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PROCESS OF ECONOMIC GROWTH: THE CASE OF SENEGAL

University of New Hampshire   PH.D.   1981

RELATIVE IMPACT OF NATIONAL AND FOREIGN SAVINGS
IN THE PROCESS OF ECONOMIC GROWTH:
THE CASE OF SENEGAL

BY

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B.A., Universite de Dakar, 1976
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Date

To the Senegalese people and government for the trust they place in me and to the U.S. government and the University of New Hampshire for giving me the opportunity to pursue my post graduate studies.

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ABSTRACT

RELATIVE IMPACT OF NATIONAL AND FOREIGN SAVINGS IN THE PROCESS OF ECONOMIC GROWTH: THE CASE OF SENEGAL

by

ABDOUL AZIZ DIA

University of New Hampshire, December, 1981

The basic questions we address in this dissertation are the following:

What was the relation between national savings and foreign savings during the 1960-1976 period for Senegal?

What was the relative contribution of these two types of financing to economic growth?

A review of the literature reveals the coexistence of two main hypotheses. The first one stipulates that foreign financing and domestic financing are substitutes, whereas, the second one claims that they are, at the best, complements.

Numerous empirical studies using single equation models support the substitutability hypothesis. In other terms, they show a negative relationship between national and external savings.

We discuss the various limitations of the single equation models and we propose a "translog" model which

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allows us to compute the elasticities of substitution between national and external savings. The empirical evidence shows that the elasticities were positive, low and stable for Senegal during the period of study. The positive sign of these elasticities supports the substitutability hypothesis.

The next step was to find the net contribution of both foreign finance to the growth rate of income. To reach this goal, a growth model was proposed and the empirical results indicate that the impact of foreign savings was very limited. However, we point out that if foreign aid had been used to improve the productive capacities of the Senegalese industries, its real impact could have been far greater than the one obtained from the model. The empirical evidence shows, also, that national savings did contribute to economic growth, especially, during the 1960-63 and 1968-76 subperiods.

The substitute effect of foreign savings on domestic savings and their limited impact on economic growth lead us to make some policy recommendations about the ways and means to raise and to allocate national savings toward productive investment. Moreover, some suggestions are made about a better use of foreign finance in the process of economic growth and development.

CHAPTER I

INTRODUCTION

Most of the African countries obtained their political independence in the early 1960's and they faced numerous political, social and economic problems inherited from the colonial era. Economic development was the principal goal. The main purpose was to find ways and means of attaining development in a reasonable period of time. The first step was to establish a political system and set up institutions locally and regionally in order to solve rapidly and efficiently the various economic and social problems. The majority of the former French Western African colonies felt the need for a monetary union and to promote fruitful cooperation with France. This idea, mainly based upon the strong economic and political ties with the former metropole, led to the creation of the Western African Monetary Union (UMOA), made up of Benin, Ivory Coast, Niger, Senegal, Togo, Upper Volta and until 1975, Mauritania, and the establishment of special relationships between France and the Union members. All these countries share a common central bank (BCEAO) and a common currency (CFA franc) as well. Although it would be interesting to extend our investigations to all the UMOA countries, our attention will be focused on Senegal.

The purpose, the methodology used and the plan of the study will be successively presented.

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Purpose of the Study

The goal is to evaluate the impact of National and Foreign Savings in the process of economic growth in Senegal.

In order to reach this objective, one can ask the following question:

- What was the relationship between National and external financing and what was their relative contribution to total output?

An attempt to address this basic question will be made throughout this study and policy recommendations derived from our findings will be made.

The first step is to address the relationship between domestic and external financing. There is a debate about this topic between two groups of theorists. The first group claims that foreign financing and domestic financing are substitutes and external finance will eventually allow the developing countries to reach self-sustained growth in the near future. The second group argues that foreign finance can be at best a complement of domestic financing and warns that economic development will not be achieved unless the improvement and the dynamization of the domestic financial sector are realized. The empirical works in the literature dealing with this topic seem to support the substitutability hypothesis. The empirical evidence shows a negative relationship between domestic and foreign finance. However, we think that what we need is to know the degree of substitutability (if any) between the two types of financing and the evolution of their relationship over time.

The second step is to find a growth model for Senegal
which will enable us to evaluate the relative contribution
of national and foreign financing to gross domestic income.
Since the monetary and financial sector can affect domestic
savings by their actions, evaluating the impact of savings
on economic growth can be an indirect way of gaining an
idea about the relative efficiency of the banking system.

The third and final step will be to suggest some
policy recommendations on the basis of the empirical find-
ings. We hope that this work will be useful both for the
academic community and for the monetary authorities who bear
the heavy responsibilities of using our very limited resources
in a very efficient way.

Methodology

The study will be essentially empirical.

First, we will test the substitutability hypothesis
versus the complementarity one. This will be done, firstly,
by testing the conventional models, i.e., a single equation
regression model to find out the nature of the relationship
between domestic investment and foreign finance for the
Senegalese economy and secondly, a new model using a re-
cently advanced technique, i.e., the "translog" specifica-
tion form, will be proposed. This will enable us to overcome
the shortcomings of the previous models because this new
technique will permit the computation of the elasticities of
substitution between foreign and domestic financing as well
as their own and cross price elasticities of the derived

demands.

Second, a model of growth for the Senegalese economy will be proposed. This model, after being tested empirically, will enable us to have an idea about the relative contribution of the financial sector upon economic growth and development.

The empirical work will only cover the 1960-1976 period because of a lack of all or some statistical data for the privious years. The data used are taken from the publications of the World Bank, the IMF and the Senegalese government.

Plan of the Study

The dissertation is divided into six chapters. The second chapter will attempt to give a general view of the geographical, social and economic characteristics of Senegal. In addition, the essential measures taken in order to solve the various problems of development in the primary, secondary and tertiary sectors will be briefly surveyed.

The third chapter will give a general review of the literature related to foreign and domestic financing written both at the theoretical and empirical level, discuss the relative shortcomings of these previous works, and attempt to overcome them. A general "translog" model is proposed and empirical advantages are discussed.

In the fourth chapter, a demand oriented growth model for the Senegalese economy will be proposed in order to evaluate the contribution of domestic financing to the rate of growth of output.

In the fifth chapter some policy recommendations will be made based on the findings made in our study.

The last chapter offers a brief summary of our main findings and some suggestions for future research related to our topic will be made.

CHAPTER II

BACKGROUND OF THE STUDY:
THE SENEGALESE ECONOMY

Introduction

The African continent has been shared between the
European countries since the conference of Berlin in 1885.
Senegal was colonized by France. The absolute economic and
political domination by the metropole lasted until 1960.
The main result of the colonization era was a state of under-
development in all fields. After political independence
was obtained, the task was to free the continent from its
economic dependence and to improve by all means the standard
of living of the people. Since 1960 many changes in the
social, political and economic structures have occurred.
The aim of this chapter is to give an idea about the general
features of the Senegalese economy and the nature of the
changes which have taken place over the last two decades.

Some Geographical Aspects

Senegal, an extremely flat country, covers an area
of 197,161 kilometers (about 76,000 square miles) and is
located on the northwestern coast of Africa. The country
is bordered on the north by Mauritania, Mali on the east,
Guinea and Guinea-Bissao on the south and the Atlantic Ocean
on the west. Senegal is traversed from east to west by four
rivers (Senegal, Gambia, Saloum and Casamance). The north-

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ern part of the country is semi-desertic, the south is in-
vaded by the remnants of the high tropical forest, but most
of the territory belongs to the African savanna.

The climate is characterized by a long dry season
(from November to June) and by a short wet one. The rain-
fall mainly determines the level of agricultural production.
A good rainy season allows the navigability of the Senegal
river from St. Louis to Kayes (Mali). Geological exploi-
tations are limited to two phosphate mines (Thies and Pallo).
However, copper and iron ore have been discovered in the
eastern part of the country and offshore petroleum explora-
tions are very promising.

The Senegalese population growth rate is around 2.2
percent per year. The population is essentially young; more
than 40 percent are under the age of 15. The 1975 census
indicated that the Senegalese population was about 5 million
(see Table 2.3).

Around half of the population is economically active.
The main ethnic group is that of the Wolof (about 1 million).
Though about half a dozen tribes coexist, the Senegalese
population is relatively homogeneous (World Bank Country
Economic Report, 1974). Wolof is considered as the national
language, but French remains the official one. Most of the
population is Muslim (80 percent). The capital, Kakar, has
an estimated population of 800,000. Rufisque, St. Louis,
Kaolack, Thies and Ziguinchor have between 40 and 60,000
inhabitants.

Senegalese Economy

General Economic Characteristics

It is well known that a significant proportion of the gross domestic product originates from the barter sector. This is primarily due to the fact that the most important component of the non-monetized sector is agricultural. Table 2.1 shows the contribution of each sector to the gross domestic product for selected years.

First, one can see that the agricultural sector was more important than the secondary one. Second, this table shows the predominance of the tertiary sector over both the primary and the secondary ones. An important point is that the primary sector retains most of the population as Table 2.2 indicates.

The primary sector retains 83.9 percent of the population. Senegal, as most of the developing countries, has essentially a rural economy. The development of the agricultural sector is a sine qua non condition for any future economic development.

Like most of the less developed countries, the standard of living of the majority of the people is quite low even though much progress has been made. Some recent data from the World Bank can give an idea (see Table 2.3).

The GDP per capita though widely used is not a very good economic indicator because it does not take account of the income disparities and the costs of living prevailing in any given country.

One can note that the growth rate of GDP per capita

Table 2.1 - Sectorial distribution of GDP

Year	Primary (as % of GDP)	Secondary (as % of GDP)	Tertiary (as % of GDP)
1959	28	20	52
1965	30	22	48
1970	29	24	47
1974	29	26	45

Source: Situation Economique du Senegal, 1976

Table 2.2 – Sectorial distribution of the active
population in 1968

	African Population		Non African Population	
	Number	percent of total	Number	percent of total
Agriculture	1,247,000	83.9	300	1.6
Industry	79,700	5.4	4,300	23.5
Commerce & others	160,400	10.8	13,700	74.9
Total	1,487,100	100.0	18,000	100.0

Source: IMF Surveys of African Economics, Vol. 3

Table 2.3 – Population, GDP and GDP per capita
from 1974 to 1976

Year	Population (000)	GDP (Market Prices) U.S. $ millions	GDP per capita (US $)
1974	4,869	1,560	320
1975	5,000	1,800	360
1976	5,135	1,980	390

Source: World Atlas, 1977

is declining over time (see Table 2.4).

One of the main reasons for this declining growth rate is that the Senegalese industries, which were satisfying the needs of all the French Western African colonies before 1960, had to limit their activities to the local demand after these countries gained their political independence.

As far as the prices are concerned, their relative stability in an inflationary world has surprised many visitors. (see Table 2.5).

Prices began to rise significantly after the 1973 oil crisis. The relative stability of prices can be explained by the system of government subsidies counteracting the rise of first necessity product prices.

Taxes are the main source of government revenue. A quick look at the general budget composition shows the predominance of indirect taxes over direct taxes. This fact is due to the low level of personal income in the developing countries. The large part of indirect taxes comes from custom taxes. (see Table 2.6).

A brief analysis of exports, imports and the trade balance can give an idea of the external equilibrium of Senegal. Our observations derive from the World Bank Country Economic Report for Senegal (1974) (see Table 2.7).

First, one can note the persistent deficit in the balance of trade. However, the rate of growth of exports (2 percent) exceeds the rate of growth of imports (-0.5 percent) over the 1964-66 period. The opposite is true for the 1969-71 period where they were 0.9 percent and 5.8 per-

Table 2.4 – Rate of growth of GDP per capita

Year	1960–1975	1965–1970	1970–1975
GDP per capita	0.7	−2.2	−1.1

Sources: World Bank Tables, 1976
           World Atlas, 1977

Table 2.5 – Consumer Prices Index (1975 = 100)

Year	1960	1963	1965	1968	1970	1972	1974	1975	1976
Con-sumer Price Index	44.1	49	53	55	60	67	82	100	106

Source: IFS 1978 Supplement (Annual data 1973-1977)

Table 2.6 – Government revenue for some selected years

Year	Direct Taxes (millions CFA)	Indirect Taxes		Total
		Customs	Total	
1962–63	6,278	7,998	22,228	29,834
1964–65	7,228	19,145	25,677	36,735
1968–69	8,687	17,352	24,537	36,193
1970–71	10,947	18,372	27,433	41,417
1972–73	12,381	19,770	30,568	46,169

Source: Situation Economique du Senegal, 1976

Table 2.7 - Major Foreign Trade Indicators

Overall Developments

At current prices	Exports billion CFAF	Exports annual growth	Imports billion CFAF	Imports annual growth	Trade Balance billion CFAF	Trade Balance percent of imports
1959-61	36.2		46.8		-10.6	22.6%
1964-66	40.0	2.0%	45.7	-0.5%	- 5.7	12.5%
1969-71	41.7	0.9%	60.7	5.8%	-19.0	31.3%

Composition of Exports

(percent of total exports)

	Rural raw products Ground-nuts	Rural raw products Others	Rural raw products Total	Minerals	Manufactured goods Ground-nut oil	Manufactured goods Others	Manufactured goods Total	Miscellaneous
1959-61	31.9	11.0	42.9	2.5	36.4	16.6	53.0	1.6
1964-66	25.8	3.5	29.3	6.4	38.6	23.0	61.6	2.7
1969-71	8.1	6.8	14.9	9.2	32.5	38.0	70.5	5.4

Composition of Imports

(percent of total Imports)

	Consumer goods Food	Consumer goods Manufactured	Consumer goods Total	Raw and intermediate goods Raw	Raw and intermediate goods Intermediate	Raw and intermediate goods Total	Investment goods
1959-61	37.4	32.8	70.2	6.1	10.3	16.4	13.4
1964-66	38.3	32.2	70.5	7.1	11.3	18.4	11.1
1969-71	31.2	26.1	57.3	8.8	15.5	24.3	18.4

Source: World Bank Country Economic Report 1974

cent, respectively. The same point can be seen in the fact that the percentage of imports rises from 12.5 percent in the first period to 31.3 percent in the seccnd period.

Second, one can see the increasing share of exported manufactured goods in total exports to the detriment of the share of the exported agricultural products. However, the importance of the production of groundnuts in the Senegalese economy can be seen both in the composition of the rural raw products and the manufactured goods exported.

Finally, one can note the predominance of the imported consumer goods over investment goods. The contrary would be more understandable for a developing country. However, there is a notable decrease in the percentage of the share of imported consumer goods in total imports; from 70.2 percent to 57.3 percent in 1959-61 and 1969-71, respectively. At the same time, the share of imported investment goods goes from 13.4 to 18.4 percent.

Moreover, it can be seen that more than half of the imported consumer goods consists of food. A policy of food self-sufficiency would probably reduce the trade balance deficit.

Foreign Financing and Foreign Aid

Most of the less developed countries rely heavily on foreign assistance to improve their economic situation. Senegal is no exception. Since foreign aid is part of foreign finance, it seems necessary to say a word about it.

Foreign aid is generally considered as the total

sum of grants and loans coming from abroad. In the case of
Senegal, one can see the net pre-eminence of French aid for
all these years. (see Table 2.8). This fact is due to the
longtime economic ties between France and Senegal from the
colonization period to the post independence era. Practically
80 percent of total foreign aid allocated to Senegal comes
from the European community (EEC), including France.

According to Samir Amin[1], capital investment in UMOA
countries during the 1960-70 decade was almost totally from
abroad. He estimated that the total of invested capital over
the period amounted to 1,110 billions CFA francs, whereas only
85 billions CFA francs, or 1 percent of the GDP of the UMOA
members over the period, came from internal savings. This
fact shows the need to improve the process of raising and
allocating efficiently national savings in order to finance
development projects.

The next step is to study, briefly, the three major
sectors of the Senegalese economy.

Primary Sector

All the reforms directed to the primary sector were
based on a document from the Prime Minister's services
(Circulaire no. 32, May 21, 1962). All the new institutions
were established in the early 1960's.

