1.0 INTRODUCTION

1.1 BACKGROUNDS AND PROBLEM STATEMENT

At least two third of the world's population are living to day under conditions of extreme poverty (Vanek, 1969). Economic development of countries where such conditions prevail, without any doubt, is the most important and most pressing socioeconomic problem of the present generation. In other words, a major problem facing developing countries in the recent time is how to promote sustainable growth and development. Thus, Sub-Saharan Africa (including Nigeria) presents the world today with its most difficult development challenge. These countries are with annual per capita income of far less that $5500 and they are among the poorest, least developed and slowest growing in the world (Lancaster, 1991).

At the time of political independence, Nigeria economy like many other Sub-Sahara African economies relied heavily on the production and export of a few primary products. This reliance made the country highly sensitive to conditions in the international market. When the terms of trade for the country rose in 1970s with the rise in prices of crude oil, Nigeria suddenly had access to windfall of foreign exchange earnings. Unfortunately, these earnings were not productive spent or saved.

In the early part of the 1980s when the price of oil fell, Nigeria government confronted a situation in which imports, government employment and expenditures had expanded while export and budgetary revenues had dropped. The gaps in the external accounts and the government budgets were in part covered by additional aid, and by additional borrowing from banks.

Not surprisingly, the country has suffered from some of the slowest growth rates in the world. During much of the 1980s economic growth has been consistently below the average for low-income countries in other parts of the world. Moreover, having failed to diversify economically, the Nigerian economy remain today largely within the narrow, rigid, and vulnerable productive bases she inherited at independence (Economic Commission for Africa, 1989). Thus, the increasingly serious economic problems that plagued the nation provoked an examination of the causes of the Nigeria's Economic problems and their potential solution.

The latter part of the decade of the 1980s marked efforts on the part of Nigerian government to implement economic reforms. During this period, the developed – country governments and the international financial institutions conditioned and

increasing proportion of their aid on the adoption of acceptable structural adjustment programs. This therefore, led the Nigeria Government to implement programs of economic restructuring, which is intended to improve the efficiency of national economic resources and encourage additional production and private investment.

Unfortunately, the country's domestic savings are insufficient to finance an increased volume of investment and the foreign exchange (exports) is also insufficient to finance the required imports. Given this impasse, the substitution of foreign resources, in the form of public or private funds, for deficient savings and exports, will enhance the nations rapid economic development but a pertinent question, is to find magnitude of the needed resources.

Thus, it is the concern of this study to explore, both theoretically and quantitatively, the inter dependence between Nigerian's economic development and the requirements of the resources, called for that development. That is, a macro-econometric projection of resources requirement in the adjustment process of the present decade will be undertaken for the Nigerian economy in this study.

1.2 RESEARCH OBJECTIVES

The research objectives follow logically from the research problem. The study intends to estimate or quantify the domestic and foreign resources requirements of the Nigerian economy for the current decade. This is to be accomplished through the construction of a small-scale macro-econometric model of the Nigerian economy that captures the basic macro-economic aggregates; savings, investment, Exports and Imports.

The past development plans of the country have projected and presented these resource requirements arbitrarily. It is thus of great importance to project these requirements in a more consistent analytical framework as intended by this study. That is to obtain a more reliable set of projections on foreign capital requirements for any given development plan.

The study also aims to undertake rigorous quantitative simulation of investment requirements in relation to forecast domestic saving, and import requirements in relation to expected export earnings, under varying growth rate assumptions. Based on these estimates, policy recommendation on how the resources gaps can be filled will be made. This is to enhance the current efforts by the Nigerian Government and policy makers in their economic reform programmes.

A by-product of this analysis would be that of familiarization with computer-aided econometric simulation techniques and modeling, which will be highly employed in our subsequent studies.

1.3 JUSTIFICATION OF STUDY

The optimism of orthodox economists by recommending that the less developed countries should get the prices right, balance the budget, and open up is being put to a rude test in the 1980s and early 1990s. Economic growth falters everywhere protectionism is on the rise, and interest rates are at very high levels. Thus, the time seems ripe for a review of the more sober Lessons of the dual gap technique, which is used, for Orthodox prescription. For chances unfortunately are that this technique may be more relevant to interpret economic conditions during the 1990s than competing models from the neoclassical school. We therefore undertake this test, by applying the two-gap model to the Nigerian economy.

Indeed, Nigeria is currently in a terrible economic situation. As a debt-ridden and distressed nation, she is among the poorest nations of the world. Given the break of her economic outlook and lack of financial resources fresh resources inflows are of fundamental importance to the survival of her people and to the prospects for her betterment. The magnitude of such foreign capital inflow needs to be estimated.

Hence, this study is justified for attempting to provide quantitative estimates of the country's resources requirements for the present decade. These capital needs are very crucial to her current economic reform measures aimed at stimulating growth and structural transformation of the economy.

This study therefore is expected to be a major input in the decision making process of the Nigerian Government, the policy makers, and international financial institutions. Given this indicative guide for policy, the study will go a long way in aiding the nation's economic reform measures and thereby bringing to an end, the depressed state of the Nigerian economy

1.4 WORKING HYPOTHESES

The working hypotheses for this study are as follows:

1. That the nation's import requirements is greater than the expected export earnings, therefore causing trade gap;

2. That the investment requirements is greater than the forecast domestic saving, therefore savings gap; and

3. And that large quantum of resource inflow to Nigeria is highly needed in the foreseeable future.

1.5 SCOPE AND DATA SOURCES

This study is a macro analysis focusing on a developing country's case. The choice of Nigeria is made out of the researcher's interest given the nation's present economic problems and circumstances. The historical period covered by the study is twenty years period (1970-1989) and the simulation period is fifteen years (1986-2000). This coverage is partly constrained by the stringent limitations of data availability and time period. These drawback no doubt imposes limitations on the level of sophistication of our empirical analysis and in fact plays a major role in the structure and characteristics of our model. However we have tried to make the best use of what we have within the time limit.

We are aware of the role of other constraints such as fiscal constraint as a possible third gap limiting the growth prospects of developing nation such as Nigeria. But, we are however limiting ourselves to the consideration f Foreign Exchange and saving constraints only. We are also aware of the role of external debt but we are assuming total debt relief and forgiveness by the creditor nations and institutions, given the deteriorating state of the Nigerian economy.

The study intends to utilize a multi-equation simulation model because of its appropriateness in solving economy-wide problems and analyses since it accounts for the various inter-relationships existing between the various macro-econometric aggregates (Raheem, 1988 and Olofin, 1985). In addition, to the specification of individual relationships, multi-equation simulation models accounts for the interaction of all these interrelationships simultaneously and recursively.

The analysis is going to be carried out in two steps. The first aspect deals with the specification and estimation of individual equations. The second stage is to undertake a simultaneous solution of all the individual equations and therefore proceed to use this complete macro-model in projecting the possible future capital requirements of the Nigerian economy under varying growth rates assumptions.

The parameters of the different equations in the system are to be estimated with ordinary least squares method, utilizing annual time series data. The relevant statistics are to be collected from various sources. These include World Bank World Tables (various issues) IMF International Financial Statistics (various issues) and Central Bank of Nigeria Principal Economic and Financial Indicators (1970-1990). The appendix presents the statistical data.

1.6 PLAN OF STUDY

The rest of the study is divided into five chapters. The review of literature and theoretical framework comes under chapter two. In chapter three, the state of Nigerian economy is analyzed with the focus on the initial conditions and the economic restructuring era. The methodology for the empirical part of the study is presented in chapter four. In chapter five, the simulation results are presented and analyzed. The study is concluded in chapter six with policy recommendations and indications for future research.

2.0 LITERATURE REVIEW AND THEORETICAL MODEL

2.1 REVIEW OF LITERATURE

Throughout the history of economic development, capital occupies a central position in the theory of economic development and it is regarded as strategic to development (Qayum, 1966). This role assigned to capital as a source of growth gave rise to the belief that the import of capital is an essential ingredient in the economic development of pre-industrial societies, which are capital scarce economies (Tewari 1982).

The new classical view of growth and development which provided intellectual foundation for this perception has significantly influenced development policies in the third-world, and has provided the rationale for the transfer of resources from the developed to the developing countries (Michael, 1981).

The most explicit and well set out model for the attainment of self-sustained growth with foreign capital has been simplified by Haniz (1970) in the neoclassical context. He said that a typical underdeveloped country passes three stages on its way to self-sustained growth. In the first stage, the dominant constraint is that of absorptive capacity, that is, the economy is so primitive that it cannot invest beneficially, the minimum amount necessary to achieve the required rate of growth annually.

The role of foreign aid at this stage is to increase the absorptive capacity of the economy. Once this is done, the constraint on growth becomes that of domestic savings. The way out of this is to use foreign capital to supplement domestic savings and fill the gap between it and investment required for a reasonable level growth.

However, as the economy grows, more and more inputs get to be required in the form of capital goods. Exports then are unable to keep pace with increasing imports and the resultant difference between the two becomes larger. At this stage, the trade gap is said to be dominant and inflow of foreign capital becomes a pre-requisite for bridging this gap. With the closing of this gap, the need for foreign aid is also reduced and ultimately the inflow is terminated.

It is often believed in may developing countries that in the process of radical transformation of their economies, inflow of foreign capital would only be a temporary aid which can and would be terminated once such countries are firmly set on the path of self-sustained development (Brahmananda, 1970). Contrary to this expectation, however, it would appear that for most countries, after a prolonged inflow of capital the normal functioning of an economy becomes

dependent on its continuation. What is often overlooked is that most of the aid to the developing countries is in the form of loans with attendant cost servicing and capital repatriation obligations (Raheem, 1988).

Despite the role of external capital in accelerating growth, there is little consensus about their interrelationships most economic theorists argue that foreign capital inflows make little contribution to economic growth, once account is taken of their effect in reducing savings, of the poor rate of return on aid-financed investment and of debt service charges. In fact, it has been shown that many poor regions of the world are net contributors of resources to the rich nations (Bourne, 1981). Thus, the criticism fundamentally questions both the need for aid and its usefulness.

