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FOREIGN CAPITAL INFLOWS AND ECONOMIC DEVELOPMENT:

THE EXPERIENCE OF THE SUDAN 1958 - 1979

by

IBRAHIM HASSAN YASSIN

A thesis submitted for the degree of
Doctor of Philosophy
in the University of Kent at Canterbury

September 1983

To My Wife AMNA and
Our Daughter NAZICK

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*Ibrahim H. Yassin
Keynes College
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ABSTRACT

The thesis contributes to the empirical literature on foreign aid and economic development in developing countries by examining the experience of the Sudan over the period 1958 - 1979.

After describing the size and structure of foreign inflows received by the Sudan, the concessional or grant element of contracted official loans is calculated. Then the excess cost of tying the assistance by end use and/or by source is quantified and related to the aid component of loans (or the benefit) in order to determine the value or net worth of the assistance.

At the macrolevel, the analysis concentrates on the impact of capital imports to the Sudan on the rate of domestic saving, capital formation and the rate of economic growth. This is followed by an inquiry into the indebtedness of the Sudan and the repayments of current outstanding debt.

An attempt is also made to compare the financing of economic development in the Sudan by means of aid and/or trade through their direct and indirect effects on the development process.

The study shows that not only has the average grant element of the loans contracted by the Sudan been low but also the real worth has been negated by the high excess costs of tying. Furthermore, great proportions of the foreign resources have been used for consumption rather than investment which was biased towards infrastructure. Therefore, the contribution of the inflows to the rate of domestic saving and economic growth was negligible. Consequently, the Sudan faced a serious debt servicing problem which has so far led to one renegotiation.

CHAPTER ONE

INTRODUCTION

This thesis is concerned with the problem of financing the economic development of the Sudan by means of external resources. Theoretically, when domestic saving is insufficient for investment requirements, a developing country can finance development by running an import surplus and rely on foreign capital inflows to finance the deficit on the balance of payments.⁽¹⁾ Foreign borrowing also alleviates the situation where the growth of a developing country is constrained by its inability to import the required inputs due to foreign exchange shortages. As such, foreign resources may play a dual role in the development process, as a supplement to domestic savings on the one hand, and as a supplement to the foreign exchange on the other, if the inability to import is the dominant constraint on growth.

Conceptually, the provision of foreign aid or economic assistance requires that the explicit transfers of foreign real resources to less developed countries (LDCs) should involve some degree of concession or favourable terms relative to those available commercially; otherwise no "gift" element will be implied. On the other hand, business transactions, private trade and capital movements between developed and underdeveloped countries are normally motivated by private returns to both exporters and importers. Obviously, this is different from the provision of resources on concessionary terms which cannot be offered by a private business source if the profitability of the

(1) See e.g., A.P. Thirlwall, **Financing Economic Development**, Macmillan, London, 1976.

business is to be maintained. Nevertheless, private capital movements may yield substantial benefits to LDCs, depending on the context in which they will be used. There are also various ways by which economic assistance can be provided without involving explicit transfer of resources. For example, the special import quotas and tariff reductions which are often granted on preferential basis to LDCs increase the relative purchasing power of the exports of these countries, implying a concessionary transfer of resources. Despite the significant actual and potential impact of these means of providing resources, they are not effectively recognized within the categories of foreign aid.

So far, the few previous studies on the Sudan as well as the Sudanese planning apparatus attempted to estimate foreign capital requirements in order to achieve a target rate of growth, assuming a given dominant constraint on growth.⁽¹⁾ This thesis is not concerned with estimating foreign capital requirements in the aggregate "per se" but rather with assessing the worth and the value of the official foreign capital inflows actually received by the Sudan during the period 1958-1979. It examines the quality of these flows and their contribution towards the economic development of the country using published time series data for the Sudan which includes both contracted loans and actually received or disbursed flows. As in many developing countries, data on aid flows to the Sudan are difficult to obtain but substantial efforts were made in order to gather the maximum possible

(1) See, for example, R. F. Wynn, "Foreign Capital, Trade and Savings: The Sudan 1955-71", **The Malayan Economic Review**, Vol. XXV, No. 2, October 1980, pp. 14-29.

information from the various available Sudanese sources. Sometimes resort has been also made to international statistics to supplement the Sudanese data whenever it was felt necessary. Also, an extensive effort was made to minimize the errors and provide reasonably reliable data. However, despite these efforts, the "exact" magnitude of Sudanese foreign borrowing, undisbursed loans and indebtedness remains ambiguous. This is because exact figures on military aid, private borrowing, technical assistance and pure grants are very scarce and this is why these forms of inflows are excluded from this study. Nevertheless, public borrowing from private sources is included in the total official foreign inflows. However, private foreign inflows (such as private capital and private foreign investment) are considered only at the macrolevel. Therefore, the study largely concentrates on official public borrowing by the Sudan where loans either originate on a bilateral or multilateral basis or form private sources. The analytical framework involves eight chapters which are now briefly discussed.

Following this introductory chapter, Chapter Two describes the nature and size of the actual annual amounts of official foreign capital inflows received by the Sudan throughout the period 1958-1979 as well as the associated debt servicing payments. The Sudanese outstanding official debt is also investigated in relation to the country's foreign exchange earnings. In addition, the projections of foreign capital inflows made by the different Sudanese development plans during the period under consideration are also examined and compared with the actual flows received. The pattern of resource allocation of these plans

is also scrutinized in order to trace the distribution of foreign resources among the different sectors of the economy.

The Third chapter is concerned with measuring the grant element in international assistance in order to assess the quality of the official loans contracted by the Sudan during the period under examination. Donor countries (or sources) are then ranked according to the concessionality of their aid programmes. Furthermore, some related issues such as the accessibility of the different sectors of the economy to "contracted" loans and the relevance of economic criteria in aid allocation are also explored. This is followed by an estimation of the excess costs of tying in the fourth chapter. After discussing the means and ways by which donors tie aid and distinguishing between the various costs to recipients, the excess costs of tying eight Sudanese projects by end use and by source are quantified using a cost difference approach. These projects include textiles, well drilling, printing and bookbinding, road building and telecommunication; all of which are chosen according to the availability of data. Then the estimated excess cost of tying is related to the grant element, in order to determine the value or net worth of the tied credits, by developing a "shadow grant element" approach.

In a macroeconomic framework, the fifth chapter examines the role of official and private foreign capital inflows in accelerating the rate of economic growth of the Sudan during the period under consideration. By exploring the contemporary theories of aid and growth and the controversy over the statistical

evidence on the relationship between foreign and domestic savings, the contribution of official and private foreign inflows towards Sudanese domestic total consumption, capital formation and the rate of economic growth are quantified.

Chapter Six examines the indebtedness of the Sudan during the period 1958-1979 and assesses "the critical rate of interest", which could have allowed the Sudanese debts to grow in proportion to the country's national income, as well as the time at which the debt reaches its "maximal" level where the determinants of both of them are based on the estimates and projections of the Six Year Plan⁽¹⁾ on the one hand, and on the estimates made from historical data on the other. In addition, this chapter provides estimates for the required annual amount of debt servicing to pay off the Sudanese debts outstanding by the end of 1979 over a period of fifty years and relates the prospects of debt servicing capacity to the current stagnation of the world economy. It also examines the potential impact of inflation in alleviating the debt burden to the Sudan.

Chapter Seven investigates critically the conventional arguments which are frequently invoked in the practice of comparing the contribution of trade and aid to the development effort through their direct effects in order to examine the economic rationale of the slogan "trade, not aid" as this slogan has become increasingly important to LDCs during the past two development decades. Moreover, the indirect effects in this

(1) Ministry of National Planning, **The Six Year Plan of Economic and Social Development 1977/78 - 1982/83**, Khartoum, April 1977.

comparison are also explored by considering the productivity of aid and trade as well as the contribution of both sources towards domestic savings and economic growth in the Sudan. Then the contribution of individual donor countries (or group of countries) in terms of total resource transfers (aid plus trade) is also examined.

In the final chapter, the results and conclusions emerging from the preceding chapters are integrated and an overall conclusion which reflects the impact of official foreign assistance on the Sudanese economic development is reached. Consequently, some policy implications and recommendations are derived.

CHAPTER TWO

PAST PATTERNS AND TRENDS OF FOREIGN CAPITAL INFLOWS TO THE SUDAN (1958 - 1979)

2.1. General Introduction

Foreign capital inflows, in their widest form, include pure grants and soft loans, short and long term borrowing, technical and commodity assistance and relief and military supplies. They can originate either from public (official) or private sources. Official flows can either be offered on bilateral basis from foreign governments or on a multilateral basis through international lending institutions (as will be further discussed in the next chapter). The major types of private flows are private foreign investment, export credits and, of recent importance, the issuing of private bonds in international capital markets especially in the Eurocurrency market.