As seen above in Table 2.2, Senegal is essentially
an agricultural country. The development of the primary

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[1]Samir Amin, L'Afrique de l'Ouest Bloqué (Paris, 1971)
see table, pp. 305-309.

Table 2.8 – Senegal: Disbursements of Public
Foreign Aid, 1965-68 (in billions
of CFA)

Year	1965	1966	1967
Countries			
France	6.10	7.27	7.5
EEC (excluding France)	2.71	2.88	2.44
Rest of World	1.50	1.32	2.58
Total	10.31	11.47	12.48

Source: IMF Surveys of African Economics,
Vol. 3, 1970

sector was considered as a priority by the planning board.

The main goals were the following:

-Complete reorganization of the rural structures.

-Introduction of the notions of rentability and productivity by modernizing and diversifying the agriculture.

-Industrialization of the primary sector.

a) Reorganization of the Rural Structures

Concerning the first goal, the Senegalese government took the following measures:

-Nationalization of 95 percent of the land (Loi sur le Domaine National in 1962).

-Constitution of cooperatives of peasants, fishermen, shepherds, etc.

However, a real reform of mentality was necessary because the rural people had to move from an agriculture of subsistence to a modern one. In order to help them in this transition period, two new institutions were created; the Rural Animation Centers (CAR) and the Rural Expansion Centers (CER).

Among other things, the CAR had to incite the rural population to be fully aware of the problems of economic development and to assist them in the process of creating and managing their cooperatives.

The CER, first, had to vulgarize new methods of production and exploitation in order to valorize the land, the forests and all other resources. Second, they were to be involved in the process of rural youngsters' training and their integration in the circuits of production. Third, they should assist the rural councils in the process of elaboration

and execution of local projects.

Other institutions, such as the Center of Research and Assistance to the Development (CRAD), the Senegalese Bank of Development (SBD) and the Agricultural Commercialization Institute (ICA) were also created. Most of these institutions were substituted for or integrated into new institutions in order to improve their efficiency and to cut the growing bureaucracy.

b) Introduction of Modern Methods in the Primary Sector Agriculture

First, the peasants were encouraged to use, on a large scale, fertilizers, selected seeds, and plows. A factory was immediately created to satisfy the demand for plows (SISCOMA). The second measure was to diversify agriculture in order to eliminate the peanut monoproduction inherited from the colonial period. Rice, cotton and sugar were heavily promoted.

Finally, measures were taken to solve the water problem. The northeastern part of the country is located in the Sahel zone. Cyclical droughts decrease groundnut production and cause much suffering to the people concerned. Many wells and dams were projected but most of them were not realized because of a lack of financing. Moreover, traditional and modern irrigation methods began to be widely used.

1. <u>Breeding</u>. Traditional breeding practices are still predominant. However, modern ranches (Doli and Bambilor) were

created. For instance, a crossbreed between Senegalese and Pakistani species gave very good results.

2. _Fishing_. The old methods are still predominant. Nevertheless, more and more fishermen are using motorized fishing boats. Moreover, a modern state fleet for tuna fishing is now operating.

c) Industrialization of the Primary Sector

The main product is groundnuts. They used to be treated by factories owned by the French. After 1960, however, the problem was to create factories able to valorize local products in order to reduce the importation of food. The Institute of Food Technology (ITA) was charged to seek out new local products from the local productions so that these new products could be exploited on an industrial scale. The ultimate goal is to create small industrial units owned and controlled by the rural communities. This would progressively eliminate the dual character of the Senegalese economy.

d) Evolution of the Agricultural Value Added

It is interesting to see the evolution of the agricultural value added and its relative weight in the total primary sector output and gross domestic product for some selected years. (see Table 2.9).

One can see the predominance of the agricultural sector in the primary sector (around 60 percent) and its relative share is gross domestic product, even though this

Table 2.9 - Evolution of the agricultural value
added (CFA, 1971)

	1959	1963	1965	1967	1969	1972	1974
Agricultural values added	29.2	34.2	39.0	36.6	33.3	35.0	31.8
As a % Primary Sector	67	68	66	64	57	55	47
As a % GDP	18	18	20	18	16	15	11

Source: Comptes Economiques du Senegal, 1976

latter is declining over time.

This fact can be explained partly by the cyclical drought which took place in the Sahelian region during this period. The World Bank Report indicates, too, a steady growth of livestock over this period (see Table 2.10).

Though livestock did grow in current prices very significantly over the period, the rate of growth in constant prices was surprisingly stable (2.4 percent). As were agricultural crops, livestock was greatly affected by the drought.

However, despite the remarkable progress made in the primary sector, self-sufficiency in food is still not attained. As seen in Table 2.7, the relative share of imported food, mainly rice, is very high.

Secondary Sector

In 1960, Senegal was the most industrialized country of West Africa. The main industries, owned mainly by the French and located in the Cap Vert region, had to meet the needs of all the former colonies of this part of Africa. The need after 1960 was to create new industrial "poles" in Senegal in order to shift some activities from Dakar to the other parts of the territory and to determine the type of activities to be promoted in the key sectors of the economy.

The Senegalese leaders thought that the promotion of heavy industries was not feasible. So they put an emphasis on the development of light industries.

The concept of "Senegalisation" instead of "Nation-

Table 2.10 – Rates of Growth of Agriculture and
Livestock (average annual growth
rates)

	1959–65	1966–71	1959–71
In current prices			
Agriculture proper	5.6	--	2.8
Livestock	4.3	8.5	6.4
In constant prices			
Agriculture proper	5.8	-1.7	1.9
Livestock	2.4	2.4	2.4

Source: World Bank Country Economic Report
1974, p.68.

ization" was adopted. By "Senegalisation" they meant the creation of mixed societies and the progressive substitution of foreigners by trained Senegalese. The capital of these mixed societies is shared between the state, foreigners and Senegalese private persons. Senegalese leaders thought that mixed societies might be more efficient and more profitable than nationalized ones. The state holds, in general, half or more of the shares.

A national society (SONEPI) was created to assist small business.

The secondary sector has been very dynamic. Its relative share in GDP is increasing over time, despite its problems (see Table 2.1).

The increasing weight of the secondary sector is seen, generally, as a sign of development. Within this sector, the dominant factors are industry (around 60 percent) and construction (around 30 percent).

Tertiary Sector

The tertiary sector contributes around half of the GDP, even though it is declining as indicated in Table 2.1.

Foreign investment was encouraged in this sector, particularly in the fields considered as priorities in the development plans. The banks, branches of French ones, were allowed to continue their activities.

Wholesale commerce was monopolized by French companies and retail sales by the Lebanese and Mauritanian people. After 1960, the government policy was to encourage

Senegalese businessmen to invest in both areas. Foreign companies were replaced by some new ones owned by private Senegalese associated with the owners of the old ones.

The freedom in this sector led to some major problems. One of them was that foreign banks tended to deal only with foreign investors and these latter were not really concerned about the development problems. Many Senegalese entreprises were affected by a lack of credit. This brought about a demand for total control of the banking system. The compromise was for the state to participate in the capital of these banks. In 1975 the government took 49 and 60 percent of the capital of BICIS (Banque Internationale pour le Commerce et l' Industrie du Senegal), and USB (Senegalese Union of Banks), respectively.

As far as transportation is concerned, the state encouraged private entreprise and took 50 percent of the Transportation Society of Cap Vert (SOTRAC).

Traditionally, cooperation was between Europeans and the State. Recently, Japanese and American corporations are getting involved by opening branches in Senegal. The case of the First National City Bank of New York is a good example.

The government created the National Society for Promotion and Guarantee (SONAGA). This latter has the same role as the SONEPI in the secondary sector. Its role is to help small business to master the modern techniques of management and to serve as guarantor to the banks for their loans to the small entreprises. The State encourages

people to invest in the dynamic tourism industry.

Undoubtedly, the dynamism of the tertiary and sec-
ondary sectors has greatly eased the difficulties which
resulted from the long Sahel drought. However, there is a
long way to go before Senegal can solve the multiple economic
problems that all developing countries face in this last
quarter of the century.

Monetary Sector and the Role of BCEAO

Banking System

Senegal is a member of the Western African Monetary
Union (UMOA). All six countries share a common central bank
(BCEAO), a common currency (CFA franc) and a common pool of
reserves kept in an operation account at the French Treasury,
enabling France to guarantee the international value and
creditability of the CFA franc.

Besides the BCEAO, the Senegalese banking network
is composed of four commercial banks, a public development
bank (Banque Nationale de Developpement du Senegal, BNDS)
and a credit institution financing consumer goods.

The Treasury acts as a financial intermediary in the
public sector by extending credit to the public and semi-
public sector and by receiving deposits from them. One can
mention, also, the important role of the post office (OPT)
in collecting private savings.

The Role of BCEAO at the Country Level

BCEAO is the Central Bank of the whole monetary

Union. Its headquarters were in France before being trans-
ferred recently to Dakar (Senegal). The BCEAO is the
intermediary between France, the rest of the world and the
concerned African governments in their monetary and financial
relationships.

However, in order to play its role efficiently, the
Central Bank has opened an agency in the capital of each
country.

BCEAO Senegal has the same privileges as any Central
Bank in any country. It has the right to issue currency in
each country. The notes issued in a country have a partic-
ular letter following the serial number. This disposition
enables the Central Bank to keep separate accounts for each
country's currency used. The coins in circulation are not
identified by country. There is free circulation of currency
in the whole monetary union even though it is issued in
different places.

The BCEAO sets the liquidity ratio and the solvency
ratio for the commercial banks. The liquidity ratio re-
lates assets (cash and negotiable assets) to short-term
liabilities. The liquidity ratio increased from 70 percent
in 1965-66 to 75 percent in 1970-71. The solvency ratio re-
lates the capital of the bank, including retained profits
and reserves, to the amount of credits extended.

The Central Bank has the privilege of fixing the
discount rate. It was maintained at a low value for all the
Union members for all credits extended to the private sector
or the government. However, the export credits enjoyed a

preferential rate of 3 percent. After 1973, the rate of discount became 5.5 percent and 8 percent from 1976 on.

The Central Bank sets semi-annually the rediscount ceiling for all countries. BCEAO extends credits to banks and financial institutions and makes advances to the governments.

1) Money Supply

As legal tender, money is used for the settlement of debts everywhere and at any time in a given territory. However, money supply consists of the currency issued by the Central Bank and the money created by the Commercial Banks which is the equivalent of the amount of credits extended to the various economic agents. Money supply must be in accordance with the real needs of any given economy.

In order to control money supply, BCEAO relied on two main instruments, which were the rediscount ceilings and the liquidity ratios. The open market policy, widely used in the developed countries, was inadequate because of an absence of true money and capital markets.

The nature and the distribution of credits led to some difficulties, not only for Senegal but for the whole Union as well. A quick examination of the composition of the credits extended shows a large predominance of short-term credits, the moderate size of medium term credits and the total absence of long term credits.

The importance of short term credits can be explained by the fact that commercial banks find this type of

credit less risky than the others.

On December 31, 1973, the total amount of credits for the Union was CFAF 277,246 millions distributed in CFAF 205,936 millions of short term credits and CFAF 72,310 millions of medium term ones.[2]

The same conclusions can be derived from any balance sheet of the Central Bank. On December 31, 1976, the total claims of the Central Bank on the commercial banks was CFAF 165,042 millions distributed in 128,825 short term credits and CFAF 36,167 millions in medium term ones.[3]

The absence of long term credits, even though partially compensated for by the action of the Caisse Centrale de Cooperation Economique (CCCE) may be seriously questioned. Long term credits are vital for the financing of development in any country and Senegal is no exception to this rule.

One can note, also, the advances made by the Central Bank to the governments. Indeed, BCEAO is allowed to extend credit to the governments of the Union in terms of direct advances, rediscounts or advances against treasury bills. The initial dispositions permitted the Central Bank to make advances for only a period of 240 days for any calendar year, whether consecutive or not. However, on June 6, 1966 an amendment to the statutes allowed BCEAO to extend advances to any government until the first working

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[2]La Zone Franc en 1975, Paris, pp 295.

[3]BCEAO: Statistiques Monetaires, February, 1977, pp 2-3.

day of the new calendar year. In December, 1968, another
amendment gives the right to the Central Bank to increase
direct advances to a member, after a careful study of its
economic situation, from 10 to 15 percent of the actual
fiscal receipts of the previous year. Since the process of
accumulating fiscal receipts is slow, advances enable the
governments to carry on their planned expenditures without
interruption. On September 30, 1976, BCEAO extended CFAF
21.4 billions to the national treasuries of the Union.
(BCEAO Feb., 1977, p. 1).

Overall, the process of monetization of the con-
cerned economies saw a constant acceleration. The money
supply has increased remarkably since 1962. The rate of in-
crease was 9.4 percent between 1962 and 1964 and 13.1 per-
cent in the 1964-66 period. (Bhatia, 1971, p. 396).

Bhatia (1971) made some estimates for the money
multipliers for each of the BCEAO countries. He found out
that the highest one was for Senegal (k = 2). The money
multiplier of the whole Union was slightly lower (k = 1.75).

The monetization process of the Union economies is
far from being achieved. The barter sector or subsistence
sector is still predominant in these countries.

Nevertheless, the governments wanted the Central
Bank to play a more active role in the process of economic
development. This is an opportunity to say a word about the
1973 reforms on the Central Bank.

2) BCEAO after 1973

One of the main goals of the 1973 reforms was to allow the Central Bank to play a more active role in the process of economic development.

In order to reach this goal, new policy instruments were given to the Central Bank. The process of implementation of this new policy can be divided into two phases.

The first phase began on July 1, 1975 with the introduction of a system of preauthorization of credit by the Central Bank, a new interest rate policy and the creation of a call money market for each country.

The interest rates were raised on the same day, in order to narrow the differences between the BCEAO rates and those prevailing in the rest of the world, principally in France. Governments have recourse to exchange controls in order to stop the flow of funds from the monetary union to the countries outside the Franc zone. Higher interest rates were expected to limit the outflow of capital and to attract more foreign capital. The Governor of the bank can also alter the basic discount rate (presently 8 percent) in accordance with the general economic situation.[4] However, a preferential interest rate (5.5 percent) was set in order to prevent the impact of high interest rates on government and small business operations. This rate is applied, also, to crop marketing credits, to treasury overdrafts, to long term credits up to ten years extended to entreprises owned

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[4]BCEAO: Structure of Interest Rates Applied by the Central Bank, 1973-78. Senegal, Dakar, 1979.

by nationals and to government economic development expen-
ditures. This measure partly solved the lack of long term
credits in the economy. Moreover, the credit extended to
the national treasuries increased from 15 to 20 percent of
the previous fiscal year receipts. For the first time, a
call money market was established in the Union countries.
This decision was based on a recommendation of an IMF study:

> "An appropriate interest rate policy should
> facilitate an acceleration in monetization
> of the economy and the collection of surplus
> funds by banks. When surplus funds are
> available in the local money market, it is
> easier for the Central Bank to organize the
> establishment of an interbank call money
> market. A capital market can be developed
> only after a money market is in operation".
> (IMF study, 1973, p. 2)

The second phase of the reforms started in January,
1976. Previously the individual ceilings on commercial
banks' rediscount with BCEAO were generally subject to
certain maximum limits. These limits were 50 percent of
their expected credit operations. In the reformed system
there are no longer individual credit allocations for the
commercial banks. Their access to BCEAO credit is deter-
mined annually by the objectives for each country and for the
Union as a whole.

In the old system the rediscount ceilings were
allocated without any sectoral distribution. This fact
enabled commercial banks to finance only very short term
operations having practically no impact on economic develop-
ment. In the new system, credits are extended in accordance
with the priorities defined at the national level. The

commercial banks must rely essentially now on their own resources or those obtained on the call money market. Therefore, the degree of tightness or easiness of money will depend, mainly, on the total amount of credit extended to the banking system as a whole. So its role becomes more active. Moreover, the central bank may extend credit for non preferential operations on a discretionary basis to achieve global credit targets.

It can be seen that the reforms above have taken in account the various problems incurred by the Union during its brief lifetime. These reforms were generally seen as a major step towards the control of the banking system, a vital sector for any country.