During the 9160s, there were many studies on the foreign capital and aid requirements of less developed countries. The "gap" model was the most generally tool of analysis for the problem at hand. Three basic variants of the model can be distinguished (Lensik and Bergeisk, 1991).

The "saving gap" model treats foreign capital as a supplement to domestic savings in financing planned investments. Via a fixed capital- output ratio, investments are derived from a target growth. Next, domestic savings are estimated. The required external capital inflow equals the difference between planned investment and available domestics savings (Rosentein – Rodan, 1969; Feiand Paauw, 1965; and United Nations 1951)

The "trade gap" model (Balassa, 1964 and UNCTAD, 1964) considers foreign capital only as a source of foreign exchange, which can be used to expand the capacity to import. The required amount of development aid and foreign capital is determined as the difference between expected exports and imports which are necessary to achieve a particular target growth rate. Some of the studies that emphasize this conclusion include: Reddaway (1962), Patel (1963) and Linder (1967).

The views imply that for many developing countries, there is a redundancy of ex-ante domestic savings, imposed by the limited availability of foreign exchange to the economy. These studies led to the general conclusion that the growth rate of many less developed economies has been constrained by their import capacity limits.

The "two gap" model takes both the trade and the saving gap into account. The most binding gap is the relevant one. The development stage of a country determines which gap is binding. Studies such as those by Chenery (1962), Chenery and strout (1966), Chenery and Carter 1973), Wisskop (1972) Papnek (1972), Vanek (1967), Eckstein (1967), Elshibly and Thirlwal (1980), Adelman and Chenery (1966), and Williamson (1966) gave support to the view that either the trade gap or saving gap was the dominant factor limiting growth. It was this

two-gap method that Carter and Clark (1964) also used in projecting the foreign aid requirements of Nigeria in the period up to 1970.

The use of this conventional two-gap approach to project capital inflow requirement has been criticized in several studies, which include those of Fei and Rannis (1968), Bruton (1969) and Kontos (1971). The early studies do not distinguish between different developing regions and they do not distinguish between external private capital flows and external official capital flows. In other words, they assume perfect substitutability between private and official funds (Bhagwati, 1985).

Moreover, the structure of the Nigerian economy depicted by the Carter-Clark model may not be too useful as a planning model due to the absence of adequate requirements of consistency among its component parts. That is, the model did not attempt to estimate dynamic relationships, nor were any targets set to be maximized. The calculations of domestic resources gap were made under the limiting assumption of constant prices (Raheem, 1988). Also, multi equation simulation model were not adopted as the econometric technique of investigation.

The recent studies disaggregate capital requirements by region and distinguish between official's funds and private funds. They still compare the exogenously projected availability of different funds with total capital requirements and subsequently divided the gap over different sources of capital supply in ad hoc manner. They also use minimum growth targets. This, for example, means that in all studies estimating capital requirements for sub-Saharan Africa, the GDP per capita growth rate is set to zero. However, their capital requirements will be much higher if an increase in per capita is desired (Lensink and Bergeiji, 1991).

The World Bank (1986a) estimates capital requirements of low-income Africa by calculating total required imports using 1980-82 as the benchmark. The goal the Bank initially sets is that during the projection period (1986-90) per capita imports should return, at least, to their 1980-82 levels. They projected an additional resource gap of $2.5 billion annually for low income Africa. It suggested that multilateral agencies should cover $1 billion of this gaps, the remaining part is to be provided by additional bilateral aid and debt relief.

Fishlow (1987) assesses capital requirements for all developing countries, and some groups of LDCs like non-Latin America, Asia, Sub-Sahara Africa, Latin America and 15 Baker countries. For most regions, he uses a trade gap model. The capital requirements of Latin America were projected with a savings gap model. He concluded that financial needs of all developing regions are much higher than the likely available funds and argues that the gap should mainly be financed with additional official lending and trade credits.

The United Nations (1988) does not use an economic model to estimate capital requirements of LDCs. It instead starts with a description of the recent external

developments relevant for sub-Sahara Africa. According to them, Africa problems mainly result from a deterioration of terms of trade, the rise in debt service obligations and the decline in financial flows. A combination of these factors led the united Nations to conclude that sub-Sahara Africa (excluding Nigeria) suffered from a net financial deterioration of $6.5 billion a year in 1985-87. The United Nation as in a rather ad hoc way concluded that sub-Sahara Africa needs additional finance of $5 billion annually.

The Development committee (1988) of the International Monetary Fund and the World Bank provides estimates of capital requirements of Sub-Sahara Africa, Low-income Asia and highly indebted countries (HICs). The committee estimated additional capital requirements of the HICs in the order of $11-12 billion annually. Concerning Low – income Asia, the committee estimates additional capital requirements at $4-5 billion a year. The estimated capital need of Sub-Sahara Africa is of the order of magnitude as the projections of the United Nations (1988).

Lensink and Van Bergeijk (1991) fitted in the tradition of capital requirement studies and estimated the necessary foreign funds for the 1990s with the help of a simple savings gap model. In the model, a Harrod Domar production function determines the required total savings needed to achieve a specified growth of per capita income. They estimated that approximately $12 billion of additional official funds (at 0% GDP per capita growth rate) is necessary to halt the economic decline of Sub-Saharan African.

For low-income Asia, they calculated a financing gap of $17 billion for a target of 3.5% per capita GDP growth during the 1990s. The average annual capital requirements of Latin America are higher than those of other regions. Their projection shows a financing gap of $26 billion for a target of 3.2$ per capital GDP growth rate:

All the mentioned recent studies led to the conclusion that additional funds are to be provided to LDCs in order to reach minimum growth targets. The required additional Funds however seem modest in relation to the large problems of the developing regions. Notably with respect to the economic problems of Sub-Sahara Africa, the studies display a rather optimistic view. And most notably, Nigeria was excluded from the sub-Sahara Africa for purposes of their regional finance gap projections.

As an extension of the existing frontier of knowledge, this study will disaggregate the aggregated regional projection by taking the Nigerian economy as a case study. Moreover our capital requirements simulation will be undertaken in a macro-econometric multi-equation framework. That being the case, the works of chenery and strout (1966), Vanek (1967) and Bacha (1984) provides the theoretical underpinnings of this study.

2.2THEORETICAL FRAMEWORK

This work takes off by considering a small open developing economy (Bacha, 1984). Thus, in deriving a modified dual-gap growth model, domestic output is determined in a Keynesian fashion by savings – investment equilibrium conditions:

$$S = I + X - M \quad (1)$$

Where

S = Savings
I = Investment
X = Exports
M = Imports

The balance of payments B is obtained by adding capital transfers (foreign aid) F to the current account balance, which is equal to the trade balance (X – M):

$$B = X - M + F \quad (2)$$

Assuming imports to be of two types – competitive M_c and Non competitive M_n, with the latter subdivided into intermediate good M_j and capital goods M_k; Net Exports E are then defined as the difference between exports and competitive imports:

$$M = M_c + M_n \quad (3)$$

$$M_n = M_j + M_k \quad (4)$$

$$E = X - M_c \quad (5)$$

The following simplified behavioral and technological relations are assumed to hold.

Savings functions: $S = sY$ (6)

Fixed coefficients production function, with labour assumed to be in perfectly elastic supply:

$$Y^* = ak \quad (7)$$

Where K is the capital stock,
A is the (normal) output-capital ratio, and
Y* the potential output

Intermediate goods import coefficient: $M_j = M_{cj}Y$ (8)
Capital goods import coefficient: $M_k = M_kY$ (9)

The following mnemonic symbols are introduced:

$$U = Y/Y;^{*} \quad (10)$$

$$E = E/Y;^{*} \quad (11)$$

$$F = F/Y;^{*} \quad (12)$$

$$B = B/Y;^{*} \quad (13)$$

$$G = I/K \quad (14)$$

Where capital is assumed to be immortal

U = is the degree of capacity utilization

E = is the ratio of net exports to potential output

F = is the capital transfers to potential output ratio

B = is the balance of payments of payments as a proportion of
Potential output and

G = is the growth rate of capital (and of potential output as well)

Taking (3) to (5) into account, the variables (1) and (2) are divided by the capital stock to yield two equations and introducing the relations (6) to (9) and the definitions (10) through (14) to these equations, gives after simplification.

$$U = [(1-M_k)]/a(S + M_j)]g + [1(S + M_j)]e \quad (15)$$

And

$$b = e - Mju - (M_k/a)g + f \quad (16)$$

Equations (15) is recognized as the Keynesian open-economy multiplier which defines the degree of capacity utilization as a function of the "autonomous" variables, the growth rate of capital stock, and the export coefficient.

Equation (16) provides a structuralist view of the balance of payments in a developing country, once e and f are taken as given. But the level of activity is given by (15); taking this into account, (16) reduce to:

$$b = [S/(S-M_j)]e - [(M_j + M_k S)/a(S + M_j)]\, g + f \quad (17)$$

In the meads – swan tradition, the economy is said to be internal balance if U = 1 and the external balance is defined by the condition of zero international reserves charge, or b = 0. Solving (16) and (17) under these equilibrium conditions, gives:

$$U = 1: g_u = [a/1 - M_k](M_j + S) - [a/(1 - M_k)]e \quad (18)$$

$$b = o: g_b = [as/(M_k s + M_j)]e + [a(Mj + S)/(M_k S + M_j)]f \quad (19)$$

For given values of alright-hand variables in (18) and (19) growth is said to be savings – constrained if $g_u \leq g_b$

And

Foreign – exchange constrained if $g_b \leq g_u$

In an alternative framework, the algebraic representation of our model could be described by the following four accounting identities:

$$Y + M \equiv C + 1 +, \quad X \quad (20.1)$$

$$C + S \equiv Y, \quad (20.2)$$

$$I \equiv S + F \quad (20.3)$$

$$X + F \equiv M \quad (20.4)$$

The symbols have the following meaning: Y is gross national product, C is consumption, S is gross domestic savings, I is gross investment, X is exports of goods and services, M is imports of goods and services, F is balance of payments on current account and all variables being measured in real terms.

