both financial and nonfinancial constraints are applicable. Shortages of domestic saving in the cases of Egypt, Tunisia, and Morocco have been a result of low per capita and national income. Voluntary saving was not successful because the increase in income was used to raise the low level of consumption. Compulsary saving has to face problems of

inefficient administrative systems in these countries. Government firms, particularly in Egypt, provide a large share of saving resources from their retained profits. The case of Algeria is similar to Libya, but the case lacks data to be analyzed properly.

Shortage of foreign exchange is a problem for Egypt, Tunisia and Morocco, as in most less developed countries. The available foreign exchange has to be directed to satisfy development projects as well as the current government projects. Algeria does not face a severe foreign exchange shortage because of oil revenues. The table below summarizes the nonfinancial constraints in North African countries.

TABLE XXXIII

RANGES OF NONFINANCIAL CONSTRAINTS IN OTHER NORTH AFRICAN COUNTRIES

CONSTRAINTS	HIGH	MEDIUM	LOW
Investment performance*	X		
Manpower constraints		X	
Infrastructure			X
Administrative organizations	X		

*Algerian case faces a low constraint in investment performance

The nonfinancial constraints in these countries can be solved if
financial constraints are to be understood within an integrated
plan for these countries and for the region as one unit. Many of the
nonfinancial constraints can be eliminated if coordination takes place
in the areas of transportation, training centers, and manpower policies.
These aspects will be discussed in more detail in the next part of this
chapter.

Scope for Economic Cooperation in the Region

Several factors which were brought out in the earlier parts of
this study, whould encourage cooperation among the countries of the
region. Low purchasing power, caused by scattered population and low
per capita income have led to excess capacity in most industries in
North Africa. While there was an excess domestic supply of some pro-
ducts in several countires, the same products are being imported from
outside the region by other countries. Thus, economic integeration is
needed based on this study to assist in eliminating various constraints
confronting each country. These constraints are summarized in Table
XXXIV to indicate the scope of integeration among the countries of the
region. The table suggests that the constraints of individual state
may offset each other. Only the administrative institution constraints
is a high dominant constraint in most of the countries and thus outside
assistance is needed.

The proposed regional group would have a central body that should
have the following objectives:

TABLE XXXIV

DOMINANT NONFINANCIAL CONSTRAINTS IN THE STATES OF NORTH AFRICA

Con-straints Country	Investment Performance	Manpower	Economic Infrastructure	Administrative Institutions
Libya	Low	High	Medium	High
Egypt	High	Low	Low	Medium
Tunisia	High	Low	Low	High
Morocco	High	Low	Low	High
Algeria	Medium	Medium	Medium	High

1.   Examining the feasibility of establishing industrial and agricultural plants on a regional base, utilizing the availability of each country's economic resources. The regional plants would benefit from the expansion of the market which would lead to economies of scale in production.

2.   Establishment of an integrated infrastructure industries which will serve the whole region's new projects. It would also encourage trade creation among the states as well as between the region and outside countries.

3.   Establishing financial facilities on regional level to provide each nation's private sectors with needed financial credits. This will help in eliminating the role of foreign middle-man in the region (European Banks).

4.   Establishing regional training centers to assist member states in providing skilled manpower for the existing and new projects.

The objectives have to be achieved through relatively smooth transitional period, taking into consideration the predominant con- straint in each state member. Though the governments may start the new projects, private sectors have to be encouraged to participate by implementing the following steps:

1.   Free movements of capital which will ensure more efficient utilization of available resources within the region.

2.   Free movement of labor which will accomplish better utiliza- tion of manpower and eliminate the bottlenecks in some countries (Libya) and unemployment or underemployment in other countries (Egypt, Morocco).

The suggested body is not intended to be a customs union or trade agreement, it is rather an investment organization using the resources of the region to eliminate the constraining factor of investment in each individual country. LDC countries have to establish the production of diversified products prior to involving themselves in trade grouping. However, a subsidiary organization may be established to coordinate and integerate the trade policies.

The proposed organization may constitute the units shown in Figure 3 on the following page. Thus the main function of this organization is investment creation within the region. This study provides the following insights on each country which can present the guidelines for policy makers to establish a regional economic organization:

1. In the Libyan case the constraints are the lack of private saving, shortage of manpower, and administrative institutions. Other North African countries can assist in providing required manpower and investment opportunities for creating Libyan private saving.