The purpose of this chapter is three fold. First, the size and nature of official foreign resources that the Sudan had received during the period 1958 - 1979 is to be distinguished. Next, the trend of debt-servicing will be examined although an extended discussion will be contained in Chapter Six. In addition, the magnitude of outstanding official debt will be considered in order to investigate the reasons behind the current deteriorating debt situation in the Sudan. Finally, the projected aid allocations of the Sudanese development plans will be also studied in order to compare the projected plans' figures with the actual amount of foreign resources received.

2.2. An Historical Background

(i) Foreign Borrowing Since 1945: A Summary

During the pre-independence period (i.e. the period preceding 1956), the Sudan relied entirely on its domestic resources in financing existing small infrastructural programmes. The two development programmes of 1946-1950 and 1951-1955, which were implemented under the "Condominium Rule", were fully financed from the budget surplus.⁽¹⁾ The major projects undertaken within these programmes were the development of the Railway; the expansion of the Gezira Scheme in order to grow cotton; and the construction of a harbour named as Port Sudan to facilitate the transport of cotton from the Gezira area to textile factories in Britain.

A few years after independence, more ambitious development policies made it necessary to resort to foreign finance. The rapid rise in investment in successive Sudanese development plans has increased this dependence on foreign sources of finance. In most cases, the inflows of foreign resources to the Sudan have been tied by end use and or by source. According to our estimates, about 83% of the total contracted loans during the period 1958-1979 were tied to specific uses (projects or otherwise), assuming these uses reflect the desirable programmes of donors.⁽²⁾ However,

(1) See e.g., Abdalla Abdul Wahab, "The Financing of Economic Development in the Sudan: The Public Sector", in **Public Administration and Economic Development**, Proceedings of the Round Table Conference, Khartoum: March 1961.

(2) These calculations are based on data collected from the Bank of Sudan as well as the Sudanese Ministries of National Planning, and Finance and National Economy.

some of the Arab countries have sometimes offered a small amount of bilateral cash loans, albeit on hard terms relative to the other forms of assistance. Other such loans, when needed, have been sought from private sources on even harder terms.

(ii) **Preparation of Aid Requirements**

The procedure by which the Sudan determines its foreign resource requirements has remained unchanged since independence. The Ministry of National Planning,⁽¹⁾ in conjunction with the other governmental ministries and departments, when preparing a list of projects, calculate the import content of these projects. This procedure is usually conducted during the preliminary preparations for a development plan. Then the preliminary list of projects is continuously revised, according to the size of the annual development budgets, and a final decision is reached as to which project will be considered at each stage of the plan. However, the decision of choosing between projects is not based on clearly defined cost-benefit analysis.

These proposed projects contribute to different sectors of the economy and they are normally grouped on a sectoral basis. For each sector, studies are to be made in order to ascertain the domestic availability of capital goods, raw-materials and manpower. The figures arrived at are compared with the total

(1) This Ministry has had several names over time. It started in the early 1960s as an Economic Planning Secretariat and changed to a Department of Planning within what was then the Ministry of Finance and Economics. In 1969 a separate Ministry of Planning was established and renamed The Planning Commission, then the Ministry of Planning and National Economy. Despite these changes in names, the functions remained the same.

requirements of the projects for each sector. Thus, sectoral resource gaps are identified which add up to the total foreign resource requirements as reflected by the import bill of these projects.

Finally, international organizations and various bilateral sources will be contacted for borrowing. The actual flow of funds usually commences after the officials of both sides exchange assessment visits. This stage is important because only at this time will some of the listed projects be selected depending on which project the donors prefer to finance.⁽¹⁾

2.3. The Magnitude and Distribution of Loans to the Sudan (1958-1979)

The Sudan had received sizeable amounts of foreign resources during the period 1958-1979. From Table [2.1], it can be calculated that the gross receipts of foreign capital inflows during the whole period amount to L.S 880.8 million while the debt service payments account for L.S 468.3 million. Thus the sum of L.S 412.5 million is the net receipts of official foreign resources over this period.

(1) For a discussion of the general problems that may be associated with this project approach, see e.g., R.F. Mikesell, **The Economics of Foreign Aid**, Weidenfeld and Nicolson, London, 1968; and the Pearson Report, **Parteners in Development**, Report of the Commission on International Development, Pall Mall Press, London, 1969.

Table [2.1]: Actual Receipts of Official Net Foreign Resources, Outstanding Debt, GDP and Exports: 1958 - 1979 (in L.S million)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year	Gross actual official inflows	Debt service (principal + interest)	Net foreign capital inflows (1) - (2)	Total outstanding debt		G.D.P.*	Export proceeds	[(3)/(6)] %	Debt service ratio [(2)/(7)]%
				Excluding IMF obligations	Including IMF obligations				
1958	14.7	8.3	6.4	10.4	n.a	346.2	51.1	1.8	16.2
1959	7.6	0.6	7.0	12.7	"	349.6	60.9	2.0	1.0
1960	13.5	5.4	8.1	15.2	"	386.8	63.4	2.1	8.5
1961	15.5	3.2	12.3	19.7	"	420.0	62.2	2.9	5.1
1962	15.7	4.1	11.6	22.5	"	456.2	79.0	2.5	5.2
1963	14.3	5.4	8.9	30.3	"	464.1	78.7	1.9	6.9
1964	17.0	5.5	11.5	38.1	"	476.8	68.9	2.4	8.0
1965	23.0	14.7	8.3	52.7	"	496.9	67.9	1.7	21.6
1966	26.0	15.3	10.7	61.0	73.5	497.5	70.7	2.2	21.6
1967	26.0	16.7	9.3	70.1	87.2	536.1	74.6	1.7	22.4
1968	12.3	6.8	5.5	75.1	95.1	583.3	85.6	1.0	7.9
1969	17.8	10.6	7.2	91.3	109.3	585.1	86.2	1.2	12.3
1970	12.8	16.5	-3.7	98.9	110.5	652.5	103.9	-	15.9
1971	10.8	22.4	-11.6	89.9	100.6	752.1	114.4	-	19.6
1972	36.4	27.5	8.9	103.6	119.2	876.8	124.4	1.0	22.1
1973	28.9	24.3	4.6	107.9	119.1	1246.2	152.2	0.4	16.0
1974	137.6	36.4	101.2	225.5	254.3	1510.8	122.0	6.7	29.8
1975	73.0	51.4	21.6	318.9	371.7	1681.0	152.5	1.3	33.7
1976	53.4	52.5	0.9	339.8	394.9	1954.8	193.0	0.05	27.2
1977	26.5	38.2	-11.7	356.4	403.6	2011.7	230.2	-	16.6
1978	68.0	46.8	21.2	359.1	432.9	2426.4	202.2	0.9	23.1
1979	230.0	55.7	174.3	489.7	617.7	2784.4	232.7	6.3	23.9

Source: The Bank of Sudan, Ministry of National Planning and Department of Statistics.

n.a = not available.

* GDP figures in the Sudan were reported on the basis of fiscal years after 1966 and in order to convert them, on a calendar year basis, they have been averaged.

(i) **The Debt Service Ratio and Debt Service Payments**

The conventional debt service ratio refers to the proportion of foreign exchange that will be absorbed by servicing foreign debts (amortization and interest) from the proceeds of exports of goods and services.⁽¹⁾ This ratio is frequently used as an indicator in assessing the creditworthiness of borrowers and their proneness to default. The higher the ratio, the greater is likely to be the pressure of debt servicing on the debtor's economy. This ratio is also a useful indicator of the short run rigidity in the borrower's balance of payments. A high ratio implies a considerable short run rigidity and reflects the degree of pressure that debtor countries might be exposed to especially in periods when their foreign exchange earnings show a sharp decline.

As can be observed from **Table [2.1]**, annual debt servicing payments have been increasing over time and reached L.S 55.7 million in 1979. This trend shows an average annual growth rate of 16%.⁽²⁾ The position of the Sudan in 1977 relative to some selected developing debtor countries is shown in **Table [2.2]**. The magnitude of total debt services paid by the Sudan in 1977 - both in absolute terms and as a per cent of GNP - was low and it ranks second to Bangladesh which is at the bottom of the table. In relative terms, however, the debt service ratio was very high in

(1) For more details, see e.g., D. Avramovic, et.al., **Economic Growth and External Debt**, Johns Hopkins Press, Baltimore, 1964, Chapter IV.

(2) The trend approach by which the growth rates of debt servicing and total outstanding debt are calculated, as well as the estimated coefficients, are reported in Appendix (2.1).

Table [2.2]: Total Debt Service by Income Group and Some Selected Debtors in 1977.