Of the four identities, three are independent, the fourth being determinate given the others. Thus, for seven variables and three independent identities, the system is determinate on the addition of a further four equations. The model sets out five structural equations, however, though only four are operative in any given growth phase (chenery and strout, 1966). These are:

$$Y^*_t = Y_o (1 + r^*)^t \quad (21)$$

Where r* is the target rate of growth, and t the target year of the plan, starting from year 0 (The asterisk is used to distinguish target or planned values from exposed values of parameters or variables)

$$I^*_t = \delta\, r^* Y^*_t \quad (22)$$

Where δ represents an incremental capital output ratio

$$X_t = X_o(1+å_t) \qquad (23)$$

Where å represents the rate of growth of exports, which is assumed to be exogenously determined by the development of the world market

$$S^*_t = So + S^*_1 Y_t^* \qquad (24)$$

Describes a saving function S^*_1 being ex ante marginally propensity to save

$$M_t^* = M_o + M_i^*_t Y_t^* \qquad (25)$$

Describes the minimum level of imports necessary to sustain the planed level of real national product; M^*_1 can then be regarded as the marginal 'necessity' to import.

The ex ante saving gap (I* – S*) will be equal to the ex ante foreign exchange gap (M* - X) only in special circumstances. Normally, one can expect one ex ante gap to exceed the other. If the savings gap is the Larger, equation (24) is operative, while (25) is not; if, on the other hand, the Foreign exchange gap is the larger, the reverse position holds.

The solutions to the model for the two phases of growth (the savings constraint and the Foreign exchange constraint) are found by combining the relevant equations are given earlier, as shown in table 2.1

TABLE 2.1: SOLUTION OF THE TWO PHASE OF GROWTH MODEL

Variables		Savings-Constrained Growth	Foreign Exchange-Constrained (Growth[b]
1	Y^*_1	$Y^*o(1 + r^*)_t$	$Y^*_o (1 + R^*)^t$
2	I^*_t	δ*rYt	(δô* Y_t*
3	S^*_t	$S_o+S_i*Y^*_t$	(δô* - M^*_j) Y^*_t + X_t - M_o
4	X_t	$X_o(1 + å)_t$	$X_o(1 + å)_t$
5	M_t or M^*_t	(δô* - S^*_i) Y^{*t} + X_t -S_o	M_o + M^*_i Y^t
6	F_t	(δô* - S^*_i) Y^*_t -S_o	$M^*_i Y_t$ + M_o -X_t
7	C_t	(1 – S^*_i) Y^*_t - S_o	(1 – δô* + M*i) Y*t – X_t + M_o

[a]Combining equations (20.1) to (20.4) with (21) to (24)
[b]Combining equatios (20.1) to (20.4) with (21) to (23) and (25)

The interesting feature of the solutions is that while an increase in exports reduces the requirement for net capital inflow for target rate of growth when the foreign exchange gap is the larger of the two ex ante gaps, variations in exports have not effect on the capital inflow requirement in the savings constrained phase of growth.

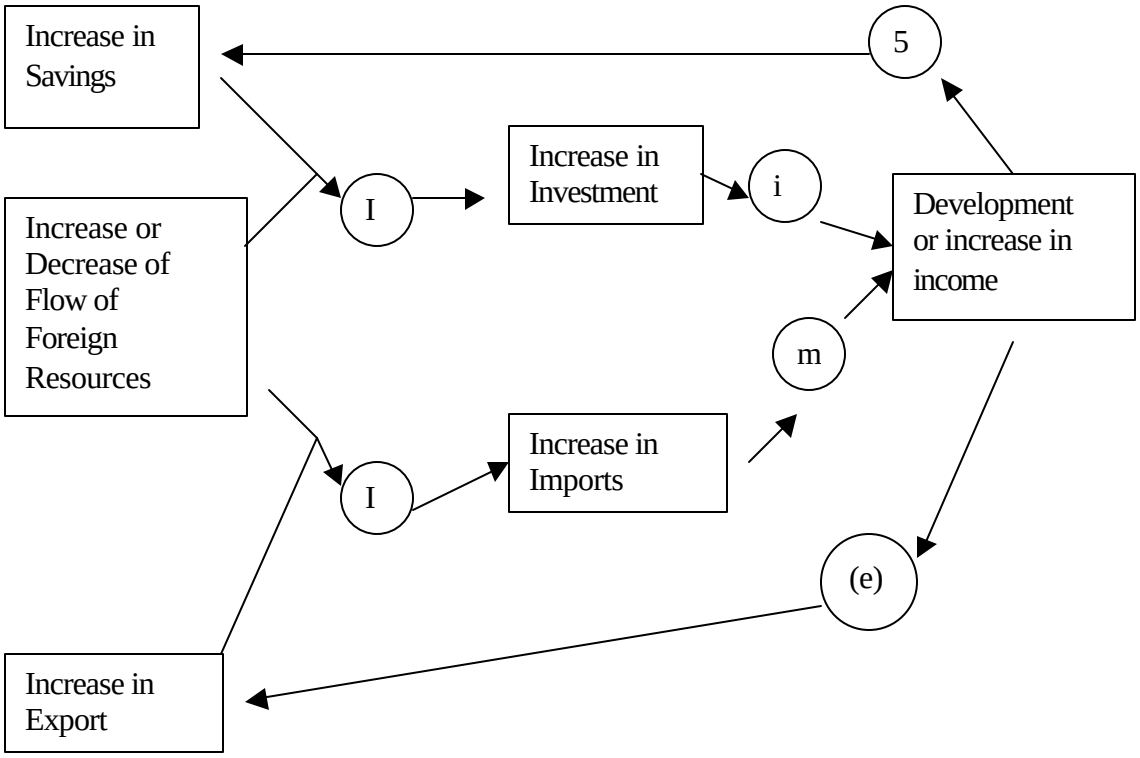
At this juncture, the basic schema permitting the identification and ultimately the computation of resource requirements of a developing country is nothing but the expression of a rudimentary theory of economic development. As indicated by the three blocks on the right hand side of Figure 2.1 and the arrows connecting then, economic development calls for two key inputs: investment aid imports. But neither investment nor imports for a given period are unlimited. The former must equal the sum of savings and foreign resources (aid and foreign capital funds) F; the Latter must equal the availability of foreign exchange composed of export earnings E and Foreign resources F. Thus S and F can be conceived as necessary inputs into I, and E and F necessary inputs into M. The arrows and coefficients "I" in the schema indicate these relationships.

Again, it will be observed that the system is impart a closed one in that two out of the three initial inputs S, F and E are related to the output, that is, to the level of development and national product V. As indicated in the diagram, savings depend on the level of national product V, the key coefficient relating changes in the two magnitudes beings. As with I and m, the parameters can for the moment be conceived of as a given constant.

The change in exports of the developing country is also linked through an index of proportionality e, to development of that country. This implies that the value of exports depends only in part on the conditions in the developing country; another is the condition of demand abroad. Thus, it is apparent from the schema that with given initial levels of the magnitudes V, I, M, S, and E and a prescribed expansion of V, the resource requirements F can be calculated for a future period.

This theoretical structure just described serves as the basis from which the empirical specifications discussed in chapter four are derived. The sets of structural equations as depicted in (21) to (25) constitute the origin for the derivation of the individual equations in our macro-econometric model. Furthermore, the schematic representation of the rudimentary theory of economic development (Figure 2.1) as it is indicated in this analytical framework underlies the basis for the simultaneous – equation simulation model structure of this study.

FIGURE 2.1 SCHEMATIC REPRESENTATION OF THE PROCEDURE FOR ESTIMATING THE RESOURCE RQUIREMENTS OF ECONOMIC DEVELOPMENT



SOURCE: Vanek, J (1967)

3.0 THE STATE OF NIGERIAN ECONOMY

3.1 THE INITIAL CONDITIONS

Like other parts of West Africa, the areas that eventually became part of Nigeria had a Long-established traditional society. Agriculture, using shifting cultivation and simple implements, was mainly for subsistence, though there was some exchange of surpluses in Local Markets. Handicraft industries produced the usual array of consumer goods. After about 1830 exports of palm oil and kernels, primarily to Britain gradually replaced the dying slave trade. Cocoa appeared in

the 1890s, and after 1900 there were diversification into other export products (Iloyd, 1983).

Modern Nigeria, like most other African states, is thus a colonial creation. The period 1890 – 1945 saw modest growth in population and per capita income, which marked continuity in the main trends of economic development. While export growth occupies the spotlight, Food output was always much larger in absolute size from 1900 to 1929. Helleiner (1960) shows export volume raising at 5.5 per cent a year and export value at 7 per cent a year. Export volume, after the post – 1929 slump, rose sharply again in the late 1930s and remained high throughout World War II. Import kept pace with exports, rising from 2 million pounds in 1900 to 16 million pounds in 1945.

The public sector, while small, also showed a high growth rate, with government revenue rising from 2.7 million pounds in 1900 to 13.2 million pounds in 1945. The most important government activity was infrastructure development; financed partly by borrowing while directly productive activities were largely left to private enterprise. The government did develop and operate coalmines at Enugu, mainly to supply the railways. By 1930, government employees average about 50,000.00. These employees had higher incomes than they would have earned in agriculture. For much of the population, however, life must have changed very little.

The years 1945 –60 saw a quickened tempo of political and economic change, which in retrospect appears as a preparation for independence. During this period (1945-66) export led growth proceeded along traditional lines with little structural change. Although the general pattern of growth during the period resembled that in earlier decades, its tempo was considerably higher. Population growth accelerated after 1945 and GDP seems to have rise at something above 4 per cent per year. But total resource use rose faster than this, as a typical trade surplus in the mid 1950s into a growing deficit financed by drawing down accumulated reserves and by Foreign capital inflow.