2. As Egypt suffers from lack of saving as well as foreign exchanges, oil producing countries (Libya and Algeria) may provide the financial credits or establish joint projects based on economic feasibility studies.

3. The cases of Tunisia and Morocco are typical cases of loan recipient countries; regional funds can provide necessary loans on semi-commercial basis, rather than depending on the European financial market.

4. Algeria is a case when diversified projects are needed, and

North African Economic Organization

Planning Office

Financial Organization

Sectoral
Development

Infrastructural
Development

Training
Center

Trade Development
and Harmonizations

Agricultural

Industrial

Road

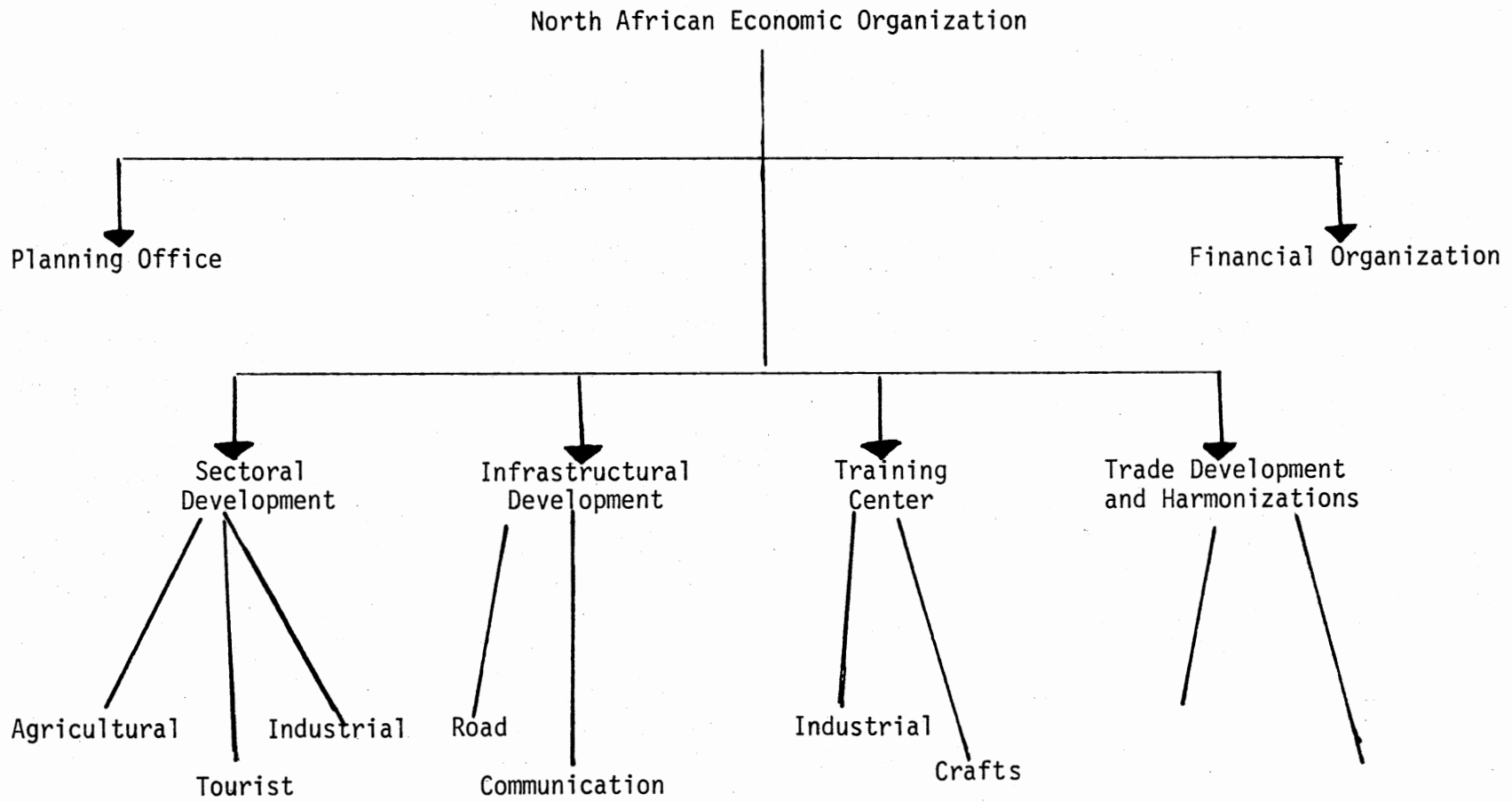Industrial

Tourist

Communication

Crafts

Figure 3.   North Africa Regional Economic Organization

the prospective expanded regional market would encourage establishing new industries.