The Country	Total Debt service \$ million	% of GNP	Debt Service Ratio
Low Income	5170	12.5	13
Indonesia	1371	3.3	12
Egypt	1058	2.6	23
India	935	2.3	11
Least Developed Countries	715	1.7	11
Guinea	155	0.4	52
Sudan	136	0.3	16
Bangladesh	83	0.2	12
Low middle-income	7115	17.2	10
Korea	1254	3.0	9
Nigeria	735	1.8	6
Upper middle-income	17587	42.7	24
Brazil	6330	15.4	46
Mexico	5219	12.7	52
Higher Income	3619	8.8	8
Spain	1598	3.9	9
Greece	866	2.1	15
Sub-total	33491	81.2	15
O.P.E.C. Countries	7736	18.8	6
Iran	1987	4.8	7
Algeria	1407	3.4	21
Total	41227	100.0	11

Source: O.E.C.D., *Development Co-operation*, 1979 Review, O.E.C.D., Paris, 1979, p.96.

the Sudan and it ranks the sixth out of the fifteen randomly selected debtors. It is also clear from **Table [2.1]** that the debt service ratio in the Sudan has started rising rapidly particularly since 1974. This shows the potential strains of debt service payments on the Sudan's balance of payments.

The apparent low repayment capacity of the Sudanese economy could be largely attributed to the fluctuations of export earnings in comparison to the increasing size of borrowing which makes it difficult to contain borrowing within the debt servicing capacity of the country. This is why sometimes past debts had to be repaid by further borrowing abroad as will become clear during the exposition.

Finally, it is interesting to notice that some of the debtor countries, included in **Table [2.2]**, seem to ensure the position of their balance of payments by transferring the debt servicing burden to another recipient country in the form of bilateral hard term loans i.e. these debtors become donors themselves. For example, Spain offered the Sudan in 1975 a loan which worth L.S 2.6 million at 8% interest rate, 5 years length of maturity and 2 years grace period.⁽¹⁾ However, this practice is risky because the borrower may default.

(ii) **Outstanding External Public Debt**

As depicted by **Table [2.1]**, total outstanding external public debt in the Sudan has reached L.S 489.7 million in 1979 excluding the IMF purchase obligations and L.S 617.7 million when

(1) Bank of Sudan, **Annual Report**, Khartoum, 1975.

these obligations are included. The total outstanding debt (excluding the IMF obligations due to unavailable data as **Table [2.1]** shows) has been growing steadily over time at an average annual growth rate of 19% (see Appendix (2.1) i.e. growing faster than debt service payments. Also, the growth of outstanding debt exceeds the growth rate of exports, as exports were estimated to be growing at an average annual rate of 8% during the same period 1958-1979.⁽¹⁾ Given the low repayment capacity of the country in comparison to the increasing size of its external public debt, the Sudan started facing serious debt problems in the late 1970s. In November 1979, the Sudan asked for rescheduling of debts according to the "Paris Club" convention and signed a "debt relief" agreement with foreign creditors in order to settle the overdue obligations while another agreement was sought with foreign commercial banks to reschedule commercial debts.⁽²⁾ The financial situation in the Sudan during this period was described by *The Times* as follows: "Sudan, which has not paid a penny off its foreign bank debts since 1978 faces a financial crisis despite a \$600m.(£250m.) rescue package put up by major banks and a grant of new funds by the IMF. It is not known whether the country's 200 other creditors will support the rescue plan."⁽³⁾

The distribution of total outstanding external public debt among various donor sources during the period 1978 - 1980 is given by **Table [2.3]**. It can be noticed that the Sudan is highly indebted to the Arab countries (in particular Saudi Arabia and

(1) See the regression results contained in Appendix (2.1).

(2) Bank of Sudan, **Annual Report**, Khartoum, 1979.

(3) **The Times**, Thursday, 28th. October 1980.

Table [2.3]: The Sudanese Outstanding External Official Debt by Source (in L.S million): 1978-1980.

Creditor countries and institutions	1978	1979	1980
International Bank for Reconstruction and Development (IBRD)	16.8	13.4	8.9
International Development Association (IDA)	22.2	22.7	24.7
Trust Fund	-	12.0	23.7
African Development Bank	1.2	1.2	1.2
West Germany	15.4	15.4	15.3
United Kingdom	3.5	2.2	0.8
Italy	1.6	1.6	1.4
U.S.A.	7.4	14.2	6.4
First Chicago and U.B.A.F.	6.7	6.7	11.7
Union Bank of Switzerland	0.2	0.2	0.2
Societe Commercial Central (Wheat Facility)	1.1	1.1	1.1
Eurodollar Loan	59.6	54.1	47.5
O.P.E.C.	2.6	2.6	2.6
Kuwait	70.0	66.7	61.2
Saudi Arabia	49.8	185.8	199.6
Libya	6.1	6.1	6.1
Algeria	0.1	0.1	0.1
A.R. of Egypt	0.6	0.6	0.6
Abu Dhabi	21.1	31.1	21.1
Quatar	4.9	4.9	4.9
Iraq	21.6	21.6	21.6
Arab Investment Company	1.1	1.1	1.1
Arab Development Fund	24.1	15.8	21.8
Iran	15.2	15.2	15.2
Yugoslavia	0.6	0.6	0.5
Czechoslovakia	0.3	0.3	0.3
East Germany	0.7	0.7	0.6
People's Republic of China	2.1	2.1	2.1
U.S.S.R.	-	1.5	-
Total	359.1	501.7*	502.8

Source: The Bank of Sudan.

* Total outstanding debt reached this figure in 1979 because of the L.S 12.0 million of the Trust Fund which is excluded in column (4) of Table [2.1].

Kuwait) as well as international organizations. It can also be seen that the total outstanding debt has increased over these two years by 40%. However, most of the loans contracted during this period were intended to redress the position of the balance of payments, to meet previous debt obligations and to finance the rescheduling plan. For instance, in 1979, a sum of L.S 15.8 million was offered by the Arab Monetary Fund for redressing the balance of payments. In the same year, a loan of \$200 million (L.S 80.0 million) was contracted with Saudi Arabia and a sum of L.S 12.1 million was drawn to meet the repayments of the 1974 Eurodollar loan which was worth \$200 million.⁽¹⁾

(iii) Causes of the Financial Crisis

The financial crisis and the serious situation of indebtedness that have developed in the Sudan in the late 1970s were caused primarily by the accumulation of short term hard loans as these loans seemed to be indispensable for the country as far as foreign borrowing is concerned. The accumulation of short term debts in a country where the debt servicing capacity tends to be low makes the occurrence of financial crisis quite predictable unless such debts can still be met by further borrowing. As can be seen from **Table [2.4]**, which explains the terms and maturity structure of the Sudanese external public debt in 1980, the Sudan was heavily dependant on loans with a maturity that ranges between 5 to 10 years associated with an average rate of interest in the range of 3 to 6 per cent, or more. Out of the total official debt

(1) Bank of Sudan, **Annual Report**, 1979, p. 54.

of L.S 502.8 million, the loans of maturity between 5 to 10 years have contributed 65.4% of total debt. The share of loans with maturity between 5 and 10 years, associated with a rate of interest in the range of 3% or more, accounts for 64.9% of the total outstanding official debt. The contribution of all the "nonconcessional" loans of maturity between 1 and 10 years, at the various levels of interest rates, amounts to 70.5% of total debt. This is why the grant element of the Sudanese contracted loans tends to be low, reflecting the nonconcessional nature of the loans that have been offered. According to the estimates reported in the next chapter, the annual average grant element of the overall contracted loans during the period 1958-1979 was 23% at a discount rate based on the annual average rate of interest

Table [2.4]: The Sudanese Terms and Maturity Structure of External Official Debt (in L.S million): The End of Dec. 1980.

Annual Rate of Interest (in %)	Original Maturity (in Years)				Total
	1-5	5-10	10-15	More than 15	
0 - 1	-	0.1	12.1	52.5	64.7
1 - 3	12.9	2.5	16.9	29.0	61.3
3 - 6	7.4	187.4	19.3	15.1	229.2
more than 6	5.2	138.8	0.5	3.1	147.6
Total	25.5	328.8	48.8	99.7	502.8

Source: The Bank of Sudan.

prevailing at the Eurodollar and U.K. money markets, which is the assumed world market rate of interest at which the Sudan might have had to borrow in the absence of aid.