The growth process continued to be fuelled by exports, which rose considerably faster than GDP. Between 1946 and 1963 export volume rose about two-and-one half times. Thus, the economy's capacity to import increased fourfold between this period. The main exports as of 1964 were cocoa, palm kernels and palm oil, groundnuts and groundnut oil and petroleum, the export list was thus, more diversified than in earlier times; but the main non oil exports were still products of rural origin produced by small farmers.

While exports rose rapidly, imports rose even faster import volume increase about six fold between 1947 and 1963. Beginning in 1955, imports pulled ahead of exports and produced a growing trade deficit for some time the deficit could be covered from the Large Foreign Exchange Reserves. By the mid-1960s, however, reserves had been drawn down to low levels. It was then necessary to turn toward

heavier foreign borrowing and to import restriction through higher tariffs and other policies. There was a moderate shift in the composition of imports, but consumer goods were still more than half of the total, suggesting the limited extent of import substitution at this point.

More broadly, one can say that there was little structural change up to the mid-1960s. Agriculture – Forestry – Fisheries was almost two-thirds of GOD. Modern manufacturing and handicraft production amounted to only 3.5 per cent of GDP; and the shares of infrastructure and public services were also modest. In fact, the economy remained heavily rural and agricultural. The bulk of government revenue continued to come from the foreign sector – import duties, export duties and marketing board surpluses. There were also inflow of foreign resources in the form of official aid and private capital investment into Nigeria. The country depended heavily on foreign resources and expertise in the construction and development of infrastructure facilities.

Oil was discovered in 1958 and by 1965 it was already the largest single export, accounting for about 25 per cent of export receipts. The industry recovered rapidly after 1970, and export volume continued to rise through a great increase in Foreign – exchange availability and Federal Government revenues. The principal import bill rose from N.052 billion in September 1979 to an unprecedented N1.2 billion by January 1982, while the foreign exchange tumbled from N5.6 billion in December 1908 to N2.5 billion a year latter, failing below N1 billion naira by April 1982 (Central Bank of Nigeria, various issues). These indicators are shown in table 3.1 and 3.2.

Hence, it is such acts of monumental excesses – including of course, inflated contracts, "kickbacks", import license racketeering and so on – that more fully explain the enormity of the present economic crisis. The structural imbalance in the economy merely set the stage for it.

TABLE 3.1
SOCIO-ECONOMIC INDICATORS OF THE NIGERIAN ECONOMY
(DOMESTIC AND EXTERNAL CONDITIONS)

YEAR	Oil Export #Millions	Non-oil Exports # Millions	Oil Sector Imports # Millions	Non-Oil Sector Imports # Millions	Federally collected Revenue # Millions	Federal Govt. Expenditure # Millions
1970	510.0	377.4	52.2	704.2	633.3	838.8
1971`	953.0	340.4	50.6	1028.4	1168.3	639.0
1972	1176.2	258.0	45.2	944.9	1405.1	977.3

1973	**1893.5**	**384.9**	**41.0**	**1183.8**	**1695.3**	**1091.3**
1974	**5365.7**	**429.1**	**52.4**	**1684.1**	**4537.4**	**2097.5**
1975	**4563.1**	**362.4**	**118.0**	**3503.5**	**5514.7**	**4902.1**
1976	**6321.6**	**429.5**	**95.0**	**5053.5**	**6765.9**	**6691.2**
1977	**7072.8**	**557.8**	**102.2**	**7014.4**	**8039.0**	**7367.9**
1978	**5653.6**	**662.8**	**110.0**	**8101.0**	**7371.1**	**8528.0**
1979	**10166.8**	**670.0**	**230.0**	**7242.5**	**10912.4**	**7406.7**
1980	**13632.3**	**554.4**	**227.4**	**8868.2**	**15234.0**	**14113.9**
1981	**10680.5**	**342.8**	**119.8**	**12520.0**	**12.80.2**	**11438.4**
1982	**80003.2**	**203.2**	**225.5**	**10545.0**	**11,764.4**	**12940.4**
1983	**7201.2**	**301.3**	**171.6**	**8732.1**	**10,508.7**	**9690.1**
1984	**8840.6**	**247.4**	**284.4**	**6895.9**	**11191.2**	**9553.6**
1985	**11223.7**	**497.1**	**51.8**	**7010.8**	**14606.1**	**12441.2**
1986	**8368.5**	**552.0**	**913.9**	**5069.7**	**12302.0**	**19223.7**
1987	**28028.6**	**2152.0**	**3170.1**	**14691.6**	**25099.8**	**22018.7**
1988	**28435.4**	**2757.4**	**3803.1**	**17642.6**	**27310.8**	**27749.5**
1989	**55016.8**	**2954.4**	**4617.6**	**26188.6**	**50272.1**	**40998.3**

TABLE 3.1 (continued)

Year	**External Reserves # Millions**	**Inflation Rate**	**Exchange Rate # per Us $**	**External Debt Us $ Millions**	**Population Millions**	**Terms of Trade 1987 =100**
1970	**146.4**	**13.8**	**0.7142**	**567**	**56.35**	**44.2**
1971	**190.5**	**15.6**	**0.6944**	**651**	**58.07**	**41.3**
1972	**291.2**	**3.2**	**0.6579**	**732**	**59.85**	**39.3**
1973	**366.3**	**5.4**	**0.6579**	**1,205**	**61.71**	**47.0**
1974	**4946.0**	**13.4**	**0.6293**	**1,274**	**63.65**	**138.0**
1975	**5487.0**	**33.9**	**0.6158**	**1,143**	**67.67**	**122.1**
1976	**4880.0**	**21.2**	**0.6266**	**906**	**70.07**	**132.0**
1977	**3898.8**	**15.4**	**0.6466**	**3.146**	**72.07**	**134.7**
1978	**1966.8**	**16.6**	**0.6351**	**5,091**	**75.18**	**119.1**
1979	**5049.3**	**11.8**	**0.6021**	**6,259**	**77.84**	**145.3**
1980	**9957.2**	**9.9**	**0.5469**	**8,934**	**80.56**	**205.8**
1981	**4006.6**	**20.9**	**0.6052**	**12.136**	**81.00**	**222.8**
1982	**1525.0**	**7.7**	**0.6731**	**12,954**	**83.62**	**215.7**
1983	**1041.4**	**23.2**	**0.7506**	**18.539**	**86.30**	**196.1**
1984	**1490.9**	**39.6**	**0.7672**	**18,537**	**93.33**	**200.7**
1985	**1839.0**	**5.5**	**0.8924**	**19,551**	**95.69**	**183.9**
1986	**2070.9**	**5.4**	**1.7323**	**24,043**	**98.17**	**91.6**
1987	**1169.9**	**10.2**	**3.9691**	**31,956**	**101.41**	**100.0**
1988	**721.4**	**38.3**	**4.5367**	**31,956**	**104.96**	**76.7**

1889	**1792.7**	**40.9**	**7.5064**	**32,876**	**105.02**	**-**

SOURCES:
Central Bank of Nigeria, Nigeria's principal Economics and Financial Indicators
World Bank, World Tables (1991 Edition)
International Monetary Fund, International Financial Statistical Year book (1991)
Central Bank of Nigeria, Statistical Bulletin Volume 1, Nos 1 &2 (December, 1990).
Federal Office of Statistics l, Digest of Statistics (Various Issues)

Table 3.2

SECTORAL CONTRIBUTION TO GROSS DOMESTIC REPOT (AT FACTOR COST)

Year	Agriculture Industry # Billions	Manufacturing Industries Billions	Non-Manufacturing Industries # Billions	Services Others # Billions
1970	**3.36**	**0.39**	**0.93**	**4.11**
1971	**4.27**	**0.43**	**1.59**	**4.73**
1972	**4.36`**	**0.53**	**1.94**	**4.95**
1973	**4.46**	**0.62**	**2.85**	**5.25**
1974	**6.52**	**0.82**	**7.05**	**7.02**
1975	**7.61**	**1.45**	**6.00**	**9.92**
1976	**8.70**	**1.93**	**8.96**	**12.00**
1977	**10.38**	**1.93**	**10.09**	**14.25**
1978	**11.44**	**2.94**	**10.70**	**14.13**
1979	**12.82**	**4.72**	**13.73**	**15.61**
1980	**14.32**	**5.04**	**17.87**	**17.54**
1981	**14.45**	**6.11**	**15.92**	**20.12**
1982	**17.01**	**7.45**	**14.73**	**21.30**
1983	**20.07**	**6.32**	**12.78**	**24.13**
1884	**25.00**	**6.66**	**12.79**	**25.50**
1985	**27.62**	**9.36**	**13.94**	**27.85**
1986	**28.96**	**10.14**	**10.90**	**29.73**
1987	**28.55**	**8.43**	**33.80**	**25.63**
1988	**45.51**	**13.56**	**34.74**	**37.86**
1989	**65.36**	**18.73**	**75.17**	**53.74**

SOURCE: WORLD BANK WORLD TABLES (1991 EDITION)

3.2 ECONOMIC REFORMS ERA

The policy response to the sharp decline in government oil revenues from 1981 to 1983 was embodied in the Economic Stabilization Act of 1982. The fiscal crisis that followed the decline in oil revenues required a substantial reduction in government fiscal operation, stricter budgetary control and reform of public sector enterprises to match the fall in available government financial resources. The evidence was to the contrary.

The need for public sector reforms explains the establishment of the Onosode Commission on Parastatals in 1981 and its report in 1982 (Iwayemi, 1990). Yet there was no significant implementation of the commission's proposals especially in the important areas of public enterprises. Indeed, the Shagari administration had neither a structured nor an internally consistent response to the fiscal disequilibria.

The Buhari/Idiagbon regime inherited a decayed economy and a desperate political environment. Its major policy action was to bring the deteriorating public finance quickly under control. Their strategies included, the sharp reduction in public sector expenditure that involved massive retrenchment of public sector workers. The regime also embarked on counter trade, bartering Nigeria's oil for goods and services from other countries. They also accepted the report of the Expert committee on the need for structural adjustment.