Conclusion

In this chapter we have tried to give, briefly, the main characteristics of the Senegalese economy. First, some indicators about the relative weight of the different sectors of the economy are given. Second, the structural changes which took place after 1960 have been reviewed. Finally, the banking system and its role are examined.

Although Senegal is far away from solving the various development problems, it seems that the various measures taken after 1960 were perceived to be very progressive.

CHAPTER III

RELATION BETWEEN FOREIGN
AND NATIONAL SAVINGS

Introduction

A broad literature has been devoted to the role of
money and finance in the process of development. Many
writers are specially concerned about the relative impact
of both foreign and domestic finance on economic growth. A
review of the literature shows the coexistence of two main
hypotheses: the substitutability hypothesis and the
complementarity hypothesis. The adherents of the first one
emphasize the vital role of foreign finance in the first
stages of economic development enabling the developing
countries to reach a self-sustained growth in the near fu-
ture. The proponents of the second one insist on the cre-
ation of modern and dynamic capital markets in these coun-
tries and an implementation of effective monetary policies
in order to overcome the various development constraints.
In the view of this second group, foreign finance is at the
best a complement of domestic financing.

The aim of this chapter is to review the theoretical
and empirical models advanced in the literature and to test
these hypotheses for the Senegalese economy.

Moreover, a new model, which will enable us to
overcome the various shortcomings encountered in the previous

studies is proposed.

The Debate

In this section we discuss the two main hypotheses at both the theoretical and empirical levels. However, before proceeding, we must point out that although some theorists explicitly support one particular hypothesis, some others have been interested either in foreign finance or in domestic financing without taking an active part in the debate.

Substitutability Hypothesis

According to this school of thought, domestic and foreign financing are substitutes for each other. External finance is, mainly, the sum of foreign transfers, capital inflows used for direct or portfolio investments and disguised subsidies.

a) The Chenery-Strout Thesis

The pioneering article was written in 1966 (Chenery & Strout, 1966). The proposed model was based on the identification of three constraints on the rate of growth.

-capacity constraint

-savings constraint

-external trade constraint

The objectives were to estimate the extent to which external finance could remove these constraints, how long the process would take and the amount of external funds that would be required.

The first assumption was that foreign finance would be in the form of grants enabling an increase in the rate of investment and, therefore, in the rate of economic growth.

The second one was that sufficient foreign finance to overcome the constraints was available.

Chenery and Strout used a linear model and made a study for thirty-one countries over the 1957-1962 period and they found that national and foreign financing were substitutes. Their conclusion was that self-sustained growth would be achieved after 45 years at a 5 percent growth rate. Another formulation of the substitute idea made by Chenery (1970) was that capital inflows support both investment and consumption. So, other things being equal, an increase in the absolute amounts of both investment and consumption might not affect the ratio of gross domestic investment to gross domestic product (GDI/GDP). This ratio would be left practically constant. Morss (1968) and Chenery (1970) reached the same conclusions as the Chenery-Strout model (1966).

b) The Pearson Commission Report

Probably one of the first studies using this hypothesis was the Pearson Commission Report published in 1969. In this report three basic assumptions were made, leading, eventually to some projections. These assumptions were:

-The total flow of financial resources (net of loans repayments) going to the developing

countries will reach 1 percent of the gross
domestic product of the developed countries
members of the Developing Assistance Committee
by 1975.

-An increase in official development assistance
(loans and grants) to .7 percent.

-More favorable terms for official loans.

Given these preceding assumptions, the developing
countries might achieve self-sustained growth by the end of
this century. Self-sustained growth means, simply, the
ability for a country to finance its development, mainly, by
its own savings.

Unfortunately, these assumptions were not realized.
According to Newlyn (1977, p. 98), it seems that "In global
terms it is clear that the assumptions about the volume and
composition of the flow of resources are not being satisfied
and that it will require a much longer period to attain
self-sustained growth at the present rate of effective
transfers, if it is to depend on foreign resources."

Keith Griffin (1970), moreover, claimed that in some
countries or regions the outflow of profits and interest
payments exceeds the new capital inflows net of amortization.
Therefore, the negative net flow resulting from this reverse
flow will be detrimental to economic development. Griffin
drew his conclusions from a study of Latin America over the
1961-1968 period.

However, his conclusions were challenged by Newlyn,
(1977), who claims that foreign finance has a positive
effect on development because it enables countries or regions
to consume and invest much more than they would be able to

in the absence of new capital.

c) Evidence Supporting the Substitutability Hypothesis

Single equation regression techniques are used where savings is the dependent variable.

Three methods are used to analyze the effects of foreign resources.

-Time series for individual countries in order
 to study their short time behavior.

-Cross section data are used to estimate long
 term functions given adequate assumptions.

-Pooled time series data for a number of countries
 using all the observations and use of dummy
 variables for each country in order to evaluate
 a short term "average" behavior.

According to Newlyn (1977) most of the studies deal with short term behavior. Few time series regressions are reported in the literature.

However, some important statistical results can be found. We will give them when the empirical evidence is discussed later in this chapter.

-In the long run, statistical evidence seems
 to support the fact that there is a substitution
 between national and foreign resources as in
 the Chenery-Strout model.

-Savings, as the dependent variable, having a
 negative relationship with foreign resources
 may reflect substitution between the two.

Other writers have confirmed these findings.

Singh (1972) for example made a study for 70 countries. Various savings functions were estimated. The most statistically significant determinant of the savings function turns out to be capital inflow. He finds a complete substitution

between foreign finance and national savings.

"The overall summary would be that on the whole, capital inflows left the domestic investment almost un-changed." K. Singh (1972, p. 34).

He thinks that "capital inflows should be lumpy instead of being thinly spread over a large global surface. Its effectiveness lies not in its role as a peripheral supplement to domestic resources, but as a shock treatment producing a quantum jump in growth rate..." (p. 36). So, "capital inflows would have to be 'unbalanced' over time and space. Given the limitation of funds, the strategy should be not to spread them all over and do 'justice' but to con-centrate on a few countries, bring them over to new levels of growth rate, and then move onto fresh pastures." (Singh, 1972, p. 37).

In his study he uses cross-section data. Singh suggested to study further the impact of capital inflows on national savings, to use time series data for a smaller number of countries in order to verify the validity of his findings and to study the role of taxes. The use of time series data may lead to different results for different individual countries.

d) Weisskopf's Study

Weisskopf (1972) made a study of 17 countries using a 3 year moving average in his time series analysis. He brought out two new issues.

First, he thinks that the inclusion of capital out-

flows in previous studies is erroneous. He argues that in the case of capital outflows "one would expect the causality to run from domestic savings to the capital flow rather than the other way around."

Second, he argues that "only in situations characterized by a binding savings constraint and a slack trade constraint is the relationship between foreign capital and export savings described by the exante savings functions."

Weisskopf concludes in the existence of wide variations in the propensity to save out of foreign resources for different countries. He stressed the need for disaggregated studies.

e) Kaj Areskoug's Work

Kaj Areskoug (1969) used time series data in his study for 22 developing countries over the 1948-1965 period. Using multiple regression techniques, he finds out that foreign resources are divided between consumption and investment as in the Chenery-Strout conclusion. However, his results rejected the hypothesis of reduction in the use of national resources for investment in respect to public borrowing.

f) Gustav Papenek's Study

Gustav Papenek (1973), using pure cross-section data, found a greater effect of foreign aid on the rate of growth of output than as a proxy of direct investment and national savings.

g) W. T. Newlyn (1977)

In his study he found a negative relationship between gross domestic capital formation (GDCF) and government transfers. He argues that this negative effect is more than offset by the positive effects of these transfers.

Based on his findings, he claims that the value of the positive coefficient between contractual borrowing and GDCF suggests that half of the total loans have been used for investment. This confirms Areskoug's results, i.e., foreign aid is divided between consumption and investment. Therefore, according to his results, the necessary conditions for self-sustained growth are only half realized. The net flow is equal to one half of the gross flow and the change in investment is equal to one half the net flow. So the impact on growth is only one quarter. Therefore, the required resources must be multiplied by four before making any meaningful projections. He claims that the propensity to consume out of foreign finance resources is less than the propensity to consume out of national income and savings constraint can be overcome, to a large extent, by taxation. He assumes that government consumption expenditures are mainly capacity creating.

However, Newlyn points out two difficulties in using foreign resources to accelerate the attainment of self-sustained growth.

> -the problem of adjusting government budget to
> the discontinuation of foreign finance as
> already pointed out by Dacy in 1975.

-the foreign trade constraint.

As seen above, this group of economists put an emphasis on external factors, mainly foreign finance, to promote economic development. However, the widening gap between rich and poor countries seems to show, clearly, the limitations of their views. This fact leads many economists to seek another way of development. Contrary to the first class, the second one put an emphasis on the internal factors. Our next step is to study their achievement, both at the theoretical and empirical level.

Complementarity Hypothesis

a) The Shaw-Gurley Thesis

The complementarity hypothesis was formulated by Shaw and Gurley (1960) and later Shaw (1973). The basic ideas of the model were the following:

-According to their debt-intermediation view, cash balance, which is a liability of the banking system, can positively affect capital accumulation.

-Strong opposition to turning the terms of trade against agriculture to extract an "economic surplus" by involuntary non-financial means.

-Resistance to any introduction of detailed fiscal and budgetary planning techniques to substitute financial processes in allocating investable capital, whether such capital results from domestic savings or foreign aid.

-Proposal for the development of a dynamic and efficient domestic capital market. In the absence of a sophisticated one, informal capital markets, such as rural cooperatives, money lenders, pawn brokers and trade credits, can be organized, though they fade away when a modern financial institution grows.

-Necessity to strive against financial repression. Financial repression occurs when the fixed interest rates are lower than the rate of inflation.

-High real interest rates on financial assets and high real yields on physical assets are a sine qua non for a successful development policy.

-Finally, foreign aid and other forms of international development assistance are a poor substitute for a vigorous capital market.

As in the case of the first hypothesis, many writings in which the complementarity hypothesis is used can be easily found in the literature. We will try, next, to review the main ones.

b) Lewis J. Spellman's Study

He makes a model derived from Shaw's books (1960, 1973). His theoretical model tries to analyze the growth equilibrium of the investment share in output, the capital intensity, the interest rate, the per capita output and the per capita consumption. Spellman's problem is to know how the introduction of a financial system would influence these variables.

He finds out that any ceiling rate tends to result, first, in "a lower deposit rate, a shrunken financial system, a lower capital intensity and an increased rate spread between capital's marginal productivity in production and the real deposit rates paid to wealthowners." (p. 20).

Second, depressed loan rates are not consistent with high capital intensity and a high investment level.

Finally, if the rate of return is less than what

wealthowners can earn under self-finance, one might expect not only a shrinkage of the financial sector but also a return to self-financed production functions.

Commenting on the previous paper, Claudio-Gonzales-Vega, contrary to Spellman, thinks that if the marginal productivity of capital under self-finance is greater than the ceiling imposed on the rate of deposits going to the financial assets holders, production will not be completely credit-financed and self-finance has to be added to the model. This would decrease the negative effects of the impact of the ceiling policy.

c) Robert C. Vogel & Stephen Buser's Work

Vogel and Buser study first the relation between financial repression and inflation and second, the relation between real financial growth and capital accumulation. They made an empirical study for sixteen Latin American countries over the 1950-1971 period.

They reached the following conclusions:

-Strong confirmation of the point of view held by Johnson (1967), McKinnon (1973) and Shaw (1973) that high rates of inflation have undesirable consequences for financial growth and allocation of resources.

-Inflation fails to affect capital accumulation. They try to explain this paradoxical finding by saying that this result is due to the type of policies taken by the Latin American governments to curb inflation.

-An increase in the ratio of monetary assets to gross domestic product decreases significantly the share of gross domestic capital formation in gross domestic product.

-The change in currency holdings and the change in demand deposits, both deflated by gross domestic product, have no impact on capital formation contrary to the change in time and savings deposits over gross domestic product which has a significant positive effect on capital accumulation.

-Finally, the empirical evidence shows that, first, repression significantly decreases capital formation, and, second, that there is a significant positive impact of real time and saving deposits on capital accumulation in contrast to currency holdings and demand deposits. This fact indicates the importance of financial intermediation and the crucial role of time and savings deposits in the process of economic growth.

d) Charles Kindleberger's Study

In his paper, Kindleberger (1977) is concerned with the international aspect of the question.

"It is not enough to emphasize the improvement of domestic money and capital markets. In a well functioning developed or developing economy, domestic money and capital are connected to international markets." (p. 127). He goes on to say that:

"Financial deepening, perfecting capital market and raising financial intermediation ratios, all have an international dimension that should be subject to economic analysis and made the object of policy formation." Moreover, he claims that "the first step toward healthy monetary and capital market conditions, is surely the restoration or new development of effectively functioning domestic markets" and "such necessity explains and justifies Shaw's emphasis on domestic financial deepening." (p. 136). Kindle-

berger's point is indeed very important. An improvement of domestic financial markets should facilitate international capital flows between countries.

e) Basant K. Kapur's paper

Kapur deals with another aspect of the question. "Assuming that it is considered desirable to liberalize the functioning of financial and capital markets in less developed economies, the question we seek to answer is, how the transition from financially repressed to a financially liberalized economic condition can be achieved. To narrow the discussion even further, we propose to examine here the short-run, macroeconomic implications of alternative policies designed to lower the "steady state" rate of inflation in a "typical" underdeveloped economy." (p.199)

Using a supply oriented model, Kapur finds that:

-an increase in the deposit rate will decrease the expected holding of money, and this will decrease price inflation through a lowering in the rate of growth of nominal money balances while increasing real money demand.

-a decrease in price inflation can come about with a decrease in real output.

f) Richard T. Stillson's paper

Stillson's purpose is to examine the policy implications of some types of foreign capital flows to certain less developed countries, to put an emphasis on the need for policies to counter some of the domestic effects of these inflows, to study the relationships between stabilization

policies and development policies which, if not clearly understood, can lead to inconsistencies, and finally, to put an emphasis on budget policies.

He introduces the concepts of foreign and domestic budgets. His conclusion is that the effects of excess demand or supply of money on relative prices depend on the assumption of fixed exchange rates.

He argues that foreign reserves can be used to supplement domestic investment, and, if profitably invested, they may allow a trade surplus from which the loans can be repaid.

g) Other Writers

Many writers (Khatkhate, 1972; McKinnon, 1973; Shaw, 1973) and (Goldsmith, 1966 & 1969; Gurley & Shaw, 1960; Patrick, 1966; Porter, 1966) have tried to show that improvements in the financial intermediation process are the preconditions of development.

McKinnon (1973) and Shaw (1973) argue for the need of high interest rate policies as opposed to low interest rates in order to stimulate investments.

This is an important point, especially for the UMOA members, because of the fact that U Tun Wai's paper (1972), which carried the main ideas of the 1973 reforms, was arguing the same idea.

h) Galbis

An important paper written by Vicente Galbis (1977) stressed the following points:

-Aggregate production functions make little
 sense because people deal with dual economies.

-The necessity of taking account of the indi-
 visibilities in physical capital in the process
 of development.

-The importance of self-financing investments.

-The role of the government, which is able,
 among other things to regulate interest rates,
 to perpetuate unofficial financial markets
 and so on.

Galbis intended to investigate the nature of finan-
cial constraints in the fragmented developing economies, to
specify a two-sector model of capital intermediation in a
dual economy, and to discuss its basic properties, and to
estimate the effects of interest rate fixing on the effi-
ciency of investment outlets, inflation and the distribution
of income.

Galbis's main findings were the following:

-An improvement in the financial intermediation,
 such as higher real interest rates; shifting
 resources from traditional low yielding invest-
 ments to modern technological sectors may
 accelerate, dramatically, the overall rate of
 economic growth.

-Interest rates on financial assets below the
 equilibrium levels usually lead to a
 perpetuation of high rates of inflation, an
 establishment of some short of credit rationing
 and a deterioration in the distribution of
 income.

i) Ali Issa Abdi's Work

Ali Abdi (1977) deals with the role of the financial
institutions in the real growth of developing economies.
He reviewed the financial repression hypothesis and the
structuralist hypothesis, successively. As McKinnon (1973),

Shaw (1973), Rod Cameron (1972) and many others before him did, he concludes that the development of the financial sector contributes significantly to economic development. The banking system fails to make a positive contribution if it is repressed by government intervention. He thinks that misquided theory is the main reason for financial repression. In the absence of perfect capital markets the complementarity between money and physical assets is more appropriate in the context of a developing economy.