(iv) **The Attempts Made to Solve the Problem of Debt**

The debt rescheduling agreements of 1979 seem to be the immediate measures that have been taken by the Sudanese authorities in order to solve the current problem of debt. Rescheduling is not in itself a "cure" to the problem but it is rather a temporary period of "debt relief" to allow the country to readjust and recover in order to pay its debts, or in Myrdal's words: "a more considerate way of managing a bankruptcy".⁽¹⁾

In support of the rescheduling plan, the government tried to impose a ceiling on nonconcessional foreign public borrowing by restricting the size of short-term hard loans. It has been declared that the size of public and publicly guaranteed foreign borrowing in the range of 1 to 10 years will be limited to \$200 million during the year ending 30th June 1980⁽²⁾. Within this overall limit, the newly contracted loans in the maturity range of 1 to 5 years will be limited to \$50 million for the same period. This ceiling excludes the new contracts that may result from refinancing or rescheduling of existing debts. In this connection, it can be argued that the principle of restricting the size of nonconcessional loans has not been properly followed for two reasons. First, the \$200 million ceiling is too high to serve the

(1) See G. Myrdal, **The Challenge of World Poverty: A World Anti-Poverty Programme in Action**, Pantheon Books, New York, 1970, pp. 291-292.

(2) The records of the Sudanese Ministry of Finance and National Economy.

purpose of this restriction as the newly contracted nonconcessional loans, according to this ceiling, will constitute about 16% of the total existing official debt. Secondly, the exclusion of the loans required for rescheduling or refinancing the existing debt from this ceiling not only means that the ceiling can be exceeded at any time for these reasons but also that the current debts cannot be paid without further borrowing on any terms.

In brief, the Sudanese authorities have concentrated on rescheduling as a solution to the current (and perhaps the future) problem of debt, relying on further borrowing to meet the rescheduling obligations without considering a parallel plan which investigates how the country can generate its own income in order to be able to pay partly for foreign debts and partly for enhancing domestic investment.

2.4 The Contribution of Foreign Resources Towards Financing the Sudanese Development Plans

In this section the different Sudanese development plans since independence will be briefly discussed in order to show how far they have been dependant on foreign resources for finance and how much was actually received. Furthermore, the basis of the projections of foreign capital inflows made by each plan will be investigated.

(i) The Ten Year Plan (1960/61 - 1970/71)

This plan was based on forward planning techniques and therefore concentrated on the macroframework of the economy with the core being the balance of payments projections. The next step

Table [2.5]: The Projected Finance of The Ten Year Plan
(1960/61 - 1970/71)

Source	L.S. million	% of total investment
Gross planned investment	565.4	100.0
Financed by:		
(1) Domestic resources:		
(a) Public sector savings	219.7	38.8
(b) Private sector savings	196.2	34.7
Total	415.9	73.5
(2) External sources:		
(i) Public sector capital inflow	117.1	20.7
(ii) Private sector capital inflow	26.4	4.7
(iii) Drawings from the country's own foreign exchange reserves	6.0	1.1
Total	149.5	26.5

Source: The Ten Year Plan, *op.cit.*, pp. 68-75.

of the plan involved the breakdown of the GDP target into sectoral value added targets and hence a sectoral allocation of total public and private investment was made. The final step considered individual projects and a small number of production targets associated with these projects.

The plan aimed at a target rate of growth of 5.2% per annum over the plan's period⁽¹⁾. As shown by **Table [2.5]**, the planned investment to achieve this target rate of growth was estimated to be L.S565.4 million. The contribution of foreign resources towards financing this investment was envisaged to be L.S 149.5 million including L.S 6.0 million depletion of the Sudan's foreign exchange reserves. The share of total foreign resources in financing the plan was projected to constitute 25.4% of total

(1) Ministry of Finance and Economics, **The Ten Year Plan of Economic and Social Development 1960/61 - 1970/71**, Khartoum, 1962.

exchange reserves. The share of total foreign resources in financing the plan was projected to constitute 25.4% of total planned investment.

As for the balance of payments projections, the estimated deficit on current account over the plan's period was to be L.S 302.3 million which meant an excess import bill of L.S 152.8 million had to be accounted for after allowing for the contribution of foreign resources (i.e. L.S 302.3 - 149.5). It was then decided that an import substitution programme should be launched in order to eliminate over the plan's period the excess amount of the import bill. Regarding the capital account, the plan had underestimated the debt servicing payments because the planners were optimistic about obtaining long term loans on soft terms. This becomes clear when comparing planned foreign resource requirements with the inflows actually received. The plan projected that the official gross foreign capital inflows would amount to L.S 171.4 million, while the debt service payments would account for L.S 54.3 million. Therefore, the net official foreign inflows would reach L.S 117.1 million. In addition, the net inflow of private capital was expected to contribute L.S 26.4 million and thus the total net foreign inflows would be L.S 143.5 million. Adding to this sum the L.S 6.0 million that would be drawn from the Sudan's foreign exchange reserves, gives the projected amount of foreign inflows (i.e. L.S 149.5 million) which matches with the cumulative deficit on current account.

On the other hand, it can be calculated from **Table [2.1]** that the actual amount of net foreign capital inflows received during

the plan's period fell markedly short of expectations, deviating below the plan's projections by L.S 47.1 million. This proportion constituted about 40% of the total projected foreign capital inflows. Furthermore, the Sudan faced serious difficulties in acquiring adequate soft long term loans throughout the plan's period and therefore resorted to short term borrowing. As a result, there was a sharp increase in debt servicing payments in particular during the second half of the plan's period as demonstrated by **Table [2.1]**. The increase in the debt servicing payments accompanied by the relative decline in the inflow of foreign resources, especially during the final years of the plan, led to a net "outflow" of resources in 1970 and 1971. These were the main factors which contributed to the unsuccessful implementation of the plan.

(ii) The Five Year Plan (1970/71 - 1974/75)

The pattern of allocation regarding this plan reflected an increased emphasis on better utilization of existing capacity and large investments in the directly productive sectors in comparison with the emphasis of the previous plan. This plan started with the usual survey which covered retrospectively the five years preceding the plan's period. This time the survey focussed primarily on efficiency and utilization of productive capacity already existing in the economy and revealed that the productive capacity of each individual sector was inefficiently utilized. The plan advocated a set of measures in order to promote efficiency and utilization of productive capacity. The next step involved an

investigation of the financial situation in order to decide upon the volume of additional investment that the public and private sector could undertake, taking into consideration projects proposed by the different ministries and departments of the government. The choice of the type and size of investment projects was determined by using the criterion of export promotion. Hence, it was expected that the newly selected projects, as well as those already existing, would contribute directly to their own revenues and also contribute to the revenue of the central government through the additional revenue that would be generated by the additional investment. Then the contribution of the domestic resources towards financing the plan was assessed and the foreign resource requirements were consequently estimated. Finally, the plan arrived at its primary target and the annual rate of growth of the GDP was determined to be 7.6%.⁽¹⁾

As can be observed from **Table [2.6]**, the plan launched a public investment programme which totalled L.S 215.0 million. Out of this amount, public domestic savings were expected to contribute 49% and the remaining 51% was to be contributed by the external resources. There was no resort to deficit finance. Although a value of L.S 170.0 million was estimated to constitute the private domestic investment, no reference was made as to how the private sector could obtain the necessary funds to finance this investment.

(1) Ministry of Planning, **The Five Year Plan of Economic and Social Development 1970/71 - 1974/75**, Khartoum, 1970.

The projections of the balance of payments on current account showed a cumulative surplus of L.S 11.7 million over the plan's period. This surplus was envisaged to be the net result of a cumulative surplus in the balance of trade amounting to L.S 65.0 million and a cumulative deficit in the balance of invisibles reaching L.S 53.3 million.

Table [2.6]: Planned and Actual Sources of Finance During 1970 - 1975 (L.S million)

Source	1970-75 Planned	% of total	1970-75 Actual	% of total
Public sector's gross investment	215.0	100	250.0	100
Financed by:				
(1) Public sector savings	105.0	49	-	-
(2) Deficit finance	-	-	169.7	68
(3) External sources	110.0	51	80.3	32

Source: The Five Year Plan, *op. cit*, and the Ministry of Planning, **Foreign Aid and Loans Section.**

However, when the socialist programme under which this plan was launched was abandoned after July 1971, the plan was amended. In November 1972, the plan was supplemented with a five year Interim Programme of Action which changed the pattern of investment and the scope of projects as demonstrated by **Table [2.7]**. It can be seen that the share of the transport sector in total planned investment was increased from 14% to 34% while the share of agriculture was reduced from 38% to 23%. As such, the

emphasis of the new programme appeared to be on distributional and mobility problems.

Although the expenditure on investment, in fact, exceeded the planned figure owing to the amendment of the plan, nevertheless, the actual receipts of foreign resources fell short of the original projected amount by 27% as can be estimated from **Table [2.6]**. Furthermore, the public sector failed to generate the expected amount of domestic savings for finance and consequently most of the investment expenditure had to be financed by borrowing from the domestic banking system i.e. contrary to what the plan envisaged, resort had to be made to the deficit finance.