Subsidy reductions especially on petroleum products and the size of exchange rate devaluation were the main contentions with the International Monetary Fund (IMF) when the government sought external Loans to meet its external debt obligations (see table 3.1). But their regime was not willing to consent to that conditionality that would have accompanied the acceptance of the loan. Although this regime carried out drastic budgetary reductions, this was done without a consistent framework that could address both short and long-term issues involved in fiscal disequilibria and other macro economic imbalance

The deterioration of the domestic economy in 1985 and the collapse of the price of crude oil in the world oil market caused domestic and external financial crisis. The socio-economic aggregates of table 3.1 and 3.2 supports this fact. Most manifested feature, is the declining external reserves and rising inflation rate. In real terms and given high exchange rate (devaluation of Naira), most of these aggregates fell drastically.

As a first step, a national Economic Emergency Decree, which empowers President Ibrahim Babangida to issue orders and make regulations during a 15-

month economic emergency period, was promulgated in October 1985. Under it, the President was given discretionary powers to put in place measures that will improve the economy. The actions taken included the reduction in wages and the removal of petroleum subsidy.

The Structural Adjustment Programme and its implementation through post 1986 budgets embody to some extent a more consistent policy framework capable of coping with both the shorter term and longer-term economic problems of the nation. Although an IMF Loans was rejected in 1985 after a national debate, its conditionality characterized the foundations of SAP and subsequent national budgets. Specifically, the major objectives of the programme are:

(1) To restructure and diversify the productive base of the economy in order to reduce dependence on the oil sector and on imports;
(2) To achieve fiscal and balance of payments viability over the period;
(3) To lay the basis for a sustainable non-inflationary growth;
(4) To lessen the dominance of unproductive investments in the public sector, improve the sector's efficiency and intensify the growth potential of the private sector.

The main elements of the adjustment programme are:

(i) Strengthening of the hitherto strong demand management policies;
(ii) Adoption of measures to stimulated domestic production and broaden the supply base of the economy;
(iii) Adoption of a realistic exchange rate policy;
(iv) Further rationalization and restricting of the tariffs;
(v) Trade and payments liberalization;
(vi) Reduction compels administrative controls and a great reliance on market forces;
(vii) Adoption of appropriate pricing policies and
(viii) Rationalization and privatization of public sector enterprises

The core policies involve actions:

(a) Correct for the serious overvaluation of naira;
(b) Overcome the observed public sector inefficiencies;
(c) Relieve the debt burden and attract a net inflow of foreign capital (Federal Government of Nigeria, 1986).

While is not within the scope of this study to give a full evaluation of structural adjustment programme policies in the past years, it is however, evident that the pace of recovery has been relatively slow, given the expectations of the citizens regarding the benefits of the reform programme. Again, all indications are that Nigeria's external sector performance still remains extremely vulnerable to the uncertainties of world petroleum market and the nations capital accounts are heavily influenced by the intolerable burden of our external debts.

Presently however, the key economic and financial problems that confronts the nation included the following: the growing fiscal deficits of government, especially at the federal level, which is financed continuously through the high cost central Bank's ways and means advances; the sharp rise in interest rate, particularly lending rates which are further constraining investment and output in the face of some depressed products demand' the persistent mounting inflationary pressures, especially the wage goods for the urban population and the expansion of aggregate credit and money supply to the domestic economy beyond the levels envisage in annual budgets (Babangida, 1992).

At the root of all these related economic and financial problems is government's inability to cater both for its minimum social agenda at home as well as service (without settling part of the principal) the nation's external indebtedness as presented in table 3.1. In fact, Nigeria's stock of eternal debt is currently about 34 billion US dollars; and the debt service load for 1992 alone is about 3.5 billion dollars. In financing this debt service load, there remain the problems of the availability of foreign exchange and then those of the budgetary provision for the naira cover in relation to available resources.

Government's policy of placing an upper limit of 30 per cent of the official exchange receipts for external debt service only buys time and further postpones the compounded hardships. It is therefore not surprising that the problem of debt services has given rise directly and indirectly to persistent budget deficits. This is in fact the reality of our nation's fiscal life, added to the profound understanding of the fundamental problem of poverty as a structural feature of the Nigerian economy.

4.0 METHODOLOGICAL FRAMEWORK

4.1 ECONOMETRIC MODELING TECHNIQUE

Mathematical modeling and application in Economics covers a wide range of methods and techniques. These include the following: mathematical programming, input-output model, Social Accounting matrix model types, neo-classical optimal growth models, differential game models and macro econometric models. Of these various approaches, the ones that have found the widest applications in seeking to analyze and manage real world economies are econometric models (Raheem 1988) and Olofin (1985).

Moreover, econometric models are helpful in formulating and assessing current and prospective initiatives. But given the disparate forecasts conceivable from alternative models and the possible absence of a clear consensus among pundits, such information are to be regarded as clues (i. e. hints or indications) to be supplemented by the other evidence (Gapinski, 1982).

A multi-equation simulation model is made use of because it allows us to account simultaneously for all the interrelationships between a set of variables. More so, it is appropriate in solving economy – wide problems, since it accounts for both the direct and indirect interrelationships existing within an economy. Often these models consist of a set of regression equations, which, after having been estimated, are solved simultaneously on a computer (Pindyck and Rubinfeld, 1981). They offer more degree of flexibility and ease of adaptation relative to others. A disaggregated multi-sectoral framework would have been more adequate for our analysis. But given the scope of this study, we will adopt an aggregative model, which however, gives an insight into the problem under investigation. Again, we would not need to develop a full macro-econometric model of the Nigerian economy. Rather, we shall construct a small – scale dynamic macro-model that captures the basic macro-economic aggregates of interest to this study. We shall then proceed to project the future resource requirements of the Nigerian Economy under varying conditions or assumptions.

4.2 MODEL SPECIFICATION AND ESTIMATION

In applying econometric methods for the specification and estimation of economic models, two approaches have been developed, the 'Orthodox Approach' and the 'Experimental Approach'. The Orthodox Approach consists in formulating a mathematical model on a prior theoretical ground while the Experimental Approach combines the theoretical considerations with the empirical observations available and is designed to extract the maximum of information from the available data (Koutsoyiannis, 1977).

Using the later approach, we specified and estimated a good number of equations with several variables. In conformity with the research problem and objectives, eight equations were finally selected. They consist six behavioral and two identities.

The endogenous, pre-determined and exogenous variables of the model are listed below:

GDP_t	=	Gross Domestic Product at factor cost
PX_t	=	Export Prices (F. O. B.)
NIF_t	=	Net Inflow of Foreign Exchange
T_t	=	Time Variable
GDP_{t-1}	=	Lagged Gross Domestic Product at fact cost
SDG_t	=	Gross Domestic Saving
IDG_t	=	Gross Domestic Investment
XGS_t	=	Export of Goods and NF Services
MGS_t	=	Import of Goods and NF Services
FOREG	=	Foreign Resource Requirement (Identity)

DOMRG = Domestic Resource Requirement (Identity)
SDG_{t-1} = Lagged Gross Domestic Saving
IDG_{t-1} = Lagged Domestic Investment
MGS_{t-1} = Lagged Import of Goods and NF Services

Now, the investment equation is specified as a function of Lagged Gross Domestic Product and Lagged Domestic Saving. That is,

$$IDG_t = \lambda_1 + \lambda_3 GDP_t\text{-}1 + \lambda_2 SDG_t\text{-}1 + e_t \quad (1.1)$$

The saving equation is expressed similarly as a function of Lagged Gross Domestic Product and Lagged Gross Domestic Saving. And this is of the form:

$$SDG_t = \lambda_1 + \lambda_3 GDP + \lambda_2 SDG_t\text{-}1 + e_t$$

(2.1)

The Export equation is specified as a function of Gross Domestic Product and Export Prices. That is,

$$XGS_t = \lambda_1 + \lambda_3 GDP_t + \lambda_2 PX_t + e_t$$

(3.1)

The Import equation is also specified as a function of Gross Domestic Product, Export of Goods and NF Services, Net Inflow of Foreign Exchange and Lagged Import of Goods and NF Services. This equation is of the form,

$$MGS_t = \lambda_1 + \lambda_2 GDP_t + \lambda_2 XGS_t + \lambda_4 NIF_t + \lambda_5 MGS_t\text{-}1 + e_t$$

(4.1)

The Foreign Resource Requirements Identity is expressed as the difference between the Import of goods and NF Services and the export of goods and NF services. This is of the form,

$$FOREG = MGS_t - XGS_t$$

(5.1)

And the Domestic Resource Requirements Identity is similarly expressed as the difference between Gross Domestic Investment and Gross Domestic Saving. That is,

$$DOMRG = IDG_t - SDG_t$$

(6.1)

In AN alternative framework, the investment equation is re-specified as a function of Gross Domestic Product and lagged Gross Domestic Investment. This expression is of the form,

$$IDG_t = B_1 + B_2 GDP_t + B_3 IDG_t\text{-}1 + \beta_t$$

(7.1)

On the other hand, the saving equation is given as a function of Gross Domestic Product and Lagged Gross Domestic Saving. And the expression is

$$SDG_t = \beta_1 + \beta_2 GDP_t + \beta_3 SDG_t\text{-}1 + \beta_t$$

(8.1)

The ordinary least squares (OLS) single equation estimation technique is used for estimating the above specified equations. As a justification for this method, Maddala (1977) identified that OLS is more robust against specification errors. And that its computational procedure is simple, in conjunction with optimal properties of the estimates and these properties are linearity, unbiasedness and minimum variance among a class of unbiased estimators. Moreover, the stochastic

error term (ε_1) satisfies all the explicit assumptions made about its behaviour (Kout Soyiannis, 1977).