5. All the countries involved suffer, however, from the lack of administrative institutions. The proposed body can benefit from international organizations and bilateral agreements with other regional organizations to assist in establishing advanced administrative units.

6. The shortage of technology and know-how can be solved if the region, as one block, can negotiate the importation of these services on service-contract basis.

7. The oil producing countries may establish double-pricing systems (a proposal which has been suggested to O.P.E.C. for LDC's) where they provide oil on cost-price to member states and opportunity-price to the non-member countries. This will assist the other countries in the region in establishing new projects with cheap energy. Oil producing countries will not suffer as such as they export only a portion to member countries and can benefit from importing low-price products.

8. The region can be considered as a custom union as a step to encourage investment and development of the region. This will help in solving foreign exchange constraints where they are binding (Egypt, Tunisia, Morocco).

Thus the economic integration will assist in solving economic growth constraints of the region. However, some of these constraints such as administrative institutions, will continue to exist for some time even if integration does take place. This constraint needs

long-term changes. Saving, foreign exchanges, and manpower will need less time to solve in the presence of economic cooperation. Infrastructure projects usually depend on the distribution of new development projects in the region.

Summary

This chapter was concerned with the analysis of financial and nonfinancial constraints in the cases under study. In the Libyan case nonfinancial constraints have a major role in affecting economic growth. The other North African countries, except Algeria, have to cope with both financial and nonfinancial constraints in their attempts to develop their economics. In the Algerian case economic development depends on how much financial resources can be allocated to eliminate nonfinancial constraints which are not severe and structural as in Libya's case (small, scattered population, and a low level of skilled manpower are the structural problems in the Libyan case).

The potential for useful cooperation among these countries stems from the fact that the region has the resources to face both financial and nonfinancial constraints if there is coordination in planning policies. A proposed regional integration body has been presented which utilize the insights of this study. The regional organization can benefit from other regional cooperation with the more advanced countries.

FOOTNOTES

[1] International Bank for Reconstruction and Development, The Economic Development of Libya (Baltimore, 1964), p. 75.

[2] Kingdom of Libya, Ministry of National Economy, Statistical Abstract 1964 (Tripoli, 1965), pp. 84-88.

[3] D. Mead, Growth and Structural Change in the Egyptian Economy (Homewood, 1967), p. 207.

[4] B. Hansen, Foreign Trade Regimes and Economic Development: Egypt (New York, 1975), p. 124.

[5] Kingdom of Libya, Five-Year Economics and Social Development 1963-1968 (Tripoli, Nd), p. 64.

[6] Kingdom of Libya, Housing in Libya, Vol. I., Existing Conditions, prepared for Ministry of Planning (Athens: Doxianis Associates, 1964), p. 27.

[7] R. Farley, Planning for Development in Libya (New York, 1971), p. 70.

[8] Kingdom of Libya, National Planning Council, Third Annual Report (Tripoli, Nd), p. 113.

[9] Farley, p. 75.

[10] D. Ashford, The Politics of Planning in Morocco and Tunisia (Syracuse, 1965), p. 38.

[11] The United Nations, Economic Survey of Africa, Vol. II., North African Sub-Region, (New York, 1968), p. 60.

[12] Ibid, p. 78.

[13] F. Arkhurst, Africa in the Seventies and Eighties (New York, 1970), p. 146.

[14] The United Nations, p. 89.

[15] Ashford, p. 60.

[16] Farley, p. 120.

CHAPTER VI

CONCLUSIONS AND IMPLICATIONS

Economic growth is limited by the shortage of productive factors of which capital is the most significant one. Capital increases through investment. Thus investment plays a key role in the economic growth process. The purpose of this study was to determine the main constraints on investment and economic development in Libya and other North African countries.