At this point, one should mention the structuralist hypothesis of Goldsmith (1969) who wrote:

> "Economic theory and economic history both
> assure us that the existence of a super-
> structure of financial instruments and
> financial institutions is a necessary,
> though not a sufficient, condition of de-
> velopment." (p. 408).

However, the aspect of the question dealing with the social and political structures is beyond the scope of this study.

j) Evidence for the Complementarity Hypothesis

No substantial empirical work has been done to test the complementarity hypothesis. Most of the studies proposed in the literature are theoretical. As Vogel and Buser (1977) pointed out, the empirical work in both McKinnon and Shaw is primarily illustrative, and economic techniques have not been used to test rigorously the hypotheses suggested. They themselves made an attempt to over come this deficiency by testing a certain number of hypotheses for some Latin American countries, and their results confirm the im-

portance of the monetary sector in the process of development.

Empirical Evidence for Senegal

In this section, some conventional tests proposed in the literature are reviewed. The same tests are conducted for Senegal to see if one would reach the same conclusions as those obtained previously. The shortcomings of the previous models are discussed and a new model to correct them is proposed.

Some Conventional Tests for the Senegalese Economy

As seen above, a single equation model has been used, in general, to test the relationship between gross national savings and foreign finance. This equation may be written in the following form:

$$Sn = a + bS_F + b_1Z_1 + b_2Z_2 + b_nZ_n \quad i = 1, 2, \ldots n$$

where:

Sn = gross national savings

S_F = foreign finance or foreign savings

Z_i = vector of various variables used in the literature that affect savings

a, b_i = the coefficients to be estimated

Some writers have utilized gross domestic savings (SD) instead of Sn in the above model.

Foreign finance (S_F) is approximated either by trade balance (TB), net flow of foreign financial assets (NFA) and alike.

It is obvious that the sign of the coefficient b is of substantial importance since it can show the nature of

the relation between Sn and S_F. A negative (positive) sign would indicate that foreign savings are a substitute (complement) for national or domestic savings.

It seems important to present, briefly, the previous empirical models and their findings.

a) Chenery's model (1970)

As reported in Singh's paper (1972), Chenery's equation is the following:

$$Sn = -17.5 + 5.7 \text{ Log } X_1 - 0.2 \text{ Log } (X_1)^2 - 0.013 \text{ Log } X_4$$
$$\qquad\qquad (1.6) \qquad\qquad (-0.6) \qquad\qquad (-4.0)$$

$$-0.35 \text{ } X_{16} + 0.16 \text{ EP} + 0.24 \text{ EM} \qquad R^2 = .66$$
$$\quad (-5.4) \qquad (3.9) \qquad (4.7)$$

X_{16} = capital inflows (% of GNP)

X_1 = per capita income

X_4 = total population

EP = share of primary exports in GDP (%)

EM = share of other exports in GSP (%)

b) Weisskopf's model

He uses his study time series data for 17 countries.

$$Sn = \text{constant} + 0.13 \text{ GNP} - .222 \text{ Capital inflows}$$
$$\qquad\qquad\qquad (65) \qquad\qquad (-5.3)$$

$$+ .176 \text{ Exports} \qquad \text{SEE} = \text{NR (non reported)}$$
$$\quad (4.6) \qquad\qquad R^2 = \text{NR}$$

GNP = gross national product

c) Griffin and Enos's model

They made their study for 32 developing countries by using cross section data (1962-64):

$$Sn = 0.11 - 0.73\ X_{16} \qquad\qquad R^2 = NR$$
$$\qquad\qquad (-6.6) \qquad\qquad\qquad SEE = NR$$

X_{16} = capital inflow as a percentage of GNP

d) Rehman's model (1968)

He made his study for 31 less developed countries by using cross section (1962).

$$Sn = 0.14 - 0.25\ \text{capital inflows} \qquad R^2 = NR$$
$$\qquad\qquad\qquad\qquad\qquad\qquad SEE = NR$$

e) Singh's model (1972)

His study is for 70 countries, developed or not. Cross country observations are used. An observation is an average of the years 1960-1965.

$$Sn = 25.1 - 814\ \frac{1}{(\text{Log } X_1)^2} + 7262\ \frac{1}{(\text{Log } X_1)^4}$$
$$\qquad\quad (-5.0) \qquad\qquad\quad (3.4)$$

$$+ 1.4\ X_2 - 5.4\ X_6 - 0.0357\ X_{17} + 0.066\ X_8$$
$$\quad (5.4) \qquad (-2.0) \qquad (-11) \qquad\qquad (2.4)$$

$$+ 0.13\ X_9 + 4.4\ \frac{X_{12}}{(\text{Log } X_1)^2}$$
$$\quad (1.8) \qquad (2.4)$$

X_{17} = Log $(X_1) \cdot X_{10}$

X_1 = per capita income

X_{10} = Capital inflow as % of GNS

X_2 = rate of growth of GNP

X_6 = ratio of unofficial to official price of domestic currency in U.S. $

X_8 = share of imports in GNP (in %)

X_9 = Labor participation rate

X_{12} = Total Tax revenue as % of GNP

It is evident that the above studies strongly support the substitutability hypothesis since all models have revealed a statistically significant negative relationship between domestic or national savings and foreign savings.

We then test the substitutability hypothesis for the Senegalese economy. Since we focus on the relation between domestic as well as national savings and foreign finance, two variants of the discussed "conventional" models are estimated.

$$\underline{\text{Model 1}}: S_i = a_1 + b_1 S_F + c_1 (GDP) + U_1$$

$$\underline{\text{Model 2}}: S_i = a_2 + b_2 S_F + c_2 (GDP) + d_2 (EX) + U_2$$

where:

$i = 1, 2$ For $i = 1$ $S_i = Sn$;   for $i = 2$ $S_i = Sd$

$j = 1, 2$ For $j = 1$ $S_{F_i} = NFA$;   for $j = 2$ $S_{F_i} = TB$

       GDP = gross domestic product

        EX = exports

        Sd = domestic savings

The following table gives our results for Senegal:

The results confirm those of the previous studies, i.e., the negative relationship between national savings and foreign finance approximated either by trade balance or net flow of foreign assets. As we have seen previously, the negative relationship can be explained by the "reverse flow" theory which stipulates that capital inflows, in developing countries, is outweighed by the capital outflows (profits, dividends and alike) going to the developed world. Another

Table 3.1 – Some Conventional tests of Aggregate Savings
For the Senegalese Economy 1959-1976

Models	Dependent Variable	Constant Terms	NFA	TB	GDP	EX	R^2	SEE
Model 1	Sn	8.858 (.80)	-0.461 (-2.365)		0.117 (2.492)		.586	5.094
	Sn	3.781 (.302)		-0.288 (-1.342)	0.151 (3.138)		.492	5.64
	Sd	-6.922 (-.406)	-1.034 (-3.542)		0.128 (1.819)		.642	7.637
	Sd	-0.367 (.026)		-1.285 (-6.036)	0.169 (3.555)		.808	5.589
Model 2	Sn	20.855 (1.306)		-0.515 (-2.073)	0.168 (3.578)	-0.355 (-1.606)	.571	5.365
	Sn	19.561 (1.492)	-0.559 (-2.812)		0.128 (2.797)	-0.261 (-1.481)	.641	4.903
	Sd	15.513 (-.749)	-0.955 (-3.036)		0.119 (1.646)	0.210 (.752)	.656	7.75
	Sd	10.712 (.644)		-1.431 (5.533)	0.181 (3.687)	-0.229 (- .997)	.821	5.59

Data used is given in Appendix

T - Statistics in parentheses

interesting observation is that if the capital inflows are of
the speculative type whose owners try to take advantage of
the interest rate differentials, their impact on economic
growth would not be very important. However, one can point
out a certain number of shortcomings of these various models
reported in the literature.

First, it is interesting to know whether foreign
finance is a substitute for or a complement to domestic
financing. Nevertheless, it is equally important to find
the relative degree of substitutability or complementarity
of these two types of financing. Such information can be
obtained only by measuring the elasticities of substitution
between foreign and domestic financing.

Second, it is also important to see how these
elasticities evolve over time. Are they increasing, de-
creasing or remaining stable? In any case, one should be
able to investigate the nature of their trend over the 1960-
1976 period.

A New Model to Measure Substitution Possibilities Between Foreign and Domestic Finance

a) Theoretical Model

The concept of substitution and/or complementarity
has many theoretical applications in economic analysis. The
field of economic theory in which this concept has been ex-
tensively used is production theory, where the main concern
of empirical investigation is with the substitution possi-
bilities, if any, between the various factors of production.

The focus of empirical and theoretical analysis in production theory is the specification of the functional form able to describe the terms in which the inputs are combined to produce output.

In chronological order, one may distinguish, mainly, three specification forms which have been advanced in the last decades: (i) the Cobb-Douglas specification, which assumes that factor inputs are substitutes with a unitary elasticity of substitution, (ii) the constant elasticity of substitution (CES) assuming a constant elasticity of substitution between any pair of inputs and (iii) recently, the "translog" specification which imposes no restrictions on the various elasticities. Moreover, this latter allows us to compute the elasticities of substitution or complementarity for each observation.

Researchers in other economic fields have applied these functional specifications to measure substitution possibilities between alternative economic variables.

Chetty (1971) used a CES function to measure the elasticity of substitution between money and quasi-money.

In this context, one can think of the need of a new model able to clarify the problem of substitution possibilities between foreign and domestic financing.

A translog model for the Senegalese economy is proposed to study the degree of substitutability between national and foreign finance.

Following the steps of the authors who proposed this method (Berndt and Wood, 1975; Hudson and Jorgenson, 1974),

we assume that output can be separated into a component for the financing of investment goods and other components representing the various types of financing consumption goods.

The fundamental equation, then, is the following:

$$Y = F(Id, Z_1, Z_2, \ldots, Z_n) \qquad (1)$$

If $\qquad Id = Sn + S_F = Sd \qquad$ (1) becomes

$$Y = F(Sn, S_F, Z_1, \ldots, Z_n) \qquad (1')$$

where

Id = Domestic financing

Sd = Domestic savings

Sn = National savings

S_F = Foreign financing

Z_i = Other types of financing consumption goods, as wages and alike

Id, I_F, Z_i are considered as inputs in (1). As Sheppard (1971), and others pointed out, the dual of equation (1') is a price equation which can be formulated in the following:

$$\phi = \phi(Y, Pn, P_F, P_{Z1}, P_{Z2}, \ldots, P_{Zn}) \qquad (2)$$

Following Griffin and Gregory (1976), we assume a homothetic aggregate function (ϕ_1) consisting of domestic and foreign financing weakly separable from the other types of financing, i.e.:

$$\phi = \phi \; Y, \; \phi_1(Pn, P_F), \; P_{Z1}, P_{Z2}, \ldots, P_{Zn}) \qquad (3)$$

Although, in production analysis the weak separability hypothesis has been rejected by some authors (Berndt-Wood, 1975) and supported by some others (Humphrey-Moroney, 1975) we use it cautiously. The reason is the predominance of the barter sector in the Senegalese economy and the lack

of reliable statistical data. Therefore, one can proceed to examine the ϕ_1 relationship as if it were autonomous of the P_{Zi}.

As pointed out by Griffin and Gregory (1976), the general function (3) does not need, practically, any priori parameter restrictions. So there is no restriction on the Allen partial elasticities of substitution and "it can be viewed as a second order approximation to any arbitrary twice differential cost function" (p. 848). We, therefore, focus our attention in the aggregate homothetic function ϕ_1.

$$\phi_1 = \phi_1 (P_N, P_F) \qquad (4)$$

If we expand ϕ_1 to a second order Taylor series approximation in a neighborhood where all the inputs are unitary, it becomes:

$$\text{Log } \phi_1 = a_o + a_N \text{ Log } P_N + a_F \text{ Log } P_F + \tfrac{1}{2} b_{NN}(\text{Log } P_N)^2$$
$$+ \tfrac{1}{2} b_{FF} (\text{Log } P_F)^2 + \tfrac{1}{2} b_{NF} \text{ Log } P_N \text{ Log } P_F + \tfrac{1}{2} b_{FN}$$
$$\text{Log } P_F P_N \qquad (5)$$

If the symmetry conditions hold ($b_{FN} = b_{NF}$), equation (5) becomes:

$$\text{Log } \phi_1 = a_o + a_N \text{Log } P_N + a_F \text{Log } P_F + \tfrac{1}{2} b_{NN} (\text{Log } P_N)^2$$
$$+ \tfrac{1}{2} b_{FF} (\text{Log } P_F)^2 + b_{NF} \text{ Log } P_N \text{ Log } P_F \qquad (6)$$

Differentiating equation (6) with respect to the logarithm of prices we have:

$$\frac{\partial \text{ Log } \phi_1}{\partial \text{ Log } P_N} = a_N + b_{NN} \text{ Log } P_N + b_{NF} \text{ Log } P_F \qquad (7)$$

$$\frac{\partial \text{ Log } \phi_1}{\partial \text{ Log } P_F} = a_F + b_{FF} \text{ Log } P_F + b_{NF} \text{ Log } P_N \quad (8)$$

The left hand side of (7) or (8) can be written as:

$$\frac{\partial \text{ Log } \phi_1}{\partial \text{ Log } P_i} = \frac{\partial \phi_1}{\partial P_i} \frac{P_i}{\phi_i} \qquad i = N, F \quad (9)$$

In production analysis, $\frac{\partial \phi_1}{\partial P_i}$ is treated as the optimum quantity of the factor input employed in the production function. This is the well known Sheppard's lemma (1971, p. 171) which states that: "along the minimum cost expansion path the equilibrium employment of the i-th input is given by $\frac{\partial C}{\partial P_i}$" where C = Y is the cost of production. $\frac{\partial \phi_1}{\partial P_i}$ is considered in the same way. It is the equilibrium use of the i-th financial input along the minimum expansion path of investment goods, i.e.

$$\frac{\partial \phi_1}{\partial P_i} = Q_i \qquad i = F, N \quad (10)$$

where Q_i is the equilibrium quantity of domestic and foreign financing.

Substituting (10) into (9), we have:

$$\frac{\partial \text{ Log } \phi_1}{\partial \text{ Log } P_i} = \frac{Q_i P_i}{\phi_i} = S_i \qquad i = F, N \quad (11)$$

Where S_i is the relative share of each type of financing. From equation (7), (8) and (11), we obtain the following system:

$$S_N = a_N + b_{NN} \text{ Log } P_N + b_{NF} \text{ Log } P_F$$

$$S_{F1} = a_F + b_{FF} \text{ Log } P_F + b_{NF} \text{ Log } P_N \quad (12)$$

One can note that the input shares sum to unity ($Q_i = P_N Q_N + P_F Q_F$) and the sum of the share changes, caused by a variation, in the price of any input must be equal to zero. Therefore, the translog cost function must meet two conditions:

$$\Sigma_i \ ai = 1 \qquad i = N, F \qquad (13)$$

$$\Sigma_i \ Bij = 0 \qquad i = N, F \qquad (14)$$

In addition, the following symmetry conditions can be derived from (4).

$$\frac{\partial^2 \ Log \ \phi_1}{\partial \ Log \ P_F \ \partial \ Log \ P_N} = \beta_{NF} = \beta_{FN}$$

However, our main interest is to find out the elasticities of substitution between domestic and foreign finance and the price cross elasticities.