The technique for evaluating the estimation results implies the use of the following standard criteria: R^2 (adjusted coefficient of determination) for testing goodness of fit of the estimated regression equation; t-ratio for testing the significance of each regression coefficients and 'd' statistic (Durbin Watson Statistics) for testing the randomness of the residuals.

The estimated equation are thus presented below:

$IDG_t = -198.411 + 0.054\ GDP_t\text{-}1 + 0.782SDG_t\text{-}1$ (9.1)

(2.4433) (5.5401)

$R^2 = 0.8731$ DW = 1.562

$SDG_t = -2402.797 + 0.130GDP_t\text{-}1 + 0.809SDG_t\text{-}1$ (10.1)

(2.1623) (2.1355)

$R^2 = 0.6325$ DW = 1.404

$XG5_t = -972.212 + 0.336GDP_t - 43.322PX_t$ (11.1)

(12.8137) (-1.66715)

$R^2 = 0.8952$ DW = 1.392

$MGS_t = 59.613 + 0.14GDP_t + 0.685XGS_t$ (12.1)

(0.4910) $(10.2212)_t$

$+ 0.605NIF_t + 0.221\ MGS_t\text{-}1$

(3.519) (1.5936)

$R^2 = 0.9901$ DW = 1.713

$IDG_t = -83.958 + 0.063GDP_t + 0.687IDG_t\text{-}1$ (13.1)

(4.2472) (4.1506)

$R^2 = 0.8790$ DW = 0.621

$SDG_t = 1564.27 + 0.145GDP_t + 0.421SDG_t\text{-}1$ (14.1)

(4.4969) (1.4362)

$R^2 = 0.7976$ DW = 1.263

In the above estimated equations, the figures in parentheses are t values, which is significant for most variables at 5% level of significance. The adjusted r2 and R were also high for all the equations. Durbin Watson Statistic (DW) also reveals the absence of serious auto correlation for all the equations. The explanatory variables also had the correct signs. These test results shows the reliability of our estimated equations in modeling the problem under investigation.

4.3 SOLUTION MODEL

In this study, the multi-equation system will be solved using Time Series Processor (TSP) econometric software (version 4.0) of 1985 developed by Hall (1983). This mathematical co-processor based software provides two quite different procedures for the solution of simultaneous equation models. The methods differ in their speed of convergence, use of computer storage and time, and in their ability to handle non-Linear or very simultaneous models.

The most general and powerful procedure is 'SIML', which uses Newton's method applied to nonlinear equation solution. For large economic models, particularly those with some sort of block structure, the 'solve' procedure will be more suitable. This latter procedure will evaluate the recursive blocks and solve the simultaneous blocks either by the Gauss – Seidel Method (Ortega and Rheinboldt, 1970) or Fletcher-Powell (Fletcher and Powell, 1963) algorithms.

These methods of model solution are very suitable for typical large economic models, which tend to be sparse, fairly linear and separable into blocks. The Gauss-Seidel iterative technique is employed here and it is quite simple, and it solves the equations sequentially in order, with each endogenous variable evaluated in turn. In general, the Gauss-Seidel Method is preferable because of the small storage capacity required.

4.4 MODEL EVALUATION (VALIDITY AND SENSITIVITY)

In constructing a simulation model, we are faced with the same difficulty that exists in constructing a single-equation regression model. The problem is how to evaluate or test the goodness of the model. Different criteria will apply depending on the model's purpose.

One criterion that is used to evaluate a simulation model is the fit of the individual variables in a simulation context. To test this fitness, we perform an historical simulation and examine how closely each endogenous variable tracks its corresponding historical data series. The simulation statistic that is used to have such quantitative measure is called rms (root-mean-square) simulation error. It is measure of the deviation of the simulated variable from its actual time path. Of course, the magnitude of this error can be evaluated only by comparing it with the average size of the variable in question (Pindyck and rubinfeld, 1981).

Another Simulation Error Statistic is the rms per cent error, which is also defined as a measure of the deviation of the simulated variable from its actual time path but in percentage terms.

A systematic measure of the accuracy of the forecasts obtained from an econometric model has been suggested by H. Theil (1966). This measure is called the inequality coefficient and is devoted by the symbol 'U'. The values that this inequality coefficient assumes lie between zero and infinity ($O \leq U \leq \infty$). The smaller the value of the inequality coefficient the better is the forecasting performance of the model.

The resource of forecast error may be obtained by the decomposition of the inequality coefficient. The three components, which form the sources of the forecast error, are called partial inequality coefficients. Bias component shows that the cause of the discrepancy between predictions and realizations is the difference between their means. Variance component shows that another cause of discrepancy is the difference between their variance. Covariance component shows that still another cause of the discrepancy is their imperfect covariance.
An additional criterion of model performance is the overall sensitivity of the model. An alteration of the initial simulation period provides one test for model sensitivity. Another test is to alter the time paths for exogenous variables over the simulation period. In all, we expect that small changes in the model's coefficients and time paths for exogenous variables should not affect the simulation performance drastically.

Thus, there are a wide variety of criteria, which can be used to evaluate the performance of a simulation model, but problems may arise in the use of these criteria. Consequently, model building is very much as art, and part of that art is learning to trade off alternate criteria in different ways.

5.0 SIMULATION RESULTS ANALYSIS

5.1 CONTROL SOLUTION/BASELINE FORECAST

Here, a forecast trend is generated from 1990 through 2000 based on the historical values of all exogenous variables. That is, all exogenous variables are kept on trend (growing with time, t). The justification of having a control solution is anchored on the need to have a basis for comparing the results from alternative growth rates assumptions.

The time paths of the endogenous macro variables and the simulated resource requirements (or gap) are presented in table 5.1.

TABLE 5.1: DYNAMIC BASELINE PROJECTION (=N= MILLIONS)

YEAR	XGS^O	MGS^O	$FOREG^O$	SDG^O	IDG^O	$DOMRG^O$
1986	22186	28762	6571	10875	17055	6180
1987	27085	34601	7515	8831	15012	6181
1988	39595	52763	13168	17988	25721	7732
1989	66143	76731	10587	22489	32991	10502
1990	36902	56030	19128	47016	64395	17378
1991	39190	46081	6921	6957	16984	10028
1992	41412	48602	7189	7342	17913	10570
1993	43669	51125	7456	7728	18841	11113
1994	45922	53646	7724	8114	19770	11656
1995	48179	56170	7991	8499	20699	12199
1996	50436	58694	8257	8885	21627	12742
1997	52689	61214	8526	9271	22556	13285
1998	54946	63738	8792	9657	23484	13828
1999	57199	66259	9060	10042	24413	14370
2000	59456	68783	9327	10428	25341	14913

The above projection has shown the dominating of domestic resource gap over the foreign resource gap. Furthermore, it has shown the continuous requirement of foreign resources for the rest of the present decade. In other words, the domestic resource gap has rose from =N=6180 million in 1986 to =N=14913 million by the year 2000. And similarly, the Foreign resource gap rose from =N=6577 million in 1986 to =N=9327 million by the year 2000.

The time paths of the simulated value of the endogenous variables are evaluated by the thesis inequality coefficients, its decomposition and root mean square error. The summary of these simulations statistics is shown in table 5.2.

TABLE 5.2: SUMMARY OF SIMULATION STATISTICS

Variables (V)	Theils Inequality Coefficients (U)	BIAS Proportion (Bp)	Variance Proportion (Vp)	Co-Variance Proportion (Cp)	Root mean square error (rms)
XGS	3.33132	0.72063	0.04770	0.23167	41934
MGS	7.56152	0.85585	0.00704	0.13710	50254
SDG	2.4919	0.37955	0.02068	0.59977	14184
IDG	3.22579	0.57390	0.00104	0.42507	24515

One plausible interpretation derivable from the above figures of the Theil's Inequality Coefficients is that there is the absence of any serious systematic bias. Consequently, the model may not need any major revision (although it can be slightly modified) for the current purpose of its development and given the fact that it is the best model performance we can get within our constraints. Again,

the decomposition of Theil's Inequality Coefficient as demonstrated in table 5.2 reveals a large part of errors in favor of Bias proportion. However, for investment and saving function, a large part of the errors was in favor of the covariance proportion.

The Root mean square error also demonstrates the fairly optimal results of our baseline forecast. This is seen by the fair closeness of the average size of the variables (see appendix A) and the root means squared error presented in table 5.2. It is pertinent to point out that the structural characteristics and poor database of the Nigeria economy affected the derivation of optimal results of some function of our model. Thus, our results should only be taken as an indication to be constantly improved upon by subsequent researchers.

5.2 **DYNAMIC SIMULATION EXPERIMENTS**

In framing and analyzing the experiments, the exogenous variables are made to follow different time paths. The impact of the alternative time path is then examined on the endogenous variables. By this, it becomes possible to examine and compared what might have taken place as a result of alternative growth rate policies. To do this, three different experiments were carried out in this study and are analyzed below.

5.2.1 **SHOCKED EXPERIMENT A**

In this experiment, the objective was to find the time paths and magnitude of the nations resource requirements as a result of a desired or target growth rate.

For the simulation run, we assumed a three percent growth rate of the Gross Domestic Product (GDP). The time paths of endogenous macro variables and the simulated resource requirements are presented in table 5.3.

TABLE 5.3
SCENARIO A: TOTAL IMPACT OF 3% GROWTH RATE OF
GROSS DOMESTIC PRODUCT ON RESOURCE REQUIREMENTS (=N= MILLIONS)

YEAR	XGS'	MGS'	FOREG'	SDG'	IDG'	DOMRG'
1989	66142	76730	10588	22489	32991	10502
1990	66092	88188	22096	47017	64395	17378
1991	68161	78031	9870	11648	28278	16630
1992	70291	80417	10126	12003	29134	17131
1993	72494	82881	10387	12369	30015	17646
1994	72494	85420	10657	12746	30923	18176
1995	77109	88042	10933	13135	31858	18723
1996	79530	90745	11216	13535	32821	19286
1997	82023	93531	11508	13947	33813	19865

1998	**82150**	**93709**	**11559**	**14371**	**34834**	**20463**
1999	**84730**	**96590**	**11860**	**14415**	**34939**	**20524**
2000	**87397**	**99565**	**12168**	**14853**	**35994**	**21141**

The above scenario A has shown that domestic resource gap is the binding dominant resource constraint. In other words, the simulation results reveal that domestic resource requirements will continue to exceed Foreign Resource requirement needed for development, for the rest of the decade. From the table, the domestic resource gap rose from =N=10502 million in 1989 to =N=16630 million in 1991 and will be =N=21141 million by the year 2000. On the other hand, the foreign resource gap rose from =N=9890 million in 1991 to =N=12168 by the year 2000.