Table [2.7]: Amendments in Planned Investment During 1970-1975
(L.S million)

Sector	1970-75 Original	%	1970-75 Amended	%
Agriculture & Irrigation	80.7	38	155.8	23
Industry and Mining	36.4	17	117.8	18
Power	13.8	6	37.2	6
Transport & Communications	29.6	14	228.7	34
Services	42.4	20	92.4	14
Miscellaneous	13.1	5	34.3	5
Total	215.0	100	666.2	100

Source: The Six Year Plan, **op. cit.**, vol. 1, p.4.

Moreover, the increased import requirements of the revised plan and the sharp increase in import prices as opposed to the stagnation of cotton exports resulted in a large deficit in the

balance of trade amounting to L.S 122.2 million in 1974/75, although a surplus of L.S 20.0 million was originally projected at this terminal year of the plan. In addition, the debt servicing liability over the plan's period increased at an average rate of 25.5% a year because resort had to be made to short term borrowing, in the absence of concessional loans, in order to meet the new requirements of the amended investment programme. Furthermore, the country's export earnings (tangible and intangible) increased at a rate of only 9.4% a year during the same period. The resulting high debt service ratio indicated the need for obtaining special terms on foreign borrowing in future as well as the necessity of promoting export earnings in order to keep the debt servicing liability manageable.

However, the distinctive feature of the original Five Year Plan was that the projected foreign resource requirements were intended to contribute to productive investments and the associated foreign debts were expected to be paid off from the returns on these investments, whereas other Sudanese development plans did not indicate that such policies or measures had been considered.

(iii) The Six Year Plan (1977/78 - 1982/83)

This plan followed the same approach and technique of the Ten Year Plan. The primary target of the Six Year Plan was to achieve an average annual growth rate of GDP of 7.5% at 1976/77 constant prices. As demonstrated by **Table [2.8]**, planned investment reached L.S 2670.0 million. Out of this sum, L.S 1570.0 million was

allocated in the public sector and L.S 1100.0 million in the private sector. The share of domestic resources in financing total planned investment was expected to account for 48% and the remaining 52% should be shared by external resources. In the public sector, domestic resources were expected to finance 47% and the external resources 53% of gross planned investment. As for the private sector, investment was expected to be financed equally by domestic and foreign resources half each. The external resources for the private sector would partly consist of private foreign investment - mainly in the form of joint ventures - and partly of foreign loans.

The total inflow of external resources during the plan's period was expected to be L.S 1785.0 million out of which around L.S 400.0 million would be absorbed by the debt servicing liability leaving a net inflow of L.S 1385.0 million. More than 90% of this inflow would be directed towards financing merchandise imports needed for development purposes.⁽¹⁾ However, the optimism about the availability of foreign finance for the public sector's investment was encouraged by the already contracted loans and grants (that should be disbursed during the plan's period) in addition to the agreements with some of the Arab countries for investment and agricultural development. Although it was not certain that the required amount of foreign inflows would be fully secured, the planners were not expecting external finance to pose a problem because some of the foreign inflows were expected to be contracted in the form of commodity aid or cash loans which

(1) See, the Six Year Plan, *ibid.*, p. 79.

implied a resort to borrowing on hard terms.

Regarding external finance for the private sector, out of the allocated L.S 550.0 million, the sum of L.S 200.0 million was

Table [2.8]: The Projected Finance of The Six Year Plan During 1977-83; (L.S million)

Source	Public sector		Private sector*		Total Investment	
	Amount	% of total	Amount	% of total	Amount	% of total
Gross planned investment	1570	59	1100	41	2670	100
Financed by						
(1) Domestic resources	735	28	550	20	1285	48
(a) Public savings	450	17	-	-	450	17
(b) Private savings	-	-	550	20	550	20
(c) Deficit financing	285	11	-	-	285	11
(2) External Resources	835	31	550	20	1385	52

Source: The Six Year Plan, *op.cit.*, p. 55.

* This sector includes the 'semi-private' sector, financed jointly by the Arab countries, the Sudanese private sector and the government of the Sudan.

expected to be contributed by the Arab countries in the form of investment in commercial ventures that would be financed by the Arab countries (50%), the Sudanese private sector (25%) and the government of the Sudan (25%). The remaining gap of L.S 350.0 million was expected to be filled partially by other joint-venture investments arranged by the private sector itself and partially by foreign loans guaranteed by the government.

(iv) **The (1977/78-1982/83) Plan's Projections of the Balance of Payments**

According to the current Six Year Plan, the future outlook of the balance of payments is uncertain. Projections are highly tentative and need to be revised annually.

As can be seen from **Table [2.9]**, about 70% of the envisaged persistent deficit arises from visible trade while 25% of the total deficit would be contributed by debt servicing payments. Therefore, the contribution of the invisible deficit (excluding interest payments on foreign loans) would be limited to 5% of the total deficit. As further illustrated by **Table [2.10]**, the balance of payments projections concede a cumulative deficit over the plan's period of L.S 1757.0 million. The size of this deficit, however, is roughly equivalent to the gross required foreign capital inflows. It can be noticed from **Table [2.9]** that the requirements for net external resources according to the balance of payments projections fell short by L.S 58.0 million from the originally envisaged amount for financing planned investment as shown by **Table [2.8]**. This sum of money may have been retained by the planners in order to safeguard against shortages of foreign finance during the implementation of the plan owing to their uncertain projections of the balance of payments components.

Regarding the debt servicing liability, it is expected to continue growing in absolute terms, over the plan's period. In relative terms, however, the debt service ratio is expected to decline from about 28% in the base year to 21% in the terminal year of the plan. Nevertheless, unless the growth of export

earnings materializes at the projected rate, the problem of debt servicing is likely to be aggravated.

Table [2.9]:The Balance of Payments Projections During the Six Year Plan in 1976/77 Constant Prices: (L.S million)

	1976/77	77/78	78/79	79/80	80/81	81/82	82/83	Total
The Current Account:-	Provisional							(77/78 - 82/83)
Total Exports	180	200	222	246	273	303	337	1581
Total Imports	332	365	402	442	486	535	588	2818
Visible Trade	-152	-165	-180	-196	-213	-232	-251	-1237
Receipts	-34	-38	-42	-47	-52	-58	-63	-300
Payments	66	72	77	84	91	99	109	532
(Interest)	(20)	(21)	(22)	(23)	(24)	(25)	(27)	(142)
Invisible Trade	-32	-34	-35	-37	-39	-41	-46	-232
The Balance of Trade	-184	-199	-215	-233	-252	-273	-297	-1469
The Capital Account:-								
Repayments	40	40	44	47	47	53	57	288
Balance of Payments	-224	-239	-259	-280	-299	-326	-354	-1757
(gross capital inflow required)								
Net inflow of External resources (Gross inflow minus debt servicing)	164	178	193	210	228	248	270	1327

Source: The Six Year Plan, *op.cit.*, p. 74.

Table [2.10]: Total Projected Deficit During The Six Year Plan
(L.S million)

	1976/77	77/78	78/79	79/80	80/81	81/82	82/83	Total (77/78- 82/83)
Trade deficit	152	165	180	196	213	232	251	1237
Invisible deficit (excluding interest on foreign loans)	12	13	13	14	15	16	19	90
Debt servicing	60	61	66	70	71	78	84	430
Total deficit	244	239	259	280	299	326	354	1757

Source: The Six Year Plan, *op. cit.*, p.73.

As for the actual amount of external resources received during the first years of the plan, it was not as much as expected. In fact in 1977 the net inflow of foreign resources was negative (Table [2.1]). Furthermore, the high figure of external capital received in 1979 did not fully contribute to the finance of the plan because, as mentioned earlier, most of the contracted loans during this year were devoted to redressing the position of the balance of payments and to paying off some of the past debts whether directly or by meeting the rescheduling obligations. However, the performance of the plan cannot be fully assessed because it is currently in operation. In practice it has been phased, or replaced by a Three Year Development Programme.

(v) Pattern of Resource Allocation by the Three Plans

The question of resource allocation by the three development

plans has been left to this stage because the analysis in this chapter is primarily concerned with the finance side of the plans. Nevertheless, given the system by which investment projects are actually selected in Sudanese development planning, the pattern of resource allocation reflects to a large extent the nature of investment preferable by donor countries. For this reason the pattern of resource allocation adopted by the three plans will be discussed very briefly because the distribution of contracted foreign resources (during the period 1958-1979) among the different sectors of the economy as well the economic criteria of aid allocation to recipient countries will be considered in more detail in the next chapter.