According to Berndt-Wood (1975), the Allen partial elasticities of substitution can be calculated in the following way:

$$\sigma_{ii} = \beta_{ii} + S^2_i - S_i \qquad i = N, F \qquad (16)$$

$$\sigma_{ij} = \frac{\beta_{ij} + S_i S_j}{S_i S_j} \qquad i, j = N, F \qquad (17)$$

The price elasticities of demand (E_{ij}) for inputs can be derived from the elasticities of substitution.

$$E_{ij} = S_j \ \sigma_{ij} \qquad i, j + N, F \qquad (18)$$

b) Empirical Tests and Results

There will be, of course, some discrepancies between the optimum minimum relative shares S_i and the observed relative shares. Such discrepancies may be attributed to a plethora of factors like imperfections in capital markets, entrepreneurial inertia, and the like. We may, therefore, write equation (12) in this form:

$$S_N = a_N + b_{NN} \text{ Log } P_N + b_{NF} \text{ Log } P_F + U_N$$

$$S_{F1} = a_F + b_{FF} \text{ Log } P_F + b_{NF} \text{ Log } P_N + U_F \qquad (19)$$

where U_i (i = N, F) are the attached disturbances given the differences between the optimum and observed relative shares. We assume that there is a correlation between U_F and U_N. Hence the two stages estimation procedure suggested by Zellner (1962) may be expected to yield more efficient estimates. However, Zellner's seemingly unrelated regression procedure cannot be applied since the relative factor shares sum to unity and, therefore, the co-variance matrix is singular. To avoid this problem we exclude one of the equations (19) and we observe that we may have estimates of all parameters by regressing only one equation. However, Barten (1969) has shown that the parameter estimates of a system of equations that sum to unity are independent of the chosen equation.

Full information maximum likelihood procedure produces estimates invariant to the choice of the equation to be deleted. Moreover, Berndt and Christensen (1973) have shown that OLS estimates of either equation, (19) are

equivalent to full information maximum procedure since only two equations are considered.

Consequently, we delete the second of the equations (19) and we conserve:

$$S_N = a_N + b_{NF} \text{ Log } P_F + b_{NN} \text{ Log } P_N + U_N \qquad (20)$$

Linear homogenity and symmetry permit us to have estimates of the parameters that do not appear in equation (20).

$$\hat{a}_F = 1 - \hat{a}_N \qquad \text{since } \hat{a}_F + \hat{a}_N = 1$$

$$\hat{b}_{NF} = \hat{b}_{FN} \qquad \text{since } \hat{b}_{ij} = \hat{b}_{ji}; \quad i, j = F, N$$

$$\hat{b}_{FF} = -\hat{b}_{FN} \qquad \text{since } \Sigma b_{ij} = 0; \quad i, j = F, N$$

Finally, since $b_{DF} = -b_{DD}$ equation (20) can be re-written as:

$$S_N = a_N + b_{FN} \text{ Log } \left(\frac{P_N}{P_F} \right) + U_N \qquad (21)$$

OLS is used to estimate equation (21) for the Senegalese economy over the 1960-1976 period. The origin and nature of the data will be available in the appendix. Our estimated equation submitted to a first order auto-correlation correction is the following:

$$S = 0.625 - 0.102 \text{ Log } (P_N/P_F)$$
$$\quad (7.497) \qquad (-2.858)$$

$$R^2 = .68 \qquad SE = .166$$

* t statistics in brackets

It is evident that all the coefficients are highly

significant at the 95 percent level.

Using equation (16), (17) and (18), we compute the
elasticities of substitution between foreign and domestic
finance as well as their own and cross price elasticities of
the derived demand for foreign and domestic finance.

These results are presented in Table 3.2.

As far as the own price elasticities are concerned,
they are all negative. This indicates that the conditions
of stability are realized and the derived demand for each
input is negatively sloped.

The cross price elasticities are important, since
they measure the sensitivity of the demand for foreign and
domestic finance to changes in their costs.

This table clearly shows a positive sign in the
elasticity of substitution between foreign and domestic
finance over the 1960-1976 period. This means that the two
types of financing are substitutes for each other. This
fact strengthens the previous findings reviewed above.
Second, one can note the low level of these elasticities
over the same period. The average value is, roughly, 1.5
with two peaks of 1.595 in 1966 and 1.60 in 1975.

Third, it can be noted that the value of these
elasticities is quite stable over the considered period.
The fluctuations in the computed values occur only within
the 1.4-1.6 range. However, the values were down from 1960
to 1962, up from 1967 to 1970 and up again for the remain-
ing of the period.

Finally, the empirical evidence does not allow us

Table 3.2 - Elasticities of Substitution, Input Derived Demand
Own and Cross Price Elasticities for the Senegalese
Economy 1960-1976.

Year	Elasticity of Substitution estimates N_F	Own Price elasticities estimates		Cross Price elasticities estimates	
		E_N	E_F	E_{NF}	E_{FN}
1960	1.443	- .811	-2.565	.519	.923
1961	1.416	-1.883	-1.065	.808	.608
1962	1.410	-1.229	-1.617	.657	.753
1963	1.481	-3.383	- .649	1.030	.451
1964	1.469	-3.138	- .688	1.001	.468
1965	1.460	-2.935	- .726	.975	.485
1966	1.595	-5.676	- .448	1.245	.350
1967	1.415	-1.842	-1.087	.800	.615
1968	1.415	-1.804	-1.108	.792	.621
1969	1.439	- .830	-2.495	.526	.913
1970	1.416	-1.074	-1.866	.611	.805
1971	1.450	- .768	-2.740	.502	.948
1972	1.481	- .650	-3.371	.652	1.029
1973	1.578	- .468	-5.323	.361	1.217
1974	1.409	-1.294	-1.534	.674	.734
1975	1.604	- .439	-5.865	.365	1.260
1976	1.541	- .518	-4.585	.388	1.154

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to support or to deny strongly the belief that the Senegalese economy will reach self-sustained growth in the near future. Moreover, the low level of the value of the elasticity of substitution does suggest that the complementarity hypothesis is not totally inadequate. Therefore, a sound development policy must not only use foreign finance in a very efficient way but also must improve the domestic financial setting and take advantage of all the monetary instruments available in order to achieve economic growth and development.

Conclusion

In this chapter an attempt is first made to review the literature related to our topic. As seen above, two main hypotheses coexist. The substitutability hypothesis is mainly based on the presumed ability of foreign finance to be a good substitute for domestic finance, enabling the developing countries to reach self-sustained growth in the near future. The attitude and policies of the international institutions can be understood in this framework. However, the modest results registered led many economists to seek a new approach. The complementarity hypothesis, emphasizing the development of domestic financial institutions was seen as an alternative, even though it was proposed long ago.

A word is said about the structuralist hypothesis, too. This latter is important because development cannot be realized without a change in social, mental and political attitudes. This area is beyond the scope of the investigation, however.

Both the theoretical and empirical works previously carried out were reviewed.

Second, we have proposed a model to test the different hypotheses. We find out that indeed foreign and domestic financing are substitutes for each other. Moreover, by using new techniques, we computed the values of the elasticities of substitution between the two types of financing in order to have an idea about the relative degree of substitutability between them and their evolution over time. The study is done only for the Senegalese economy. The elasticities of substitution are quite low and stable over the 1960-1976 period.

Some policy recommendations from the empirical results obtained will be suggested in our next chapter.

CHAPTER IV

RELATIVE CONTRIBUTION OF NATIONAL
AND FOREIGN SAVINGS

Introduction

We have seen in the preceding chapter that the
empirical evidence shows a negative relationship between
national and foreign savings. However, it would be im-
portant to know the combined effect of these two types of
financing and the relative contribution of each of them to
total output. In order to reach this goal, a relatively
simple model is proposed. The specified equations of the
model will be tested and our conclusions will be derived
from the statistical results.

The Model

Description of the Model

The model is mainly a demand oriented one. It will
enable us to see the main determinants of income and its
growth rate and their relative contribution during the 1960-
76 period.

The econometric characteristics and the technical
aspects will mainly be dealt with in the appendices. The
basis of the model is a set of three structural equations
derived from some identities and some general assumptions.
The model contains no interest rate because the rate of dis-
count, taken as proxy, was low and fixed from 1962 to 1973

for all the UMOA members.

Time series data are used in our econometric work. All our equations are estimated for the 1960-1976 period, mainly, because of the lack of data for the previous years.

Methodology

The methodology followed here, that of a demand oriented growth model, is widely used in the literature. For instance, it was used by Caves and Holton (1959) in their study of the impact of exports on the Canadian economy, by Thorbecke and Condos (1966) and Roemer (1970) in their study of the contribution of exports to Peruvian growth and by Ghali (1973) in his study of the relative impact of investment and export on Hawaiian growth.

The question which arises and which all these studies try to answer is well posed by Ghali: "What would have happened if exports (or any other variables)[1] did not grow?"

This methodology is quite simple in its essence. First, an econometric model able to capture the essential features of the economy is made. According to Ghali (1976, p. 528), "this model can be used to simulate the behavior of the economy under the counterfactual assumption. By comparing the simulated behavior thus obtained with that obtained under the condition which actually prevailed, the contribution of exports (or any other aggregate)[2] can be

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[1]our own words.

[2]our own words.

evaluated."

However, as pointed out by Goldberger (1966)[3], simulation is necessary if the model is dynamic because comparison based on estimated parameters gives only the short run effects. The long run effects of exogenous variables can be obtained only by solving the model or by simulating its behavior.

In general, demand oriented models derived from the Keynesian framework were used in all these previous studies. As indicated in Ghali's paper (1973) serious objections can be leveled against this type of model. Cornwall (1970) pointed out that the results (importance of exports) obtained in previous studies depends only on the use of demand oriented models. However, Roemer argues that the procedure is valid because "if the economy operates below capacity, aggregate demand alone determines equilibrium levels of income" (1970, p. 50).

Chambers and Gordon (1966) argue that the fact of considering an increase in output which results from the expansion of a sector as its net contribution is erroneous unless the factor of production used in this expansion has no alternative use.

One can point out that the impact of aggregate demand on the level of output depends on the rate of growth of productivity in different sectors and the relative mobility of resources.

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[3]A Goldberger "Comment" in Adelman and Thorbecke, 1966.

However, one must bear in mind that no model is perfect. Following the previously mentioned studies, we use a demand approach model in this study. Although a theoretical supply model can be made, it would be quite impossible to test it because of a lack of reliable data about capital or labor for Senegal.

The agricultural sector is primarily a barter one characterized by a very low level of monetization. Senegal, like most of the developing countries, is an agricultural one and any fluctuations in this sector directly affect the whole economy. These fluctuations generally occur because of the cyclical drought in the Sahel and a dummy variable will be used to take account of this fact.

Specification of the Model

a) Identities

Following the traditional demand approach, income can be expressed by the familiar identity:

1) $Y = C_p + C_g + I + EX - IM$

where the symbols denote income, private consumption, government consumption, gross domestic investment, exports and costs associated with them, and imports in real terms, respectively.

The second identity is that disposable income, Y_d, is simply total income after taxes, T.

2) $Y_d = Y - T$

The following identities will show how the equilibrium between savings and investment is reached.

(3) $Cg + EX + Id = T + Sp + IM$

where Sp = private savings. Rearranging the terms in (3) gives the following:

(4) $Id = (T - Cg) + Sp + (IM - EX)$

Since $(T - Cg) = Spu$ which is public savings and $(IM - EX) = -TB$ where TB is trade balance (4) can be rewritten into (5).

(5) $Id = Spu + Sp - TB$

However, one can note that:

(6) $Spu + Sp = Sn$

Since the opposite of trade balance is taken as foreign savings, we have:

(7) $-TB = S_F$

In the particular case of Senegal, the trade balance was in deficit throughout the whole period. This means that there was a continuous transfer of purchasing power from the rest of the world to Senegal.

Putting (6) and (7) into (4) gives the following:

(8) $Id = Sn + S_F = Sd$

where Sd is gross domestic savings.

This is simply the familiar I-S equilibrium. According to Leff and Sato (1979) "if foreign capital inflow S_F is elastically supplied to the LDC, its internal adjustment problem is mitigated since any excess of gross domestic investment over gross national savings is simply filled by S_F". They added that "if output is flexible and responds to demand stimulus in the short run, then gross domestic investment and gross domestic savings adjust to establish the

equilibrium output, given the exogenously determined level
of foreign capital inflow" (p. 170-171).

b) Basic assumptions

Four basic assumptions are made in the model. First,
we assume that private consumption is a function of dis-
posable income:

Assumption 1: $C_p = Cp(Yd)$

In other words, private consumption is highly re-
lated to the level of disposable income.

Second, government consumption or expenditures are
assumed to be highly related to taxes:

Assumption 2: $C_g = Cg(T)$

Even though the government is able to finance its
operations by increasing the public debt or by having re-
course to foreign aid, for instance, the point is that taxes
are by far its main resource. Therefore, one can expect
that government expenditures are determined, mainly, by the
tax revenues.

Third, it is assumed that imports are a function of
income.

Assumption 3: $IM = IM(Y)$

Finally, the last assumption is that exports and
foreign finance are exogenously determined. Exports vary
with the level of the world demand for the Senegalese prod-
ucts. Since a large proportion of the exports is made up
by agricultural products, natural events like a prolonged

drought can drastically affect them. Therefore, exports are determined by exogenous factors both at the demand and supply side. Foreign financing can be influenced by economic factors such as the potential rate of return on invested funds which stem from favorable tax policies, cheap labor, and the like. However, one can assume that the most important determinants are non economic. Social and political considerations may be crucial in the decision of investing abroad along with some economic potential gains. Therefore, we assume that foreign financing is exogenously determined.

Assumption 4:   EX, S_F exogenous

The preceding assumptions lead to the reduced form equation:

(9) $Y = F(Id, T, EX)$

The change in income would be a function of the change in investment, in exports and in taxes. Mathematically this can be written by:

(9') $\Delta Y = f(\Delta I, \Delta T, \Delta EX)$

If equation (9') is assumed to be linear and if both sides are divided by Y_{-1}, we get by simple transformation the following:

(10) $GY = \alpha + \alpha_1 GI\left(\dfrac{I}{Y}\right)_{-1} + \alpha_2 GT\left(\dfrac{T}{Y}\right)_{-1} + \alpha_3 GE\left(\dfrac{EX}{Y}\right)_{-1}$

where GY, GI, GE, GT represent the rates of growth of income investment, exports and taxes, respectively.

If one changes the variables in terms of Z for notational convenience and if an error term is added, equation

(10) can be rewritten as:

(11) $GY = \alpha + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3$

where

$$Z_1 = GId\left(\frac{Id}{Y}\right)_{-1}; \quad Z_2 = GT\left(\frac{T}{Y}\right)_{-1}; \quad Z_3 = GE\left(\frac{EX}{Y}\right)_{-1}$$

The model to be complete needs a set of behavorial equations.

c) Behavorial equations

Since foreign financing is assumed to be exogenously and independently determined from the system, only national savings and taxes need to be specified.

The following relationship is modelled for Sn.

(12) $Sn = F(Y, S_F)$

The second behavorial equation is about taxes. Taxes are expected to be related to the income of the previous year.

(13) $T = T(Y_{-1})$

The next step is to explain the various variables of the model.

The explanatory variables

The relevance and the plausibility of the explanatory variables will be discussed below.

A discussion of the determinants of the rate of growth of output, domestic savings and taxes will be made successively.

a) Explanatory variables for the growth
   rate of Income

The first variable is gross domestic investment.
The role of investment in the process of generating income
does not need any discussion because of its universality.
Gross domestic investment is financed both by national and
foreign savings. However, we have established in the preced-
ing chapter that there is a negative relationship between
the latter. Nevertheless, if the overall effect on the rate
of growth of output, this would mean that the negative effect
of foreign finance on national savings is overcompensated
by its positive effect on output. If this is the case, the
coefficient of Z_1 should be positive and statistically
significant.

Our second explanatory variable is taxes. The
importance of government tax revenues is vital for a devel-
oping country like Senegal because of its social and economic
implications. Taxes allow the government to invest, not
only in the traditional public sectors, like education,
health, and the like, but also in many development related
projects.

Moreover, an appropriate taxation policy could
positively affect the amount of both national savings and
foreign savings in the economy.

The third explanatory variable is exports. The
role of exports on economic growth is vital because it seems
to be the only reliable source of revenue for the developing
countries to finance their development objectives.

In the case of Senegal, agricultural products remain the major part of total exports. Peanuts and their derived products are the main commodities. One can see the negative impact of the drought on the supply side and the direct relationship between the amount of exports and the world demand. For instance, the Senegalese peanut oil industries began to have trouble because of the arrival of new kinds of cooking oil in the international market.