Investment may be constrained or limited by one or more of the following factors: a shortage of domestic saving, a scarcity of foreign exchange, and a lack of absorptive capacity. This study has developed and applied a macroeconomic multigap model to determine which constraint has been dominant in each country of the North African region, and to identify whether the constraint was binding during all or part of a certain period or periods in this study: 1957-1963 and 1964-1975.

This chapter will, first, present a summary of the findings of the study. Second, the main policy recommendations are introduced. Finally, the last part will focus on the major issues that must be considered in discussing the economic development of North Africa.

Summary of Conclusion

This study has used a macroeconomic gap model in the case of

financial constraints and statistical inferences in the case of non-financial constraints. The main conclusions are as follows:

Two techniques (linear regression and linear programming) have been used and the results indicated that domestic saving and lack of absorptive capacity were the binding constraints in Libya during the period 1957-1963. During the period, 1964-1975, Libya has experienced the same constraints with lack of absorptive capacity becoming the main limiting factor. Thus we accept the null hypothesis that saving and absorptive capacity were the dominant constraints in Libya during the two periods. The testing of Libyan case indicated that the availability of foreign exchange does not substitute for the lack of domestic saving and the lack of absorptive capacity. This conclusion has a significant implication for the LDC economics, and suggested that they need not only to acquire foreign exchange (or foreign aid) but also be able to mobilize internal resources to attain their economic growth objectives.

Professor Gerald Meier has stated that,

> Whether it be financed from internal courses or external, the accumulation of capital in any developing economy requires the mobilization of an economic surplus. If investment is to increase, there must be a growing surplus above current consumption that can be tapped and directed into production investment channels.[1]

Thus capital formation in Libya, or in this case any less developed country, has to pass through three main steps:

1. An increase in the volume of real saving, i.e. releasing sources for investment.

2. Financial machinery or facilities, so that investable funds can be collected and traded.

3. The act of investment where resources are used to increase capital stock.

The problem in Libya is mainly to recognize the last two steps, and to adopt appropriate policies to implement all three steps.

The cases of other North African countries have been examined in the two periods. Financial gaps have been diagnosed by applying the estimation techniques, linear programming and linear regression, to the gap model. There is conclusive evidence in this case of Egypt that saving was the binding constraint in the first period, while both saving and foreign exchange were the dominant constraints in the second period. Tunisia and Morocco have experienced a lack of domestic saving and a shortage of foreign exchange in the second period. No conclusive results have been obtained in the first period for these two countries. Algeria is a case where financial constraints are not as severe as in Egypt, Tunisia, and Morocco. The four countries face nonfinancial constraints particularly in the ineffi-cient performance of investment and administrative institutions. Thus the hypothesis of complementary relationship between the financial and nonfinancial constraints has appeared to be true for the North African countries as a whole. Nonfinancial constraints in these countries have the characteristics of being influenced by the shortage of financial resources. The development of efficient investment performance requires improving the existing capital and applying new

technology. Both of these elements depend on availability of foreign exchange, for these countries cannot produce sufficient capital goods and/or technological methods themselves in their present stage of development.

The study has demonstrated that the countries of the region can coordinate their development policies in order to cope with the constraints. The constraints are different in each country and, therefore, some can be eliminated by more cooperation on a regional basis.

The oil producing countries in the region suffer mainly from the fact that the nonoil sectors in their economies are lagging. The leading sector (oil) is highly modernized, but there is no feedback directed towards the development of other sectors. The oil trade, thus, does not show a significant effect in eliminating nonfinancial constraints (manpower, inefficient investment performance, etc.) in the nonoil sectors.

International trade has proved to be a very significant factor in the economic growth processes in the region. Even with more regional cooperation, the needs for importing capital goods and exporting oil and other mineral resources would be required to connect the economies of the region with the more developed countries of the World.

Policy Implications

The following policy implications are based on the results of this study. The main purpose in presenting them is to provide policymakers in the countries under study with more insights for appropriate steps in the planning and policy-formulation process. These policy implications are:

1. The role of saving in the Libyan case is proved to be signi-
ficant in this study. Voluntary saving can be increased by self-
imposed reduction in consumption. This is not easy in the Libyan case
where there is a high degree of inequality in income distribution, with
most of the population at low income levels. Involuntary saving,
through taxation and credit expansions, are handicapped by nonmodern-
ized taxation systems, thus the tax potential is greater than the actu-
al tax revenues. The potential has to be fully exploited by renovating
the taxation system. The last policy to increase saving is to utilize
efficiently under-employed manpower, this will lead to higher incomes
and thus higher rates of saving.