The time paths of the endogenous variables (export, import, investment and savings) also took increasing values throughout the decade under investigation.

5.2.2SHOCKED EXPERIMENT B

The objective of this experiment was also to find the magnitude of the nation's resource requirements given a desirable developmental growth rate.

In this simulation, we assumed a five percent growth rate of Gross Domestic Product (GDP). The time paths of the endogenous macro variables and the simulated resource requirements of this experiment are presented in table 5.4.

TABLE 5.4:
SCENARIO B: TOTAL IMPACT OF 5% GROWTH RATE OF
GROSS DOMESTIC PRODUCT ON RESOURCE REQUIREMENTS (=N= MILIONS)

YEAR	XGS [2]	MGS[2]	FOREG[2]	SDG[2]	IDG[2]	DOMRG[2]
1989	66142	76730	10588	22489	32991	10502
1990	67523	89765	22242	47017	64395	17378
1991	71138	81311	10173	11878	28832	16954
1992	74935	85534	10598	12482	30286	17804
1993	78935	89977	11042	13116	31812	18696
1994	83137	94645	11508	13782	33415	19633
1995	87560	99556	11995	14481	35098	20617
1996	92213	104718	12505	15215	36865	21650
1997	97100	110142	13041	15985	38720	22735
1998	102244	115845	13602	16794	40668	23873
1999	107648	121838	14190	17644	42713	25069
2000	113333	128138	14805	18536	44861	26325

In the above projection, domestic resource requirement was seen to be greater than foreign resource gap in each of the year simulated. The experiment also showed that the nation's financial need continues to increase for the rest of the decade.

As can be seen from the table, the domestic resource requirement rose from =N=10502 million in 1989 to =N=16954 million in 1991 and =N=26325 million by the year 2000. Similarly, the Foreign resource requirement rose from =N=10588 million in 1989 to =N=10598 in 1992 and will reach the level of =N=14805 million by the year 2000.

Again, the time paths of exports, imports, investment and savings followed similar trend as shown in table 5.4.

5.2.3. SHOCKED EXPERIMENT C

In this last experiment, an alternative macro framework was developed. This was done by re-specifying the savings and investment functions as shown in section 4.2. For the simulation run, the export variable was exogenesis by assuming that it grows at the rate of five percent. This is in addition to assuming a five percent growth rate of Gross Domestic Product. The bases of this assumption, is the recognition of Nigeria's membership of the international Cartel known as Organization of Petroleum Exporting Countries (OPEC) and given the fact that oil export constitutes the greater percentage of our total exports.

Again, the time paths of the endogenous macro-variables and the simulated resource requirements of the experiment are presented in table 5.5.

TABLE 5.5:
SCENARIO C: TOTAL IMPACT OF 5% GROWTH RATE OF EXPORTS AND GDP ON RESOURCE NEEDS (=N= MILLIONS)

YEAR	MGS[3]	FOREG[3]	SDG[3]	IDG[3]	DOMRG[3]
1989	82688	7848	14476	37705	23229
1990	97340	18758	15979	50090	34212
1991	89102	6590	14710	32485	17775
1992	93549	6912	15449	34187	18738
1993	98220	7251	16226	35975	19749
1994	103125	7608	17042	371852	20810
1995	108277	7985	17898	39823	21925
1996	113688	8381	18797	41892	23095
1997	119370	8798	19741	44065	24324
1998	125338	9236	20732	46346	25614
1999	131605	9698	21773	48742	26969
2000	138136	10185	22866	51257	28391

Like the previous shocked experiments, our last experiment also revealed the domestic resource requirement as the binding resource constraint on the nation's economic development. The scenario further showed that for the rest of the decade, the Nigeria's Foreign Resource needs will continue to increase.

As shown in table 5.5, the domestic resource requirement rose from =N=23229 million in 1989 to =N=28391 million by the year 2000. In the same way, the

Foreign resource gap rose from =N=7484 million in 1989 to =N=10185 million by the end of the present decade (2000).

Finally, the time paths of export, import, investment and savings followed similar trend as shown in table 5.5.

5.3 POLICY IMPLICATIONS

The estimated foreign resource requirements and domestic resource requirement cannot be taken merely as two different estimates, in that both short run and long run forces determine the actual resource gap. In fact, different factors and economic agents (decision makers) act upon the four central macro-economic aggregates – savings, investment, exports and imports and imports in the Long run.

Thus, the savings – investment gap estimate on the one hand and the foreign exchange gap estimate on the other, as simulated in this study, do not have to equal each other. However, a policy concern, is to make sure that the short run adjustment which in the end will bring to equality, he two gaps does not in any way violate the very assumptions on which the resource requirements projections are based. And specifically that it does not frustrate the assumed overall growth rates.

Indeed, a condition that will guarantee the actual realization of the rates of growth assumed is that the required foreign exchange (aid) be as large as the larger of the two gaps or resource requirements estimated. In other words, the larger of the two gaps is an estimate of foreign exchange requirements (or Foreign aids) consistent with the overall rates of growth. For if the minimum consistent requirement were not forthcoming in the projection period, the underlying rates of growth could never be realized. However, inflexible prices and rigid inflationary trends will generally result in a reduction in economic activity and hence will reduce resource requirements (Vanek, 1967).

From our projections, we have seen that the saving – investment gap is the dominant (binding) constraint, which determines the minimum consistent requirement of foreign resources (exchange). Given that this minimum resource requirement is forthcoming, the proper policy is to relax import restrictions. But if imports of capital goods and intermediate goods are controlled along with other imports, it will lead to an increased in investment; and thus the binding gap would be increased and the minimum foreign resources would fall short of the minimum requirement consistent with increased capital formulation and growth.

Again, the neglect of the gap disparity and reliance on autonomous forces of adjustment by the authorities appear undesirable. With an excess of the ex ante requirements over the foreign resource requirements, there will be an excess of

effective demand over effective supply in the economy and either undesired inventory decumulation or inflationary pressures will have to produce the ex-post adjustment. This adjustment will take place via a reduction in the (dominant) savings – investment gap to the level of the other gap. However, the growth process will be vitiated because the productive or growth investment will not have been realized.

And this is the reason behind the policy of intending to fill the gap with external aid (resource), for a depressed developing country such as Nigeria. In fact, our current economic reform measures (SAP) should be adequately financed so as to achieve the desired objectives of transforming the country into a sustainable growth path. This is in addition to reducing the inherent mass poverty in the country.

In fact, the only viable policy that can aid the rate of expansion in the short intermediate run is the acquisition of additional foreign resources. In the long run, of course, the development pattern could be redesigned in the direction of an increased substitution for imports of capital and intermediate goods; and a production of additional exportable. Again excessive devaluation in a developing economy (such as Nigeria) experiencing a foreign resource gap dominating by the savings – investment constraint cannot lead to an improvement in the situation. Under these conditions the supply of exports will be zero elastic because no productive resources or products can be withdrawn from domestic use to be exported.

The best policy option therefore, is for the nation's policy makers to, mobilize foreign resources so as to complement domestic savings (resources) in order to achieve our desirable development objectives. This being the case, it is the minimum consistent domestic resource requirements that must be taken as the final result (because we are considering a number of alternative growth rates) of this study. We hope that international organizations and developed countries government should help to fill this important gap existing in the Nigerian economy.

6.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY OF FINDINGS

The thrust of this study has been a quantitative determination of the Domestic and Foreign Resource Requirements of the Nigerian Economy for the present decade. Specifically, our aim was to investigate the dominant resource constraint limiting growth and development in Nigeria and estimating future resource requirements to achieve a desired rate of growth. That is, to determine investment requirements in relation to savings and import requirements in relation to export earnings. Using a small-scale macro-econometric multi-equation simulation model, three different experiments were carried out, in view of ascertaining the magnitude of the nation's resource requirements under varying assumptions or conditions.

Going by the results of the study, the nation's resource needs will continue to increase for the rest of the decade. And that at a higher target growth rate, more resources will be required than at a lower growth rate. More importantly, domestic resource gap was ascertained to be the dominant (binding) resource constraint or the minimum foreign resource requirement consistent with the desired rate of growth. This finding is consistent with the original Chenery (1966) Hypothesis that in the early stages of development a domestic savings – investment gap may predominate, reflecting the low level of monetised saving in countries in the pre take-off stage of development.

Furthermore, we found that ex ante saving- investment gap and export gap were never equal. This was in sharp contrast to the equality of export saving – investment gap and export – import gap. The export equality and ex ante inequality were not inconsistent with the economic theoretical postulation; which has it that in national income accounting, expost, the two gaps must be identical though ex-ante they need not be so. (Ghatak, 1978).

On the whole, the findings of the study seem to provide sufficient evidence in support of the three major hypotheses that were stated at the beginning of this study. These hypothesizes are that the nation's import requirements is greater than the expected export earnings, therefore causing trade gap; that the investment requirement is greater than the forecast domestic saving, therefore savings gap; and that Large Quantum of resource inflow in Nigeria is highly needed in the foreseeable future.

6.2 POLICY RECOMMENDATION

The urgency of the development problems facing Nigeria, argues for a more coherent and more focused approach to the external dimension of reform and development for the country. But in order to undermine the incentives for reform, any new approach should link debt relief and fresh foreign capital inflows to

development needs or resource requirements. Therefore, the results of this study provide the basis for making some policy recommendations.