The effects of exports on the trade balance and the balance of payments do not need any comment.

For all these reasons, one can say that the contribution of exports to economic growth is important.

Before passing to the next paragraphs, two points must be made. First, it is assumed that one year is the necessary period for the variables to affect the rate of growth. This is the main reason why all our ratios are lagged for one period.

Second, we think that all our variables affect the rate of growth positively. Therefore, we expect positive and statistically significant coefficients between the rate of growth and each of them.

b) Explanatory variables for national savings

The relation between savings and income is consistent with the Keynesian theory of savings and does not need further comment. The relation between S_n and S_F has been widely investigated in our preceding chapter.

c) Explanatory variables for Taxes

The amount of taxes depends primarily on the level of income of the previous year. We expect a positive and significant coefficient between taxes and GDP because the amount of taxes increases with the level of income.

The complete model, the estimated coefficients, the final equation and the eventual statistical problems encountered will be given in the appendix. Moreover, a schematic representation of the model is given in figure 4.1.

The Empirical Results

Before we examine our statistical results, a number of observations must be made.

First, in order to take account of the disruptions which occurred because of the long drought, a dummy variable is introduced in our growth equation for the years 1967, 1969 and 1973. A big drop in total output was registered, primarily because of the drought.

Second, as seen in the model, the reverse of the trade balance is taken as a proxy for foreign financing and this is consistent with the way gross capital formation is computed in the Senegalese National Accounts and the World Bank Tables.

Finally, the estimated equations are presented in Table 4.1.

a) The estimated growth equation

The estimated growth equation is given by equation 1 in Table 4.1. First, one can easily note that all the co-

Figure 4.1 – Schematic representation of the model
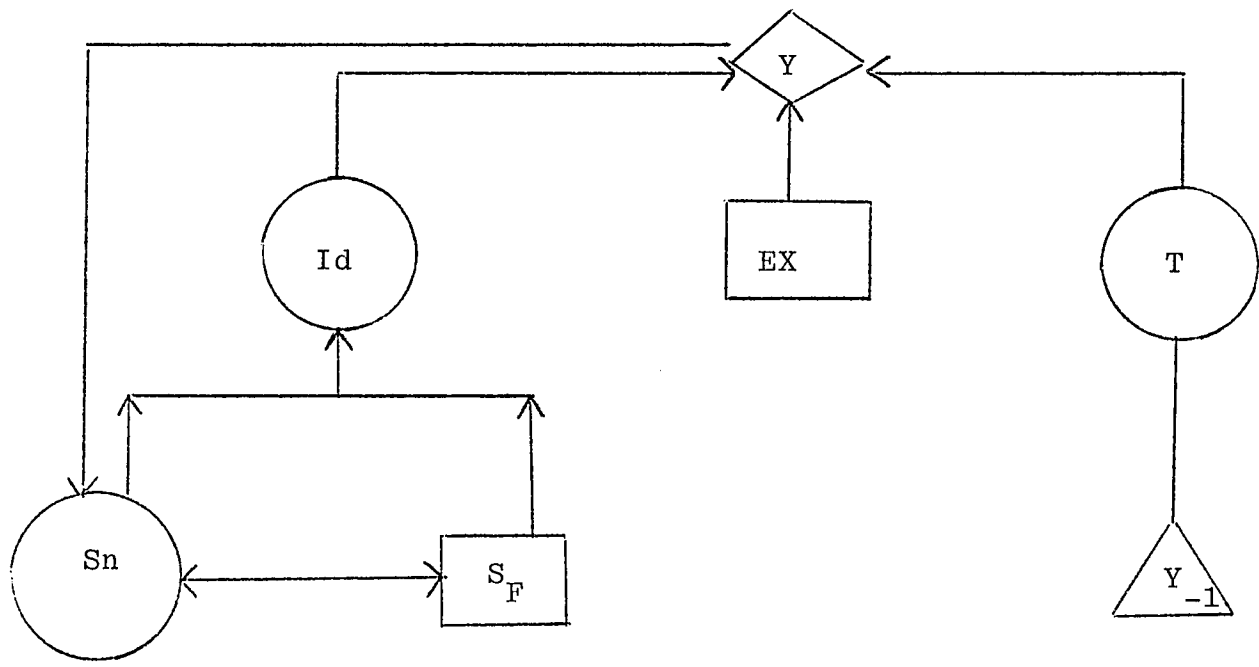
☐	Exogenous variables
○	Endogenous variables
△	Lagged variable
◇	Dependent variable

Table 4.1 - Empirical Results

						R^2	SE
(1)	$GY = .033 + .654 Z_1 + .908 Z_2 + .285 Z_3 - .072 D$					.82	.017
	(5.584) (2.148) (2.391) (2.429) (-5.755)						
(2)	$T = 10.957 + .124 Y_{-1}$					.70	3.099
	(1.704) (4.449)						
(3)	$Sn = -28.334 + .262 Y - .918 S_F$					.81	5.40
	(2.401) (5.724) (-5.922)						

T statistics in parentheses

efficients are positive except for the dummy variable and all
the coefficients are statistically significant at least at
the 95 percent confidence level. In other words, all our
independent variables evolve in the same direction as the
growth rate of output and have a positive effect on it.

As indicated in the preceding chapter, there is a
negative effect of foreign savings on national savings
However, the coefficient of Z_1 is positive and significant.
This means that the negative effect of foreign financing is
overcompensated by its positive effect on the growth rate
of output.

The overall performance of the estimated equation is
excellent. Investments, exports and taxes explain about 80
percent of the variation of the rate of growth of output.

b) The tax equation

The estimated tax equation is given by equation 2
in Table 4.1. First, it can be seen that the coefficient
of Y_{-1} is positive and statistically significant at the 1
percent level.

This means that there is a strong and positive re-
lationship between taxes and income lagged on period. This
result was expected. The actual government expenditures
depend, mainly, upon the tax receipts recovered from the
previous year.

c) The national savings equation

The estimated Sn equation is given by equation 3 in

Table 4.1. As expected, there is a positive relationship between savings and income. This is not new. The negative relation between national and foreign savings has already been established. However, one can note that the coefficients are highly significant even at the 99 percent confidence level.

Our "Final Equation"

If we solve the model by the use of these estimated equations, one will be able to predict income over time and this will enable us to predict the contribution of both national and foreign savings.

To obtain our "final equation" for income, we solve the model and will use it to compare the behavior of the actual and the estimated income over time and to evaluate the contributions of internal and external financing to gross domestic product. The result obtained is the following.

$$(14) \quad Y = \left(\frac{1 + \alpha_0 + \alpha_2 \delta_1 - \alpha_1 \beta_1}{1 - \alpha_1 \beta_1} \right) Y_{-1} +$$

$$\frac{\alpha_4}{1 - \alpha_1 \beta_1} DY_{-1} + \frac{\alpha_2 \delta_1}{1 - \alpha_1 \beta_1} Y_{-2} + \left(\frac{\alpha_1 \beta_2 + \alpha_1}{1 - \alpha_1 \beta_1} \right) \Delta S_F$$

$$+ \quad \frac{\alpha_3}{1 - \alpha_1 \beta_1} \quad \Delta EX$$

where Δ indicates a change in the variable. The way equation (12) is obtained will be shown in an appendix. Using the estimated parameters of the three equations of the model we get the following:

$$(15) \quad Y = 1.176\ Y_{-1} - .136\ Y_{-2} + .065\ \Delta S_F + .344\ \Delta EX$$
$$- .087\ DY_{-1}$$

Utilizing equation (15), we plot the predicted and the actual level of output. The result is given by figure 4.2. The fit of the estimated equation is excellent. Only two turning points (1966 and 1969) are missed and the predicted output is greater than the actual for these two years. From these observations, it appears that the model fits closely the actual growth pattern of the Senegalese economy.

Using the model to predict the 1977 level of GDP, we obtain 300.1 billions CFA Francs whereas the actual value was 299.4 billion. One can see that the actual and the estimated GDP are close and the model seems to be very powerful.

Our next step is to evaluate the relative contribution of the financial sector to output.

Relative Contributions of National and External Savings to Income

The method used to appreciate the relative contribution of a given variable to income is very simple. It consists, first, of assuming that the variable keeps its 1960 value over the 1961-1976 period. In other words, the change in the given variable throughout the whole period is

Figure 4.2 - Actual and estimated total output

_____ Actual Output

- - - - - - - - Estimated Output
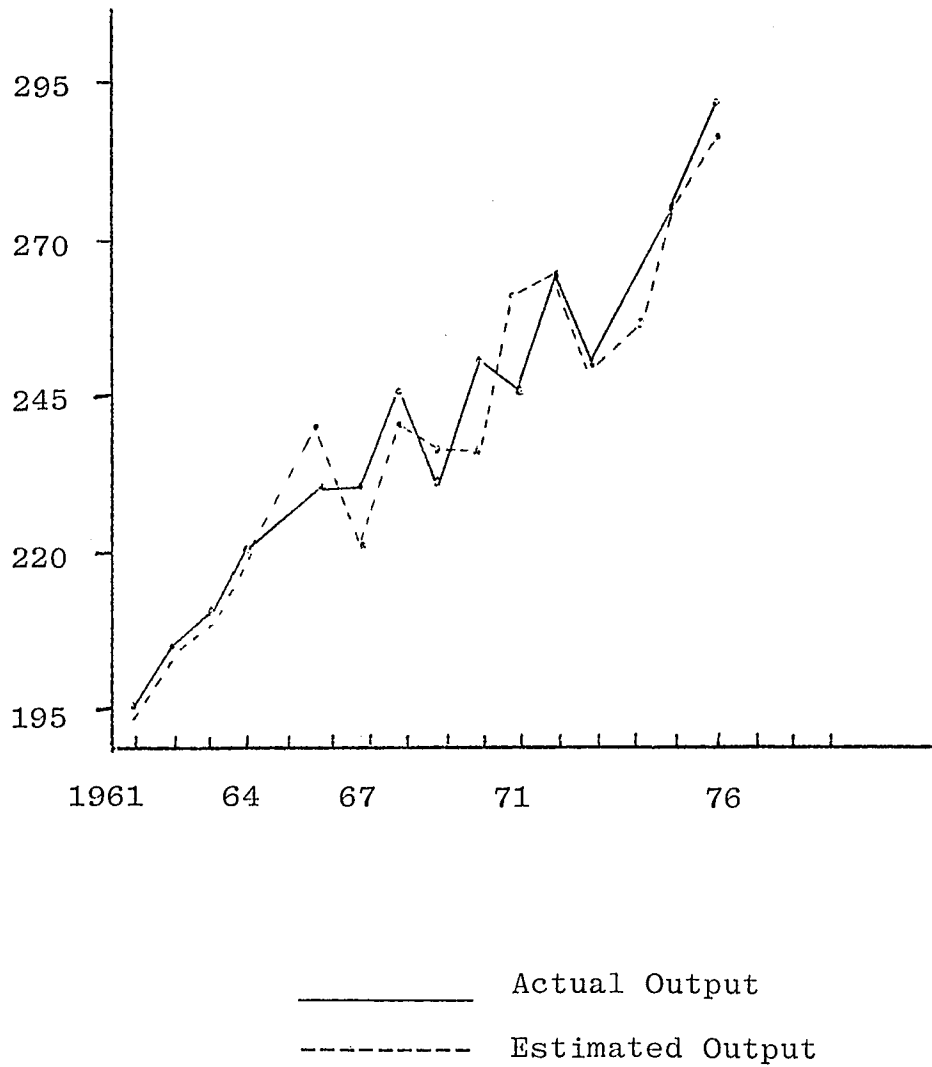
equal to zero, and, therefore, disappears from equation (15).

Second, one can compute estimated income with and without the given change in the variable.

Finally, one can plot them and the differences between the two time paths indicates the contribtion of our variable.

a) The contribution of foreign finance

The contribution of foreign finance to income is made through foreign savings, S_F.

As indicated in figure 4.3, the contribution of foreign finance to income was quite limited. The fact is that income would have grown the same without foreign financing, except for 1972 where external financing has a positive effect and 1975 where it had a negative one. However, if foreign financing was indeed used for the purpose of increasing the production capacities of the country, its impact would be greater than the one indicated by the closeness of the two time paths. Therefore, it would be quite difficult to make a definite judgement about the relative impact of foreign financing by using the "final equation" method.

b) Contribution of national savings

The final equation allows us to evaluate the relative impact of foreign savings on the level of output through the disappearance of ΔS_F. However, one cannot do the same for national savings Sn because of the fact that it is partly determined by income itself. Therefore, we need to find an alternative way if its relative impact is to be evaluated.

Figure 4.3 – Estimated output with and without the contribution of external financing

_____ Estimated Income with External Financing

------- Estimated Income without External Financing
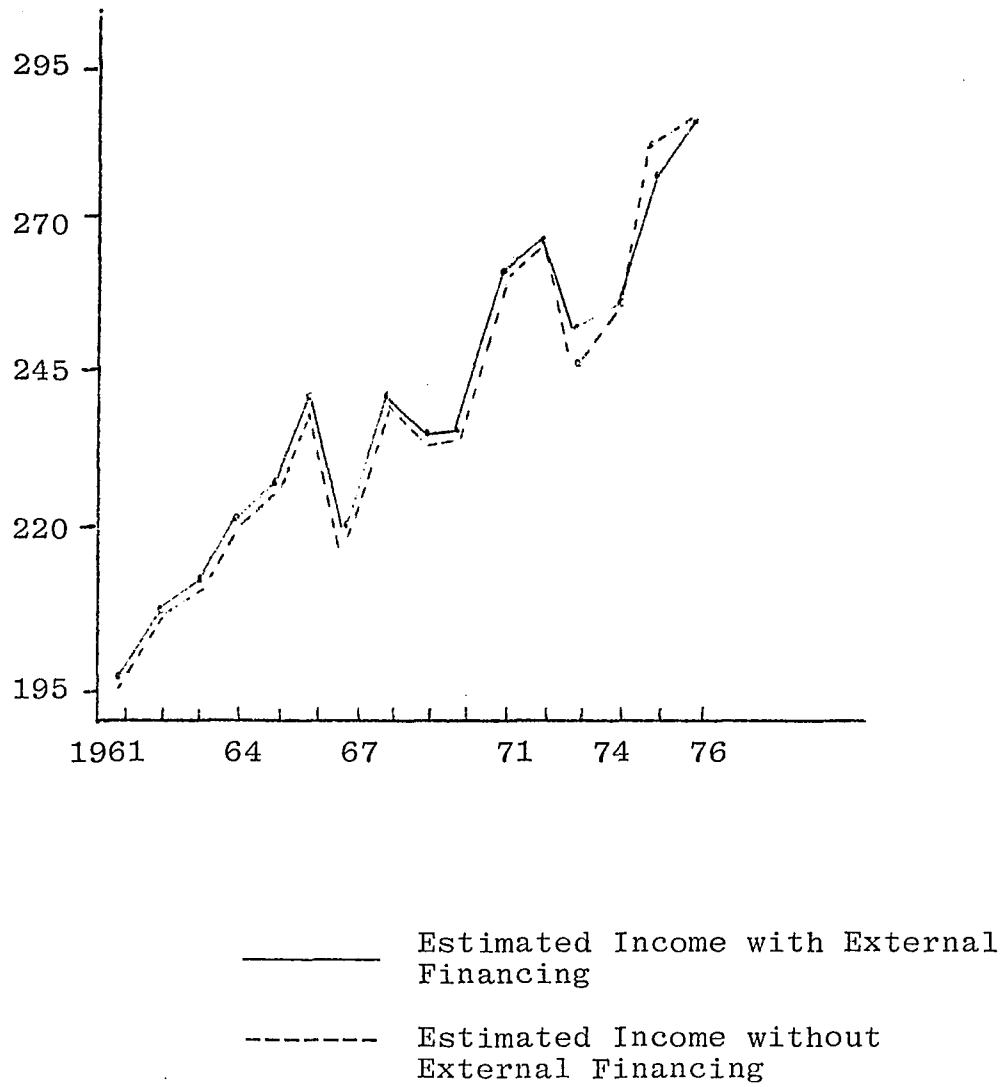
We go from the growth equation (10) determined previously.

$$(10) \quad GY = \alpha_0 + \alpha_1 \, GI\left(\frac{Id}{Y}\right)_{-1} + \alpha_2 \, GT\left(\frac{T}{Y}\right)_{-1}$$

$$+ \alpha_3 \, GE\left(\frac{EX}{Y}\right)_{-1}$$

We known that: $\quad Id = Sn + S_F$

$$\Delta Id = \Delta Sn + \Delta S_F$$

and

$$GI = \frac{\Delta Id}{Id_{-1}} = \frac{\Delta Sn}{Id_{-1}} + \frac{\Delta S_F}{Id_{-1}} = GS_N\left(\frac{SN}{Y}\right)_{-1} + GS_F\left(\frac{S_F}{Y}\right)_{-1}$$

therefore:

$$GI\left(\frac{Id}{Y}\right)_{-1} = GS_N\left(\frac{SN}{Id}\right)_{-1}\left(\frac{Id}{Y}\right)_{-1} + GS_F\left(\frac{S_F}{Id}\right)_{-1}\left(\frac{Id}{Y}\right)_{-1}$$

$$= GS_N\left(\frac{SN}{Y}\right)_{-1} + GS_F\left(\frac{S_F}{Y}\right)_{-1}$$

Equation (10) becomes:

$$(10') \quad GY = \alpha_0 + \alpha_1 \, GS_N\left(\frac{SN}{Y}\right)_{-1} + \alpha_1 \, GS_F\left(\frac{S_F}{Y}\right)_{-1}$$

$$+ \alpha_2 \, GT\left(\frac{T}{Y}\right)_{-1} + \alpha_3 \, GE\left(\frac{EX}{Y}\right)_{-1}$$

The growth equation specifies that the growth of income is the weighted sum of the growth of domestic investment financed by both national and foreign savings, the growth of taxes and the growth of exports. As Ghali, (1973), points out "this growth equation is not an identity; it is derived from the reduced form of a model that incorporates behavorial assumptions regarding consumption and import demands." He suggests that this type of growth equation based on a demand oriented model can be taken as the "counterpart of Denison's supply-based growth identity" widely used in growth studies.