It is clear from Table [2.11] that the Five Year Plan stressed investment in more productive activities (such as agriculture and industry) relative to the other two plans which emphasized investment in infrastructure and social overheads (such as transport and social services) with the Six Year Plan giving more attention to the expansion of public utilities (such as power) in order to develop the rural sector. As stated in the Six Year Plan, the extension of social services, electricity, roads and other programmes to remote regions would promote rural development and integrate the traditional agricultural sector.⁽¹⁾ This pattern of resource allocation was consistent with the policies of the World Bank (and its affiliates the IBRD and the

(1) The Six Year Plan, *op. cit.*, p.47.

the IDA) and the nature of projects that the World Bank may accept to finance. It has been the rule of the World Bank only to meet the foreign exchange costs of infrastructural projects until recently, when allowance has been made for small scale rural development projects.⁽¹⁾ Whether these policies were appropriate for the Sudan's development strategy or not, one cannot give a comprehensive answer in this chapter.

Table [2.11]: Sectoral Shares in Total Planned Public Investment in the Three Development Plans.

Sector	Ten Year Plan (1961/62 - 1970/71) (%)	Five Year Plan (1970/71 - 1974/75) (%)	Six Year Plan (1977/78 - 1982/83) (%)
Agriculture and Irrigation	32	38	32
Industry, Mining and Power	13	23	25
Transport and Communications	22	14	24
Social Services & Administration	31	20	19
Others	2	5	-
Total	100	100	100

Source: compiled from the three development plans.

(1) For more details, see e.g., B.Hurni, "The New-Style Lending Policy of the World Bank", **Journal of World Trade Law**, Vol. 13, No.6, November/December 1979, pp. 523-34.

2.5 Some Concluding Remarks

This Chapter has analysed the size and nature of foreign capital inflows to the Sudan during the period 1958 - 1979. The analysis reveals that the project approach which the Sudanese authorities follow in order to select investment projects tends to be biased towards import intensive activities for which, in the absence of concessional borrowing, the required imports had to be purchased by resorting to short-term loans on hard terms. This is reflected by the share of nonconcessional loans (with obvious low grant elements) which accounts for 70.5% of the total current debt outstanding by the end of 1980. The apparent impact on the balance of payments and the pressures to which the economy might be exposed as a result of increasing debts, have been further explained by the behaviour of the debt service ratio. This ratio has shown an increasing trend throughout the period under consideration indicating that the gap between debt servicing payments and exports has been widened. As a result, the country has been confronted with a critical situation of indebtedness and sought in 1979 to reschedule its overdue external debts. As the analysis suggests, the rescheduling plan is most likely to be financed by further borrowing.

The other factors which contributed to the problem of indebtedness have operated through the Sudanese experience in development planning. It seems that when foreign capital requirements are to be calculated, the planners tend to underestimate the debt servicing payments because they are always optimistic about getting long term soft loans. On the other hand,

they also overestimate or, in most cases, ignore the the country's ability to contribute towards meeting the debt servicing obligations. This is why it is difficult to qualify the planners' estimates of foreign resource requirements as being based on a dominant domestic resource or foreign exchange gap. Furthermore, no Sudanese development plan has explicitly maintained which of the two gaps is dominant and what measures are to be taken to fill it. However, the Six Year Plan envisaged the saving ratio to rise progressively (although it has not been mentioned how and why) over the perspective plan period (i.e. until 1994/95) and to catch up with the investment ratio i.e. implying a dominance of a saving - investment gap. Indeed, when the dual gap analysis was applied to the estimates of the Six Year Plan, it has been found that the plan seems to envisage a cumulative domestic resource and trade gaps of roughly equal magnitude with the domestic resource gap just dominant.⁽¹⁾ Therefore, in order to estimate the requirements of foreign capital inflows properly and to consider the possibility of repaying these flows from the returns on planned investment, the development plan should make first an appropriate assessment of the constraints on growth. As the analysis shows, apart from the Five Year Plan which directed foreign capital towards productive investment and expected this investment to contribute to the repayment of debts, the other two development plans gave little attention to investment in directly productive projects and to the problem of servicing the debt.

(1) See, M. El Shibly and A.P. Thirlwall, "Dual Gap Analysis for the Sudan", *World Development*, Vol. 9, No. 2, February 1981, pp. 193-200.

Moreover, the analysis reveals that there was a consistent discrepancy between the actual receipts of foreign resources and the amount projected by each development plan. Furthermore, it has been always difficult to contract the expected concessional loans and so short term borrowing as well as deficit financing have become inevitable. Despite the fact that the Sudanese development plans were proved to be mistaken in their anticipation of the size of concessional loans, the planners still depend on massive foreign capital for finance.

Appendix (2.1)

Estimates of the Growth Rates of Debt Servicing Payments, Outstanding Public Debt and Exports.

The growth rates for debt servicing payments (D), outstanding public debt (P) and exports (X) may be calculated by using Ordinary Least Squares (OLS). The rate of growth (g) is estimated by regressing all the values of the three variables concerned (within the relevant period) against time by using the following conventional exponential form:

$$\text{Log } N_t = a + b_t + e_t \quad (2.1)$$

where N is the variable under consideration, e is the error term, b is the slope coefficient and t is time. Then the OLS estimate of the growth rate can be determined as: $g = (\text{antilog } b) - 1$.⁽¹⁾ Accordingly, the regression coefficients on the estimated variables are obtained as:

$$(1) \quad \text{Log } D = .834 + .153536 t \quad R^2 = .7758 \\ (3.44) \quad (8.32) \quad \text{DW} = 2.159$$

where the antilog of .153536 = 1.1659, and therefore $g_1 = .17$

$$(2) \quad \text{Log } P = 2.289 + .177612 t \quad R^2 = .9745 \\ (27.11) \quad (27.63) \quad \text{DW} = 1.898$$

where the antilog of .177612 = 1.1943, and therefore $g_2 = .19$

$$(3) \quad \text{Log } X = 3.777 t + .0724373 t \quad R^2 = .9352 \\ (25.01) \quad (7.06) \quad \text{DW} = 1.980$$

when the antilog of .0724373 = 1.07512, and therefore $g_3 = .08$

As can be seen from these estimates, this method generates results almost identical to those generated by using the conventional exponential form i.e. by using equation (2.1) where $g = b$ instead of $g = (\text{antilog } b) - 1$.

(1) This method is often used by the World Bank. See e.g., World Bank, **World Development Report**, Washington D.C., 1979, p. 175.

CHAPTER THREE

THE GRANT ELEMENT OR THE AID COMPONENT OF INTERNATIONAL ASSISTANCE

3.1. Introduction

This chapter is primarily concerned with the measurement of the grant element in foreign assistance in order to assess the quality of the various loans contracted by the Sudan on different terms. Although it involves many conceptual complications, the grant element method has the advantage of expressing the nature of loans (whether soft or hard) across donor sources or of a whole loan programme in terms of a single parameter. Thus it enables ranking the donor sources by their aid programmes and helps distinguishing the desirable forms of credits as well as the corresponding sources.

The grant element in this analysis will be estimated from the recipient's point of view and hence it should reflect the embodied benefit or the concessional element in the official foreign capital inflows that have been contracted by the Sudan during the period 1958-1979. These inflows include bilateral loans, multilateral aid and borrowing from private sources.

After defining the relevant concepts to this chapter and identifying the analytical framework, the empirical results will be reported. Furthermore, some related issues such as the economic criteria for aid allocation to recipient countries as well as the accessibility of the domestic sectors of the economy to foreign capital inflows will be investigated.

3.2. Definitions

(a) External Public Borrowing

External public borrowing can be defined as the acceptance by a government (or a government agency) of real or financial resources from an external government (or an international lending institution) with the obligation of repaying such resources to the donor body at one or several future dates. This definition implies that the repayments can be regarded as equivalent to negative borrowing (i.e. lending). Furthermore, this definition allows the incorporation of the different forms of official loans contracted by the Sudan which originated from foreign governments on a bilateral basis, multilateral aid channelled through international organizations and borrowing from private sources i.e. the short term loans may be included.

Within this definition, the terms foreign capital inflows, foreign aid, capital imports, foreign resources, foreign assistance and so on will be used synonymously.

(b) Official Development Assistance (ODA)

Within the category of the official loans, the Development Assistance Committee (DAC) of the Organization for Economic Co-operation and Development (OECD) has distinguished the amount of ODA from other forms. The ODA can be arrived at by excluding from the total flows all those which can be regarded as either nonconcessional or not primarily directed towards promoting economic development. Then five principal forms of ODA were specified namely: grants (including technical assistance); concessionary loans (repayable in lenders' or borrowers'

currency); contribution in kind; suppliers' credits and reparations payments.

The ODA was intended to be concessional in nature as set out in the 1965 DAC recommendation on financial terms and conditions which was revised in the supplement of 1969.⁽¹⁾ The objective of these recommendations was to obtain an increase in the volume of aid by members as well as to soften the terms of borrowing. The minimum concessional element test which was set by the DAC requires that for at least 85% of the ODA, in each particular transaction, a grant element of 61% must be maintained, in contrast to the 1965 standard which required only 53%. Also, the ratio of ODA to GNP should be 0.7% for donors.