2. It is argued that government revenues from oil may substitute
for private saving, but the lack of efficient public organization and
adequate incentives system in LDC's public sector has prevented the
government from engaging in transforming these revenues into produc-
tive investment. Thus the need to preserve private sector's role is
of great significance in these countries.

3. It was obvious through the study that all the countries in
the region have to rely on international trade to achieve economic
development, i.e. the transmission of development through trade. As
these countries are mainly raw material exporting countries, they
must adopt an export-led development policy. That means to rely on the
leading export sector to provide development linkages to other sectors.
This sector should not be isolated in the economy of any country. As
far as the problem of foreign exchange shortage, the problem must be

expected in the first stages of development. But it is not advisable to adopt the usual and widely accepted protectionist trade policy. These countries have to be connected to international markets. Restrictive trade policies cannot solve foreign exchange shortages. They may even intensify the shortage leading to import of more capital goods to create unfeasible industries. The appropriate policy is to start producing and exporting semi-manufacturing commodities derived from domestic raw material or from other resources. Tariff preferences, and the removal of trade barriers, has to start on a regional basis among these countries and with their international trade partners.

4. One problem facing all the countries in the region is the lack of entrepreneurship in the economic system. The significant role of entrepeneur can be explained in the following tasks: perception of market opportunities, command of scarce resources, acquiring inputs, marketing products, dealing with the public bureaucracy, supervising various management functions, and introducing innovations. North African countries have to create their own entrepreneurs, and there must be policies directed to differentiate between ownership and management. Whether under private or public ownership the management function must be delegated if proper use is to be made of more efficient, trained and professional management.

5. The study resulted in determining the significant role of manpower in the Libyan case. Manpower policies have to be adapted to the Libyan economy needs. As there is a shortage in some sectors such

as the industrial sector, and a surplus in other sectors such as
agriculture and services, these require long term programs for training.
Also, industrial location must take into consideration the availability
of manpower as an input. Areas of cooperation in manpower policies
in the region can be explored and implemented gradually. Training
centers can be established on regional bases.

6. There is a great need to develop regional economic cooperation
to meet the developmental objectives both within each country and
on a regional basis. The failure to transform surplus investable
resources in Libya can be traced to a lack of financial machinery. On
a regional basis, these countries have to rely on the more developed
countries as places to deposit funds and acquire loans. These coun-
tries have to start the suggested regional cooperation gradually and
smoothly in order to adjust their economic plans and policies.

Major Issues

The study also raises issues that need more research to be explored.
These issues will be highly significant in the future development of the
region and similar less developed areas. These issues are:

Internal and External Factors in
Economic Development Process

The economic development of less developed countries has its
peculiar characteristics. It is necessary to utilize both internal
and external resources to facilitate the process of capital accumula-
tion in these countries. Concentration on one element, either

internal or external resources, cannot solve the problems of economic
development. Only a combination of both internal resources, (such as
domestic saving, skill manpower, and organizational institutions),
external resources (such as capital goods and advanced technology) can
transform LDC economies into more developed economies. Thus, reliance
on foreign aid or similar means to transfer resources from developed
countries will not succeed without the mobilization of potential
internal resources.

Oil Countries as Less Developed Countries

Oil producing and exporting countries cannot be considered as
developed countries. Though they acquire financial resources, these
resources are not necessarily the most important factor in the economic
development processes. These resources alone are not worthless, but
they certainly do not solve all the problems - they solve part of the
problems and create some others.[2] Thus these countries have to define
their developmental objectives so as to achieve balanced economic
growth.

The Role of Research and Development

This issue is one of the most important ones, particularly in LDC.
The most common policy in many LDC is to transfer and/or copy the
existing organization and technology in advanced countries. The
establishment of research and development organizations to explore the
appropriate strategies of economic development from inside these

countries has to be studied. These countries have their own economic
structure and social and political system that differentiate them
from the more developed countries.

FOOTNOTES

[1]G. Meier, <u>Leading Issues in Economic Development</u> (New York, 1966), p. 267.

[2]M. Bryce, "Some Alternatives to Development," <u>The Libyan Economic and Business Review</u>, IV (1968), p. 18.

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