From equation (10'), one can evaluate directly the contribution of national and foreign savings, taxes and exports to the growth rate of output. The results are given in Table 4.2 and Table 4.3. Table 4.2 gives the absolute contribution of the different determinants of the growth rate of output. For the whole period 1960-1976 and the 1964-67 period the results show that they did not contribute very much. The rate of growth was determined by other factors, such as technological changes, better use of resources and better management.

The contribution was much more positive in the subperiods 1968-71, 1972-76 and especially for the 1960-63 one where the residuals were only one tenth of one percent.

In the 1960-1963 period, Sn contributed for 1.5 percent contrary to S_F which was only .1 percent. The same conclusion can be derived from the results of the 1968-71 and 1972-76 subperiods where the contributions were, respec-

Table 4.2 - Absolute Contribution to Economic
Growth 1960 - 1976 (In percentage)

Period	1960-76	1960-63	1964-67	1968-71	1972-76
Rate Growth of GDP	5.4	4.1	5.2	6.3	5.8
Due to Foreign Savings	0.0	.1	.03	.56	.36
Due to National Savings	0.2	1.5	.01	1.5	.67
Due to Taxes	0.6	1.8	.04	.07	.5
Due to Exports	0.04	.6	.12	.2	.3
Residuals or "Unexplained Factors"	4.56	.1	5	3.97	3.97

Table 4.3 - Relative Contribution to Economic
Growth, 1960 - 1976

Period	1960-76	1960-63	1964-67	1968-71	1972-76
Rate of Growth of GDP	100	100	100	100	100
Share of Foreign Savings	0.0	2.40	.05	8.88	6.21
Share of National Savings	3.7	36.60	.02	23.81	11.55
Share of Taxes	11	43.90	.08	1.1	8.62
Share of Exports	.07	14.63	2.5	3.17	5.17
Residuals or "Unexplained Factors"	85.23	2.47	97.20	63.04	68.45

tively, 1.5 and .67 percent for Sn and .56 and .36 percent for S_F.

The same kind of analysis can be conducted by using the relative contribution of all the explanation variables to the growth rate of total income given in Table 4.3. First, one can note the high percentage of the residuals peaking in the 1960-76 (85.23 percent) and 1964-67 period (97.20 percent) in explaining the growth rate. This is not a new result. For instance, Fabricant (1954) estimated that in the United States over the period 1871-1951 about 90 percent of the increase in output per capita is due to technical progress. If this is the case for Senegal, for instance, the contribution for S_F is more important than the way it is indicated by our results. If foreign savings are used to buy new technologies in order to improve the efficiency of the key sectors of the economy, the contribution measured in terms of CFA Francs might be small but its overall contribution might be indeed very important. Therefore, the nature of the goods and services financed by S_F is critical. In any case, the results in Table 4.3 show the S_F impact was very limited for the whole period and subperiods except for 1968-71 where it represented 8.88 percent of the growth rate.

As far as Sn is concerned, its relative contribution was very limited in the whole period 1960-1976 and 1964-67. However, its impact was very substantial in the other subperiods. Sn contributed for 36.60 percent in 1960-63, 23.81 percent in 1968-71 and 11.55 percent in 1972-76. Sn was the most important contributor to the growth rate in these three

subperiods except for taxes, which contributed for 43.90 percent in the growth rate in the 1960-63 period.

In summary, the empirical evidence shows, in terms of CFA value, a very limited contribution of foreign savings and a substantial contribution of national savings in the process of economic growth, especially for the 1960-63, 1968-71 and the 1972-76 subperiods. This is an encouraging result because we think that development problems will be primarily solved by the internal factors.

Policy recommendations derived from the empirical evidence will be made in our next chapter. We will try to suggest some ways and means to improve the process of raising and efficiently allocating savings to maximize their impact on economic growth and development.

Conclusion

In this chapter a growth model for the Senegalese economy has been proposed. The model allows us to measure the relative contribution of both national and foreign savings. Our basic finding is that the contribution of national savings to economic growth was very substantial, contrary to the contribution of foreign savings which was very marginal. However, conclusions derived from models should be used cautiously. In the next chapter, policy recommendations stemming from the empirical evidence will be proposed.

CHAPTER V

POLICY RECOMMENDATIONS

Introduction

After the evaluation of the contribution of national
and foreign savings to economic growth, an attempt to make
some recommendations based on the evidence discovered
throughout this study will be made.

The basic aim of these policy recommendations is to
suggest efficient ways and means for collecting and channel-
ing savings to productive investment and, therefore, to
economic growth.

Moreover, some general observations about external
financing will be advanced.

Significance of our Findings

As seen in Chapter IV, the contribution of national
savings to economic growth was quite substantial, especially
during the 1960-63, 1968-71 and 1972-76 subperiods despite
the fact of a lack of sophisticated capital and financial
markets and a deliberate official policy of low and fixed
interest rates from 1962 to 1973. Some measures were taken
in 1973 to make the financial sector more dynamic and more
efficient.

Some specific suggestions to improve the monetary
and financial sector more will be made further.

The second finding is the very limited effect of foreign finance on economic growth. This is surprising, but the very limited effect of foreign finance could be explained by the fact that capital inflows generate capital outflows, which are a kind of "reverse flow" toward the developed countries.

Finally, it has been found that internal and foreign savings are substitutes for each other. The elasticity of substitution between the two types of financing is about 1.5 for Senegal according to the computations. This means that one percent change in the price ratio will lead to a one and a half percentage change in the ratio of internal to external savings.

One can observe that if foreign financing is really a substitute for internal financing, the flow of funds abroad could lead to a non-development of the domestic monetary sector and this would be detrimental to economic growth in the long run.

The substitute effect of foreign savings and its very limited contribution to growth indicated by the empirical evidence lead us to think that economic growth will be mainly achieved by internal factors. This conclusion was indeed reached by the proponents of the complementarity hypothesis, who put a great emphasis on the dynamization of the domestic financial and monetary structures.

These findings, above, lead us to this basic question: What measures should be taken to make the financial and monetary sector play a more important role since

it can greatly affect national savings through its policies?
An attempt to give an answer to this question will be made
in the next section.

Improvement of the Financial and Monetary Sector

The financial and monetary sector can be improved
both at the institutional and policy levels. At the insti-
tutional level the following recommendations seem necessary.

First, capital markets should be established. They
would allow buyers and sellers of long term financial
instruments to meet. The funds collected from the sales
of long term maturity securities would finance long term
investment projects. It is generally accepted that effi-
cient capital markets are essential for gross capital
formation and economic growth. Their absence leads to a
loss of the most promising investments, and capital, the
most scarce resource in developing countries, is less than
optimally allocated.

However, efficiency varies with the degree of
sophistication of financial markets. Therefore, one should
not expect the new structures, if created, to operate
perfectly at least in the short run. The process of orga-
nizing dynamic capital markets would be, indeed, a very
important step.

Second, it is necessary to diversify the financial
sources, especially by allowing major foreign banks and
financial institutions to open branches in Senegal or at
least to participate in the capital of existing institutions.

This would lessen somewhat the relative financial dependency of Senegal on the former metropole.

These institutional improvements would facilitate the transfer of funds between financial institutions themselves and between non-financial corporations and households. Moreover, the financial relationships between Senegal and the rest of the world would be better.

At the policy level, first, a fundamental change in the philosophy of the financial institutions, which consists of shifting from the short term operations to the financing of long term development projects, is absolutely necessary. The incentives and motivation which would make possible such radical change can be realized through such inducements as tax exemptions under investment codes and the like.

Second, more liberal interest rate policies are suggested. The implementation of the 1973 IMF recommendations led to the raising of the discount rates in 1973 from 3.5 to 5.5 percent and in 1975 from 5.5 to 8 percent. Although this was a sign of progress, the point is that interest rates should be primarily determined by the supply and demand of available funds. Therefore, given a certain risk, the allocation of savings would be made primarily on the basis of expected yields and the economic agents bidding the highest prices to obtain these limited funds would be the ones who obtained the best investment opportunities. Therefore, the allocation of funds would be very efficient. Moreover, higher interest rates could induce people to save

more and this would result in the availability of a greater
amount of national savings. However, the special disposi-
tions securing low interest rates for the agricultural
sector and small business should be maintained, at least in
the immediate future.

Finally, efficient capital markets and liberal
interest rate policies might render changes in control
policies unnecessary in the long term.

External Finance

As seen in Chapter IV, the contribution of foreign
finance to the rate of growth was limited. However, as
pointed out before, if foreign savings are used to finance
capital goods and new technologies to improve the productive
capacity of the economy, their real contribution is far more
important than the one given by the model. Since capital
is scarce in LDCs, efficient use of foreign financing is
vital. The following recommendations should lead to a better
use of external finance.

First, foreign savings should be strictly used to
finance productive operations such as capital goods, new
technologies, training programs, and the like. The idea is
to put in place the necessary structures which will eventu-
ally lead to economic development in the long run.

Second, the question about the nature of development
projects funded by foreign sources is very important. The
criteria for financing a project should be primarily deter-
mined by its overall impact on the economy. For instance,

the best way to fight against the drought is not to ship
food whenever this calamity occurs, but to solve the water
problems by financing the dams unbuilt because of a shortage
of capital.

Third, one of the components of external financing
is foreign borrowing and the debt service payments related
to the latter are certainly a heavy burden for Senegal, as
is the case for most of the underdeveloped countries. Accord-
ing to the 1977 World Debt Tables Report, the debt outstanding
as a percentage of exports for Senegal was 43.5 percent in
1969, 54.6 percent in 1971 and 56.9 percent in 1973. For the
same period, the debt service payments as a percentage of
exports was respectively 2.6 percent in 1969, 5.3 percent in
1971 and 8.3 percent in 1973. A great number of developing
countries are borrowing not to improve their economic
situation, but only to pay previous debt obligations. For
instance, Senegal got an emergency aid program of $105
million from France in 1980 to stave off a default on its
$1.3 billion in foreign debts.[1] Although a dialogue be-
tween creditors and debtors is going on, no satisfactory
solution is in sight. To alleviate the debt burden, one
solution would be to limit the debt payments to a negotiated
fixed percentage of exports. This would give more flexi-
bility for debtors to face their obligations. According to
Singh (1972) during the 1960-70 decade foreign aid has been
on average in the order of 2 to 3 percent of the GNP of the

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[1]Prayna B. Gupte. 'Senegal, Once France's Star Colony
Sees Glory Dim'. New York Times, September 17, 1980.

LDC's. However, he points out that "this amount has been declining and further, the proportion of net foreign aid to gross foreign aid has been declining owing to the growing debt service burden", (page 48). Therefore, it is urgent that the debt problem be solved in the near future in order to avoid some serious distortions in the Third World economies.

Fourth, as far as the allocation of foreign aid by international institutions is concerned, Singh suggested an idea in 1972 which should be given more consideration. He argued (see above, p. 41) that capital inflow should be lumpy instead of being thinly spread over a large global surface. Used in that way foreign aid would lead to a jump in growth rate. Whether this result would be attained remains to be determined. However, the idea could be very valuable, especially for the financing of regional and multinational development projects.

Finally, the Senegalese authorities should use foreign financing to create new economic poles and so avoid the total concentration of the great part of the secondary and tertiary sectors in the Cap Vert region. Such action would lead to more balance between the different regions. The preceding suggestions above should make external finance more suitable to the needs of Senegal.

Conclusion

In this chapter, a brief review of the main findings of the study is made. Also, some suggestions to make the

financial and monetary sector play a more important role
in the process of economic development are made. Finally,
some general observations and recommendations about a better
use of foreign finance are proposed.

CHAPTER VI

SUMMARY

In this final chapter we will try to give a brief summary of our findings throughout this study. Moreover, some suggestions leading to further research in the area of finance and economic development will be proposed.

In the first chapter, the nature, scope and purpose of the study are defined. The main goal is to evaluate the impact of national and external savings in the process of economic growth. The analysis is both theoretical and empirical. The study is made for Senegal over the 1960-1976 period.

In the second chapter, the general characteristics of Senegal and its economy are given. This review, which is mainly a descriptive one, shows the relative share of the primary, secondary and tertiary sectors in the gross national product. The importance of the agricultural sector, both at the economic and demographic levels, is one of the signs of a developing country. Moreover, the various structural changes which took place in the early 1960's are briefly reviewed.

The third chapter deals with the relationship between national and foreign financing. The debate between the proponents of the substitutability hypothesis and the

complementarity hypothesis about external financing is investigated. According to the empirical evidence, national savings and foreign savings are substitutes. This fact is derived both from single equation models and a "translog" model which permits the elasticities of substitution between the two types of financing. Moreover, it has been found that the value of these elasticities was quite stable over time for Senegal and was revolving around 1.5 during the 1960-76 period.

In the fourth chapter, a demand oriented growth model derived from the Keynesian framework for the Senegalese economy is proposed. The basis of the model is a set of three structural equations which result from some general assumptions. Time series are used to test the model and the empirical evidence leads to three basic findings.

First, even though foreign finance affects national savings negatively, the combined effect of both of them has a positive effect on the rate of growth. In other terms, the negative impact of foreign savings on national savings is more than compensated by its positive impact on the rate of growth of output.

Second, the study reveals that the contribution of foreign savings was very limited. However, it should be pointed out that if external savings were indeed used to buy capital goods and new technologies to enhance the productive capacity of the Senegalese industries, its real contribution would be far more important than that which is indicated by the empirical results.

Finally, the contribution of national savings to the growth rate of income was quite substantial in the 1960-63, 1968-76 subperiods despite the lack of organized capital markets. Therefore, one can expect that an improvement in the ways and means of raising and allocating national savings toward productive investment would be very beneficial for Senegal.

In the fifth chapter, some policy recommendations stemming from the investigation are made. Ways and means to make the domestic monetary and financial sector more dynamic in the process of raising national savings, both at the institutional and policy levels, are suggested. Moreover, some general observations about foreign financing, in general, and foreign aid, in particular, were made.