In the DAC calculations, the grant element is usually arrived at by applying a uniform discount rate of 10% which reflects the net rate of return on capital in the economies of the DAC/OECD countries.⁽²⁾ Although the ODA is a useful term as an absolute concept, it will be of limited applicability in this study because the 61% grant element target cannot be a necessary and sufficient condition for the concessionality of borrowing since the ODA was arbitrarily defined to include a wide range of loans the concessionality of which may sometimes be questioned.⁽³⁾ This is

(1) See, OECD, **Development Co-operation**, Report from the Chairman, 1969 Review, OECD, Paris, 1969.

(2) Another discount rate which is sometimes applicable besides this one, is the average long term borrowing rate of each individual donor of the DAC/OECD.

(3) For a further discussion, see e.g., Danny M. Leipziger, "Lending Versus Giving: The Economics of Foreign Assistance", **World Development**, Vol. 11, No. 4, April 1983, pp. 329-335.

why the DAC admitted that sometimes the use of subjective measures in distinguishing an ODA form would be inevitable in a number of cases when the classification of a type of a transaction as development assistance is particularly difficult.⁽¹⁾ Therefore, in this chapter the term "concessionary" will rather be used in relative terms when the terms of borrowing are to be compared among donors. Thus aid will be analysed in order to rank donors according to their aid programmes judging by the performance of donors which offer the highest grant element instead of simply using an ODA grant element target. Nevertheless, the ODA will be relevant when a distinction is to be made as to which DAC/OECD donors have met the 1969 grant element target when they offered loans to the Sudan.

(c) The Grant Element or Aid Component of Loans

It has been widely accepted that when loans are made on concessionary terms, they contain an aid or grant element which can be estimated in cash terms and regarded as a cost (or benefit) associated with such loans. The grant element is thus defined as the difference between the nominal value of the loan (or its face value) and the present value of all future repayments (amortization and interest) discounted by a proper discount rate.

3.3 The Factors Affecting the Value of the Grant Element

The rate of interest attached to the loan is the major determinant of the grant element. There is also the grace period which lies between the date of disbursement and the date at which

(1) OECD, 1969 Review, *op.cit.*, Annex 1, p. 242.

repayments start. Usually during this period only the interest is paid and given the maturity date of a loan, a longer grace period would mean a lower present value of future discounted repayments and thus a higher grant element. Another factor is the maturity period by the end of which the repayments terminate. The longer the maturity period, the longer the concessionary interest rate is enjoyed and the less the present value of the discounted future repayments i.e. the higher the grant element.

Now, given the terms of borrowing, what would be the appropriate discount rate to use and how should the concessionary element be estimated?

3.4 The Discount Rate

The choice of a proper discount rate is essential because it determines the present value of the future repayments of loans (as distinct from outright grants) and hence the equivalence of different flows offered on different terms. However, the application of a uniform discount rate in the absence of an integrated perfect capital market will be extremely difficult if it is to consider both the cost to the lenders as well as the benefit to the borrowers, as these may differ in imperfect capital markets.

Since most of the methods that have been used in the calculations of the grant element were conducted from the donor's point of view, in order to show how the real burden of aid was shared between donors, such methods have chosen discount rates that reflected the cost of aid to donors. For instance, in this

respect the discount methods used by Pincus⁽¹⁾, and Little and Clifford⁽²⁾ were similar in nature. The approach of Pincus concentrates on the opportunity cost of funds in the donor country as reflected by the discount rate in the estimates of the real cost of aid to the donor. This approach cannot be applied unless it is assumed that loans are offered by sacrificing domestic investment. The opportunity cost is measured by choosing alternative discount rates from a spectrum of the donor's own long term rate of interest to the profit rate earned by private foreign investors in the donor country itself. The former would presumably measure the returns that the donor might have earned if the sum was invested domestically instead of being given abroad as aid while the latter would reflect the cost that the recipient country might have had to pay in order to borrow foreign funds in the absence of aid. Accordingly, Pincus chose discount rates of 5%, 5.75% and 10%. The marginal domestic long-term return on capital, which reflects the opportunity cost of capital, was approximated by the 5% while the 5.75% resembled the international lending rate which, in the absence of a private market for long term lending to developing countries, was approximated by the World Bank lending rate. Finally the 10% approximated to the long term rate that private investors would have earned by investing in the donor countries under consideration.

In the case of the method of Little and Clifford, the

(1) See, J.A. Pincus, "The Cost of Foreign Aid", **Review of Economics and Statistics**, Vol. XLV, No. 4, November 1963, pp. 360-367.

(2) See, I.M.D. Little and J. Clifford, **International Aid**, George Allen and Unwin, London, 1965.

discount rates were also given three values (6%, 10% and 15%): 6% to approximate the international lending rate (this time the IBRD lending rate), the 10% to approximate the rate which private investors might earn and the 15% to account for the lender's risk i.e. to make an allowance for the possibility that many of the offered loans will not be repaid according to the schedule agreed upon.

Elsewhere, it has been argued that when the grant element of loans is calculated from the donor's point of view, the appropriate discount rate would be that rate of interest at which the donor might have had to borrow in the capital market in order to provide the loan.⁽¹⁾ But this implies no real resource transfer from the donor country unless the counterpart of the financial flow is provided by the donor, for instance, in terms of an export surplus or any other form. This is why Bhagwati⁽²⁾ has criticized this approach and argued that it would be unrealistic to assume that donors would borrow on commercial terms the whole amount of funds that will be lent to another recipient as aid. Thus, he suggested that the procedure by which the real cost of foreign assistance is to be calculated must be adjusted to allow for the possibility of part of the total flow being borrowed commercially and the rest being provided from the domestic resources of the donor itself. Accordingly, when estimating the real cost of

(1) See, A.P. Thirlwall, **Growth and Development with Special Reference to Developing Economies**, 2nd. ed., Macmillan, London, 1978, p. 311.

(2) J. Bhagwati, "Alternative Estimates of the Real Cost of Aid", in P. Streeten (ed.), **Unfashionable Economics**, Weidenfeld and Nicolson, London, 1970.

foreign aid in this sense, the proportion of the flow that would be borrowed on commercial terms, must be identified. Since it is difficult to assess this proportion for different loans from different sources, it can be assumed to constitute, say, 25%, 50% or 75% of the total amount of the loan.

From the recipient's point of view, studies on the grant element of international assistance are infrequent and they usually tend to employ arbitrary discount rates.⁽¹⁾ It is clear that the choice of a proper discount rate cannot be made with any precision especially if it is to deal with the complicated problem of assessing the terms of borrowing. However, the specification of the objective of the calculations becomes an important factor in making at least plausible assumptions for the choice of a discount rate (or rates).

Since the objective of this chapter is to estimate the grant element from the recipient's point of view, it becomes essential therefore to define a "world's market rate of interest" in order to ascertain how much below that rate aid has been given i.e. to consider the rate at which the recipient country (or the Sudan) might have had to borrow in the absence of aid. It will be assumed that any interest rate which prevails in the biggest sophisticated capital markets in some advanced industrial countries would suffice. Hence, this rate⁽²⁾ is approximated by the prevailing

(1) See e.g., M.A. Mahmood, "An Estimation of the Grant Element in Foreign Aid", **Pakistan Development Review**, Vol. XVI, No 1, Spring 1977, pp. 1-16.

(2) Data on these interest rates was obtained from the IMF, **International Financial Statistics**, various issues.

annual average interest rate of the Eurodollar and U.K. money markets throughout the period 1958-1979. In addition, the overall average of these rates during the whole period tends to be around 7.5% (i.e. approximately 8%) which is also used as a uniform discount rate for comparison purposes because when the rate of discount is constant, any change in the grant element can be attributed only to changes in the terms of borrowing. Although this 8% will overestimate the values of the grant element due to rounding especially in the earlier period when the rates of interest were low and may underestimate them towards the end of the period, yet when also discounting by the prevailing average interest rates in each year, the values of the grant element will not really be affected. However, this 8% is retained because it also coincides with the average annual rate of growth of consumption in the Sudan, during the same period, which helps in assessing the "resource transfer" as will be clear during the exposition. Furthermore, the standard 10% discount rate of the DAC/OECD is also used in order to examine which members have met the 1969 ODA target.