We propose an immediate establishment of a World Development Agency with participation by the World Bank Creditor and Donor Governments, International Institutions and the individual African Government (that is, the Nigerian government in the case of Nigeria). The scope of responsibility of this new Agency would encompass economic reform and development as well as external financing issues involving the participating African government.

The Agency would meet periodically to review the participating country's (Nigeria) progress in implementing its economic reforms and development programs, to assess Nigeria's plan for such program and coordinate the amount and use of debt relief and aid flows required to support future reform and development programs. The creditor governments would also be expected to cancel the debt owned to them. In addition, the Nigerian government and the international financial institutions would commit appropriate amounts of aid to support target import and investment levels as indicated by this study. This commitment can be sustained by the establishment of an investment center, to be governed by a board of directors drawn from the foreign and domestic public and private sectors to act as a source of information on investment opportunities and on Laws and regulations governing the investment.

Furthermore, external assistance should extend beyond investment to cover development expenditures more broadly defined (including expenditures to improve health and education, to protect the environment, and to maintain and rehabilitate infrastructure). Donors should shift their assistance increasingly from financing projects to financing a "time-slice" of sectoral or subsectoral programs (World bank, 1990).

A high level of resource transfer may lead to an aid dependency syndrome and a decline in domestic savings, overvalued exchange rate and high wage rates. With a proper policy framework, however, such transfers can be associated with high growth rates and an appropriate wage and exchange rates. (As the case of Korea). Thus, there is urgent need for an articulated policy on foreign development assistance to guide the country in the negotiation, coordination and effective utilization of foreign assistance. This will ensure that all external resource should be put in productive ventures that can generate enough foreign exchange to each repayment.

Technical Assistance will still be required. Experts in engineering, agronomy and finance will continue to be in short supply. This assistance must be increasingly used to build local capacity and institutions. This is in addition to building up local capabilities and increasing the supply of qualified people through training programs. Reversing the brain drain from Africa should be part of such program.

The key challenge for the national economic policy in the field of domestic resource mobilization should be to pursue a more flexible interest rate policy, which will substantially improve the functioning of the financial system. However, sustained success in mobilizing financial savings from savers can be achieved if financial institutions offer appropriate savings and credit instruments suited to the needs of the larger part of the population.

Furthermore, the informal financial sector have great role to play in resource mobilization given their large size. To this end, a Nigerian credit union should be opened at the national level, with membership open to all rotting savings and credit associations. The appropriate link strategy between the union and other financial institutions should be one of mutual assimilation. Such integration should embody the attractive features of the informal sector and the organized financial system.

Precisely, the macro-economic policy mix for raising the level of domestic savings needs to cover a wide range of institutional policy measures, comprising greater financial intermediation, control of inflation through effective supply side aggregate demand management, positive and realistic rates of interest, tax incentives for personal savings, and integration of savings mobilization in macro-economic policies at the organizational level.

Furthermore, we recommend the implementation of differential export subsidies, removal of trade barriers and encouragement of barter trade, to boost Nigeria's export trade sector and consequently improving her balance of payments. There should also be specific export incentives for processed exports and carefully – selected primary commodities so as to ensure increased diversification, reduced vulnerability to fluctuations in commodity prices, export growth and increased export earnings (Economic Commission for Africa, 1991).

At this juncture, we must note that given the rate of progress in the development and applications of computer technology as a tool for policy analysis, economic projections and the overall management of the economy; there is a great need to adequately equip econometric research centers with update versions of mathematical programming software packages and latest computer systems. This is in addition to establishing more of these centers in Nigeria.

Finally, donors must increasingly take on a bigger role to support our national programs and institutions. However, the big increase in external resource inflow to Nigeria during the 1990s that is proposed in this study could be anticipated and would be justifiable if there were confidence that it would lead to sustained growth with equity. This implies that those who have to implement the difficult economic structural changes in this decade or more should actually believe in the policies and feel that the changes are of their own making (i.e. being dedicated, sincere and patriotic in discharging their responsibilities). In this way, fresh foreign resource assistance will ensure a successful implementation of the nation's economic reform and adjustment programmes and thereby enhancing the country's economic recovery from its current depressed state.

6.3 LIMITATIONS AND INDICATIONS FOR FURTHER RESEARCH

The findings of this study tend to suggest that the dominant resource constraint in domestic resource gap, which therefore is the minimum foreign resource assistance needed for the country's development. Given an improved database, disaggregated sectoral studies can be carried out with the view to determine each sector's resource requirements.

It may also be necessary to focus on the micro dimensions of the problem, which is completely ignored in the present study. This may require a cost-benefit analysis to examine major key projects that were or are to be financed from external resources. On the other hand, the scope of the investigation could focus on sectional or regional analysis. There should also be studies on how effective utilization of these resources can e ensured.

Finally, considerations should be given to the use of analytical framework that involves optimization process or input – output methods. This can be used in studying the impact of the growth of a particular sector on the rest of the economy, given their minimum sectoral resource requirements. In other words, a more rigorous quantitative analysis should employ an inter-sectoral input-output models designed for determining minimum resource requirements and based on specific sets of structural relations. This can be integrated in a broader context of General Equilibrium Models and Global Models.

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APPENDIX

STATISTICAL DATA

1	2	3	4	5	6	7
Y	**GDP_t:**	**SDG_t**	**IDG_t:**	**XGS_t:**	**MGS_t:**	**PX_t:**
Year	**Gross Domestic Product at Factor Cost (₦ Millions)**	**Gross Domestic Saving (₦ Millions)**	**Gross Domestic Investment (₦ Millions)**	**Exports of Goods and NF Services (₦ Millions)**	**Imports of Goods and NF Services (₦ Millions)**	**Export Price, FOB (1987 = 100)**
1970	**960**	**1240**	**1260**	**940**	**960**	**44.2**
1971	**11020**	**1900**	**1850**	**1410**	**1360**	**41.3**
1972	**11780**	**2480**	**2220**	**1520**	**1250**	**39.3**
1973	**13180**	**3250**	**2620**	**2440**	**1810**	**47.0**
1974	**21400**	**6600**	**3170**	**6180**	**2740**	**138.0**
1975	**24980**	**5750**	**5510**	**5270**	**5030**	**122.1**
1976	**31200**	**8530**	**8510**	**6520**	**6570**	**132.0**
19777	**36640**	**9650**	**9920**	**8430**	**8700**	**134.7**
1978	**39210**	**8440**	**9890**	**7110**	**8560**	**119.1**
1979	**46880**	**12030**	**9580**	**10610**	**8160**	**145.3**
1980	**54760**	**16680**	**11570**	**14760**	**9650**	**181.9**
1981	**56600**	**10560**	**12600**	**11360**	**13400**	**196.8**
1982	**60480**	**5810**	**9460**	**8530**	**12360**	**177.9**
1983	**63290**	**5180**	**7420**	**7770**	**10000**	**163.4**

1984	**69950**	**5500**	**4300**	**9420**	**8210**	**163.3**
1985	**78780**	**8720**	**6070**	**11640**	**8990**	**149.7**
1986	**79740**	**6040**	**7920**	**9490**	**11380**	**83.9**
1987	**96400**	**16600**	**11240**	**31960**	**26600**	**100.0**
1988	**131670**	**19920**	**16620**	**34720**	**31420**	**84.8**
1989	**212990**	**45670**	**27270**	**74840**	**56440**	**102.7**

	8	9	10	11	12	13	14
Y:	**NIF_t:**	**GDP_{t-1}:**	**SDG_{t-1}**	**IDG_{t-1}:**	**XGS_{t-1}:**	**MGS_{t-1}:**	**T:**
Year	**Net Inflow of Foreign Exchange (₦ Million)**	**Lagged Gross Domestic Product at Factor Cost (₦ Million)**	**Lagged Gross Domestic Saving (₦ Million)**	**Lagged Gross Domestic Investment (₦ Million)**	**Lagged Export of Goods and NF Services (₦ Million)**	**Lagged Imports of Goods and NF Services (₦ Million)**	**Time Variable**
1970	**-58.6**	**4700**	**520**	**550**	**680**	**700**	**1**
1971	**.128.8**	**9060**	**1240**	**1260**	**940**	**960**	**2**
1972	**39.6**	**11020**	**1900**	**8150**	**1410**	**1360**	**3**
1973	**-174.4**	**11780**	**2480**	**2220**	**1520**	**1250**	**4**
1974	**03102.2**	**13180**	**3250**	**2620**	**2440**	**1810**	**5**
1975	**-157.5**	**21400**	**6600**	**3170**	**6180**	**2740**	**6**
1976	**339.0**	**24980**	**5750**	**5510**	**5270**	**5030**	**7**
1977	**527.2**	**31200**	**8530**	**8580**	**6520**	**6570**	**8**
1978	**1293.6**	**36640**	**9650**	**9920**	**8430**	**8700**	**9**
1979	**1868.9**	**39210**	**8440**	**9890**	**7110**	**8560**	**10**
1980	**-2402.2**	**46880**	**12030**	**9580**	**10610**	**8160**	**11**
1981	**3020.8**	**54760**	**166801**	**1570**	**14760**	**9650**	**12**
1982	**1398.3**	**56560**	**10560**	**12600**	**11360**	**13400**	**13**
1983	**301.3**	**60480**	**5810**	**9640**	**8530**	**12360**	**14**
1984	**-354.9**	**63290**	**5180**	**7420**	**7770**	**10000**	**15**
1985	**-349.1**	**69950**	**5500**	**4300**	**9420**	**8210**	**16**
1986	**784.3**	**78780**	**8720**	**6070**	**11640**	**8990**	**17**
1987	**159.2**	**79740**	**6040**	**7920**	**9490**	**11380**	**18**
1988	**2294.1**	**96400**	**16600**	**11240**	**31960**	**26600**	**19**
1989	**-8727.8**	**131670**	**19920**	**16620**	**34720**	**31420**	**20**