The research has been done strictly for Senegal, although the initial intent was to do it for the whole West African Monetary Union (UMOA). The main reason which led us to this decision is the lack of adequate statistical data for the other countries. Therefore, the first suggestion would be to conduct the same kind of study for each of the members and for the Union as a whole. It would be very informative to compare the values of these elasticities of substitution obtained for each member and find if they behave in the same way.

The second suggestion is to make similar studies for other developing countries both at the individual and at the regional levels and see if the empirical evidence obtained leads to similar or opposite conclusions. Most of

the time cross-section data was used to find out the relationship between national savings and foreign financing. But given the great disparity among less developed countries, it seems that time series data would give more reliable information.

In this study a Keynesian type demand-oriented model is the base. It would be interesting to use a supply oriented model to see if one would arrive at similar or different findings. The growth model was used only to evaluate the contribution of the financial sector. However, similar models can be used, also, to evaluate other variables, for instance, taxes, exports and the like.

Finally, one can note that models similar to the one used in this study, whether they are made at the national or at the regional level, if they perform well, can be used for simulation or forecasting purposes. Indeed, these models would be very useful in the process of elaboration and implementation of economic development policies. However, one must use these macroeconomic models very cautiously because of their tendency to aggregate the economy. The existence of dual economies in LDCs could lead to some legitimate questions about the use of them. In addition, for the same country, different assumptions will lead to different models and empirical results.

Therefore, the choice of the assumptions becomes very important. A model will perform well if the predicted values of the dependent variables obtained from it are very close to the actual ones.

Despite all their weaknesses, a very well specified model can portray the essential features of any given economy and the results obtained from it can be taken at least as good indicators.

APPENDIX A

Symbols and Definitions

BS – Balance of Services

C_g – Public consumption

C_p – Private consumption

CT – Total consumption

DEF – GDP deflator

EX – Exports

GB – Rate of growth of total balance of services

GI – Rate of growth of total investment

GT – Rate of growth of total taxes

GX – Rate of growth of total exports

GY – Rate of growth of total output

I_d – Gross domestic investment

IM – Imports

NFA – Net flow of foreign assets

P_F – Price deflator of foreign savings

P_N – Price deflator of national savings

S_d – Gross capital formation or gross domestic savings

S_F – Foreign savings

S_{F1} – Ratio of foreign savings to domestic savings

S_N – Ratio of national savings to domestic savings

S_n – National savings

S_{n1} – National savings in nominal terms

T   – Taxes

TB   – Trade Balance

TB_n – Trade balance in nominal terms

Y   – Gross Demestic Product (GDP)

Yd   – Disposable income

APPENDIX B

Model:
$$S_d = S_n + S_F \qquad (1)$$

Foreign savings is approximated by trade balance. The next step is to find the prices of internal and external savings, successively.

Since we have both the current and the real values of these variables, their prices can be computed easily.

$$P_i = \frac{\text{Current values}}{\text{Real values}} \qquad i = N, F$$

so,

$$P_N = \frac{\text{National savings in current terms}}{\text{National savings in real terms}}$$

In the same way:

$$P_F = \frac{\text{Trade balance in current terms}}{\text{Trade balance in real terms}}$$

Now we make the ratio of internal investment to total investment:

$$S_N = \frac{S_n}{S_d} \qquad \text{(share of national savings in domestic savings)}$$

Our single equation is:

$$S_N = \alpha + \beta_{NF} \text{ Log } P_F + \beta_{FN} \text{ Log } P_N$$

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As seen above, the symmetry conditions give:

$$\sigma_{NF} = -\sigma_{FN}$$

So,

$$S_N = \alpha + \beta_{FN} \; Log \; P_N - \beta_{NF} \; Log \; P_F$$

$$S_N = \alpha + \beta_{FN} \; Log \left(\frac{P_N}{P_F} \right) \qquad (2)$$

σ_{NF} is the elasticity of substitution computed from (2).

$$\sigma_{NF} = \frac{\Delta Sn}{\Delta S_F} \; \frac{P_F}{P_N}$$

The value of these elasticies are given in the text.

APPENDIX C

The Complete Model

(1) $\quad Y = Cg + Cp + Id + EX - IM$

(2) $\quad Yd = Y - T$

$$\text{Assumption 1} \quad Cp = Cp(Yd)$$

$$\text{Assumption 2} \quad IM = IM(Y)$$

$$\text{Assumption 3} \quad Cg = F(T)$$

(3) $\quad Y = F(Id, T, EX)$

By differentiating:

(4) $\quad \dfrac{dY}{dt} = F\left(\dfrac{dId}{dt}, \dfrac{dT}{dt}, \dfrac{dEX}{dt}\right)$

(5) $\quad \Delta Y = F(\Delta Id, \Delta T, \Delta EX)$

(6) $\quad \dfrac{\Delta Y}{Y_{-1}} = F\left(\dfrac{\Delta Id}{Y_{-1}}, \dfrac{\Delta T}{Y_{-1}}, \dfrac{\Delta EX}{Y_{-1}}\right)$

Since $\quad \dfrac{\Delta Id}{Y_{-1}} = \dfrac{Id - Id_{-1}}{Id_{-1}} \quad \dfrac{Id_{-1}}{Y_{-1}} = GId\left(\dfrac{Id}{Y}\right)_{-1} = Z_1$

In the same way:

$$\dfrac{\Delta T}{Y_{-1}} = GT\left(\dfrac{T}{Y}\right)_{-1} = Z_2$$

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$$\frac{\Delta EX}{Y_{-1}} = GE\left(\frac{EX}{Y}\right)_1 = Z_3$$

(7) $\quad \frac{\Delta Y}{Y-1} = GY = F\left[GId\left(\frac{Id}{Y}\right)_{-1}, \ GT\left(\frac{T}{Y}\right)_{-1}, \ GE\left(\frac{EX}{Y}\right)_{-1}\right]$

$$= F(Z_1, \ Z_2, \ Z_3)$$

Behavorial Equations

(8) $\quad Sn = F(Y, \ S_F)$

(9) $\quad T = F(Y_{-1})$

Alternatively, the model can be rewritten in the following way:

(10) $\quad GY = \alpha_0 + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3 + \varepsilon_1$

(11) $\quad Sn = \beta_0 + \beta_1 Y + \beta_2 S_F + \varepsilon_2$

(12) $\quad T = \delta_0 + \delta_1 Y_1 + \varepsilon_3$

The method used to test these equations depends on the assumption made about the disturbances ε_i.

The least square estimators assume that $E(\varepsilon_i) = 0$ and this means that the Σ_i are normally disturbed and that $E(\varepsilon_i \ \varepsilon'_i) = \sigma_{ii} I_t$ (covariance matrix).

However, if the different equations are mutually correlated $E(\varepsilon_i \varepsilon'_p) = \sigma_{ip} I_t$ and in this case the ordinary least squares (OLS) give consistent and unbiased coefficients but their efficiency is questionable. To solve this problem

the whole system is but in one big equation and the BLUE
(best linear unbiased estimates) are given by Aitken's
formula:

$$\hat{\beta} = (X'\Omega^{-1}X)^{-1} (X'\Omega^{-1}Y)$$

which differs from the OLS estimates $\hat{\beta} = (XX^{-1}) (X'Y)$
where Y is the dependent variable, X the independent one
and Ω is the variance-coveriance matrix.

The variances given by Aitken's method are smaller
than the OLS ones.

In the case where Ω is unknown, it is replaced by
a consistent estimator of Ω.

The two stage method is equivalent to Aitken's
generalized least squares and both lead to efficient β
estimates.

We assume that the disturbances in our system are
related and we use the Cochrane – Orcult iterative method
to test our equations and this method leads to consistent,
unbiased and efficient estimates.

APPENDIX D

Estimated Equations and Empirical Results

Estimated Equations

(1) $Gy = \alpha_0 + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3 + \alpha_4 D$

(2) $Sn = \beta_0 + \beta_1 Y + \beta_2 S_F$

(3) $T = \delta_0 + \delta_1 Y_{-1}$

Empirical Results

(4) $GY = \quad .033 \quad + \quad .654\ Z_1 \quad + \quad .908\ Z_2 \quad + \quad .285\ Z_3$
$\quad\quad\quad (5.584) \quad\ (2.148) \quad\quad\ (2.391) \quad\quad\ (2.429)$

$\quad\quad\quad - \quad .072\ D$
$\quad\quad\quad\quad (-5.755)$

(5) $T = \quad 10.957 \quad + \quad .124\ Y_{-1}$
$\quad\quad\ (1.704) \quad\quad (4.449)$

(6) $Sn = \quad -28.334 \quad + \quad .262\ Y \quad - \quad .918\ S_F$
$\quad\quad\quad (-2.401 \quad\quad (5.724) \quad\quad (-5.922)$

Even though they can be easily computed, the R^2 does not necessarily indicate the fitness of the regressed equations when Aitken's generalized least squares are used because they are not restricted between 0 and 1.

APPENDIX E

Final Equation

(1) $\quad GY = \alpha_0 + \alpha_1 \dfrac{\Delta Id}{Y_{-1}} + \alpha_2 \dfrac{\Delta T}{Y_{-1}} + \alpha_3 \dfrac{\Delta EX}{Y_{-1}} + \alpha_4 D$

(2) $\quad Y - Y_{-1} = \alpha_0 + \alpha_1 \Delta Id + \alpha_2 \Delta T + \alpha_3 \Delta EX + \alpha_4 DY_{-1}$

(3) $\quad Id = Sn + S_F$

(4) $\quad \Delta Id = \Delta Sn + \Delta S_F$

(5) $\quad \Delta Sn = \beta_1 \Delta Y + \beta_2 \Delta S = \beta_1 (Y - Y_{-1}) + \beta_2 \Delta S_F$

(6) $\quad \Delta T = \delta(Y_{-1} - Y_{-2})$

$\qquad$ (5) and (6) into (2) gives:

(7) $\quad Y - Y_{-1} = \alpha_0 + \alpha_1 \left[\beta_1 (Y - Y_{-1}) + \beta_2 \Delta S_F \right] + \alpha_1 \Delta S_F$

$\qquad\qquad + \alpha_2 \left[\delta_1 (Y_{-1} - Y_{-2}) \right] + \alpha_3 \Delta EX + \alpha_4 DY_{-1}$

Rearranging the terms leads to the final equation, which is:

(8) $\quad Y = \left(\dfrac{1 + \alpha_0 + \alpha_2 \delta_1 - \alpha_1 \beta_1}{1 - \alpha_1 \beta_1} \right) Y_{-1} + \left(\dfrac{\alpha_4}{1 - \alpha_1 \beta_1} \right) DY_{-1}$

$\qquad + \left(\dfrac{\alpha_2 \delta_1}{1 - \alpha_1 \beta_1} \right) Y_{-2} + \left(\dfrac{\alpha_1 \beta_2 + \alpha_1}{1 - \alpha_1 \beta_1} \right) \Delta S_F + \left(\dfrac{\alpha_3}{1 - \alpha_1 \beta_1} \right) \Delta EX$

(9)　　$Y = 1.176\ Y_{-1} - .136\ Y_{-2} + .065\ \Delta S_F + .344\ \Delta EX$

$- .087\ DY_{-1}$

APPENDIX F

Data Base 1959 - 1976 period

Year	GDP (billions of CFA Fr)	Cg (billions of CFA Fr)	Cp (billions of CFA Fr)	Id (billions of CFA Fr)
1959	184.9	33.4	131.5	32.8
1960	188.7	33.8	133.3	32.1
1961	197.2	33.8	143.4	28.6
1962	203.8	37.9	156.0	29.9
1963	211.6	38.7	170.9	26.8
1964	217.8	40.6	171.5	28.8
1965	225.9	41.1	177.3	28.0
1966	232.4	43.1	183.1	24.7
1967	229.6	43.6	184.6	27.0
1968	244.0	38.8	192.6	29.5
1969	228.0	33.7	172.4	32.1
1970	247.5	37.1	184.8	38.7
1971	247.2	38.8	185.9	40.2
1972	263.0	38.3	184.5	44.2
1973	248.3	38.2	183.4	45.1
1974	258.7	41.1	189.0	48.8
1975	276.5	41.4	197.2	41.8
1976	290.4	45.3	215.8	41.1

Sources: International Financial Statistics (IMF)

Comptes Economiques 1975 (Ministere des Finances)

Cinquieme Plan Quadriennal de Developpement Economique et Social (Ministere du Plan)

Situation Economique de Senegal, 1976 (Ministere des Finances)

World Tables, 1976 (World Bank)

Data collected by the World Bank staff on Senegal

Data Base 1959 - 1976 period

(in billions of CFA Fr)

Year	TB	TB_n	EX	IM	BS
1959	-12.8	- 0.20	57.8	69.1	- 1.5
1960	-10.5	- 1.50	52.4	62.7	- 0.2
1961	- 8.6	- 0.40	47.6	58.9	2.7
1962	-20.0	- 2.40	46.7	65.1	- 1.60
1963	-24.8	- 7.50	42.1	65.9	- 1.00
1964	-23.1	- 9.30	44.4	67.6	0.1
1965	-20.5	- 8.00	45.8	64.0	- 2.3
1966	-18.5	- 2.60	51.4	69.9	0.00
1967	-25.6	- 6.50	47.1	70.4	- 2.3
1968	-16.9	-15.90	51.7	71.1	2.5
1969	-10.2	-17.70	49.8	63.4	3.4
1970	-13.1	-11.00	48.1	69.5	8.3
1971	-17.7	-17.70	37.5	68.3	13.1
1972	- 4.0	-10.00	56.8	74.4	13.6
1973	-18.4	-28.40	39.3	72.0	14.3
1974	-20.2	-21.40	45.3	76.1	10.6
1975	- 3.9	-22.20	57.89	81.39	19.6
1976	-11.8	-29.60	69.07	74.34	- 6.53

Sources: International Financial Statistics (IMF)

Comptes Economiques 1975 (Ministere des Finances)

Cinquieme Plan Quadriennal de Developpement

Economique et Social (Ministere du Plan)

Situation Economique du Senegal, 1976 (Ministere des Finances)

World Tables, 1976 (World Bank)

Data collected by the World Bank staff on Senegal

Data Base 1959 - 1976 period

(in billions of CFA Fr)

Year	Sn	Sn_1	T*
1959	20.00	23.10	20.95
1960	21.60	21.90	25.39
1961	20.00	21.30	32.19
1962	9.90	20.90	32.19
1963	2.00	13.70	34.23
1964	5.70	14.10	35.32
1965	7.50	15.60	36.28
1966	6.20	18.40	35.60
1967	1.40	16.50	36.00
1968	12.60	9.10	35.50
1969	21.90	11.40	36.00
1970	25.60	26.70	38.80
1971	22.50	22.50	40.90
1972	40.20	36.50	43.30
1973	26.70	24.20	46.50
1974	28.60	53.70	49.60
1975	37.30	50.10	62.50
1976	344.40	46.10	76.40

Sources: International Financial Statistics (IMF)

Comptes Economiques 1975 (Ministere des Finances)

Cinquieme Plan Quadriennal de Developpement
Economique et Social (Ministere du Plan)

Situation Economique du Senegal, 1976 (Ministere
des Finances)

Data collected by the World Bank Staff on Senegal

World Tables, 1976 (World Bank)

*Taxes are given in nominal terms. We use GDP deflator
(DEF) to obtain the taxes in real terms.

Data Base 1959 - 1976 period

Year	DEF	NFA
1959	80.0	----
1960	79.5	----
1961	82.0	----
1962	84.0	15.35
1963	84.2	11.40
1964	87.0	9.08
1965	88.0	7.09
1966	88.5	9.51
1967	89.5	7.95
1968	89.0	2.93
1969	95.0	- .23
1970	97.0	5.21
1971	100.0	4.41
1972	104.0	5.83
1973	112.0	- 3.39
1974	131.0	- 5.91
1975	147.0	10.31
1976	157.3	-10.70

Sources: International Financial Statistics (IMF)

Comptes Economiques 1975 (Ministere des Finances)

Cinquieme Plan Quadriennal de Developpement
Economique et Social (Ministere du Plan)

Situation Economique du Senegal, 1976 (Ministere
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