On the other hand, it may be also useful to examine the net benefit or worth of loans as valued by the recipient country in a cost-benefit sense i.e. the resource transfer as distinct from the grant element. The grant element as a notional figure does not correspond to an actual flow of funds or goods and services nor in any clear way can it be related to the net benefit of aid to the recipient country. It is usually calculated on the basis of aid commitments by donors rather than in terms of actual flow of funds

because this is more convenient, as will be discussed later in this chapter. Nevertheless, by assuming that contracted loans will contribute to investment and/or consumption in the recipient country (although they might finance other uses such as paying off past debts), the problem becomes analogous to that of assessing the return on public investment projects. However, treating the problem as one of selection of a social rate of discount, in order to discount the future stream of benefits, is very difficult and much debated.⁽¹⁾

There are several views as to how the social rate of discount should be determined and yet there is no consensus. For instance, it has been suggested that the social rate of discount can be approximated by the market rate of interest because the latter shows the individual's willingness to pay for future consumption.⁽²⁾ This approach is fraught with difficulties major among which is the imperfection of capital markets and the existence of various rates of interests. Furthermore, in order to make rational intertemporal choices, individuals must know something about their life time incomes which cannot be known with certainty. Finally, if the market rate of interest is below the individual's time preference,⁽³⁾ the individual will not be able

(1) For a discussion on the determination of the social rate of discount, see e.g., S.A. Marglin, **Public Investment Criteria**, George Allen and Unwin, London, 1967; and for a good summary of the debate, see e.g., D.W. Pearce, **Cost-Benefit Analysis**, Macmillan, London, 1971.

(2) See e.g., A.P. Thirlwall, **Growth and Development**, *op.cit.*, Chapter 7.

(3) See Thirlwall, *ibid.*, pp. 192-194.

to express a preference for greater capital accumulation without a welfare loss i.e. to save more although the rate of interest is below the rate of time preference.

Another view is that the social rate of discount should be equal to the marginal product of capital in the whole economy.⁽¹⁾ This is because public investment is expected to yield benefits at least equal to the rate of return that can be achieved had these resources been invested privately, which implies a fixed level of investment resources and by investing in one activity another one should be sacrificed or excluded.

Due to the practical difficulty of determining a social rate of discount, several alternatives have been suggested in the literature.⁽²⁾ These alternatives allow the government to make value judgements about the social rate of discount on the basis of its own estimates of the rate of growth of consumption and the rate at which the marginal utility of consumption declines; or to extract it from the choices made in the past. It can also be determined as the internal rate of return defined as the interest rate which would discount the net present value of the project to zero. These suggestions have been closely followed in this chapter.

The average annual growth rate of total consumption in the Sudan during the period 1958-1979 was 8.24% or approximately 8% which is regarded as a proxy for individual's time preference. However, according to the estimates of the International Labour

(1) See Thirlwall, *ibid.*; and also S.A. Marglin, *Public Investment Criteria*, *op.cit.*, Chapter 2.

(2) See e.g., A.P. Thirlwall, *op.cit.*, Chapter 7.

Organization (ILO), for the period 1975-1980, the rates of growth of public and private consumption in the Sudan were found to be 6% and 6.9% respectively.⁽¹⁾ This seems to be compatible with the policy of the Sudanese Six Year Plan which aimed at containing the growth of total consumption within the limit of 6.6% a year.⁽²⁾

An alternative is to determine the internal rate of return of investment in the Sudan by referring to the credit policy of the Bank of Sudan (the central bank) which influences the structure of interest rates. Such a policy reveals a rigid interest structure and largely reflects financial restrictions. Until 1974 the rate of interest ranged between 4% to 5% and in that year it was raised to 6%, then to 8% in 1975 and after that it remained constant. This rate is applied both by the Bank of Sudan itself and by all the commercial banks when dealing with public or private transactions. Further measures will normally be taken by the Bank of Sudan to restrict the size of advances provided by the commercial banks by stipulating the amount of internal funds that will be available for loans. In addition, the Bank of Sudan applies a differential interest rate⁽³⁾ to the borrowing by commercial banks by charging 9% (instead of 8%) or 9.5% for credit

(1) I.L.O., **Growth, Employment and Equity: A Comprehensive Strategy for the Sudan**, ILO, Geneva, 1976, Table 154, p. 518.

(2) The Six Year Plan, *op.cit.*, p. 127.

(3) The details on the structure of the interest rate and the credit policy of the Bank of Sudan were collected from a study published by the Bank of Sudan, **Department of Economic Research**, Khartoum, April 1977; and also the Bank of Sudan, **Annual Report**, 1979.

facilities. This latter rate seems to be more relevant to this chapter because it is independent of further restrictions. Therefore it will be assumed to reflect the internal rate of return on financial investment which will be regarded as approximately 10%.

It appears that three discount rates may be chosen: namely the current annual average interest rate of the Eurodollar and U.K. money markets, 8% and the 10% of the DAC/OECD. The 8% and 10% will play a dual role in the analysis, by entering into the calculations of the grant element as well as in estimating the resource transfer, although in this chapter we are primarily concerned with the former role.⁽¹⁾

3.5 Estimation of the Grant Element of Loans

All the factors which are essential for the calculation of the grant element of international assistance can be incorporated into this formula:⁽²⁾

$$GE = F - \sum_{n=1}^N \frac{P_n}{(1+i)^n} \quad (3.1)$$

where GE is the grant element or aid component of loans, F is the face value of the loan, P_n is the total payment of the principal and interest in year n, N is the maturity of the loan and i is the

(1) Besides these rates, the annual average interest rate of the U.S.A. money markets, which was approximately 5% during the period 1958-1979, is also used as a uniform discount rate which obviously leads to lower grant elements relative to those associated with the uniform discount rates so far obtained.

(2) See, A.P.Thirlwall, Financing Economic Development, *op.cit*, p. 64.

rate of discount. Since P_n comprises interest charges, it can be observed that the lower the interest rate relative to the discount rate and the longer the maturity period, the higher will be the grant element of a loan. Given these factors the grant element can be calculated for different combinations of them in order to find out, for example, by how many years a 1% increase in the interest rate can be offset by a corresponding increase in the grace or maturity periods (or both). To give an illustration, the grant element of a loan of 15 years maturity and 3 years grace period is equivalent to a 16 year loan with no grace period (assuming constant interest and discount rates) or a 20 year loan with interest rate higher by 1% and no grace period (assuming no change in the discount rate). As this sensitivity analysis suggests, the grant element is quite sensitive to small changes in the interest and discount rates while relatively insensitive to variations in the grace and maturity periods because these periods are merely means of providing liquidity.

Assuming a constant stream of debt servicing payment (i.e. the recipient country will surrender a constant annual payment of principal and interest after the grace period during which only the interest will be paid), the grant element can be calculated using formula (3.1) by determining first the "present value" of all future repayments.⁽¹⁾ One way of doing this is by using the "zeta" transformation for discrete time series analysis. This can

(1) Debt servicing payments can also be made at an increasing rate (i.e. in each successive year the repayable instalment increases) or at a decreasing rate over time.

be described by the function $[f(nT)]$ where T is a constant length of time and n is an integer. After transforming this function, the resulting formula that will be applied is ⁽¹⁾

$$PV=rF \left[\left(1-(1+i)^{-G} + (1+r)^{N-G+1} \right) \times \left((1+i)^{-G} - (1+i)^{-N} \right) \right. \\ \left. \div \left((1+r)^{N-G+1} - (1+r) \right) \right] / i \quad (3.2)$$

where PV is the present value of the constant annual instalments of debt servicing on the loan, G is the grace period, r is the annual interest attached to the loan, F , N and i are as defined in formula (3.1). Then the grant element as a per cent of the face value of the loan is simply

$$GE = \left(\frac{F-PV}{F} \right) 100 \quad (3.3)$$

or

$$GE = \left(\frac{1-PV}{F} \right) 100 \quad (3.4)$$

In the literature, several forms of equations and specifications have been suggested for accomplishing the calculations of the grant element. Most of these forms, including formula (3.2), do not deal with the case when the grace period is equal to the maturity period (i.e. $G=N$). This is a serious weakness because some of the terms in the equations used will become zero and this might lead to an infinite result i.e. when a

(1) For the transformation and derivation of this formula, see, Appendix (3.1); and for an elaborate discussion, see, H.L. Beenhakker, **Handbook for the Analysis of Capital Investment**, Greenwood Press, Connecticut, 1976, Appendix 4, pp.332-338.

division by zero is incurred. In addition to that there are also some other limitations regarding these conventional formulae. For instance, the commonly used formula of Ohlin distinguishes between short and long term loans; and the formula which measures the grant element in long term loans operates only when the discount rate is different from the interest rate attached to the loan i.e. when both rates are equal, any loan irrespective to its length of maturity and grace period will yield a zero grant element.⁽¹⁾ But it is clear from formulae (3.3) and (3.4), the grant element will be positive if $PV < F$, equal to zero if $PV = F$ and negative if $PV > F$ i.e. the interest rate is a necessary but not a sufficient determinant of the grant element. The effect of the maturity and grace periods is also important as the length of these periods may counteract any increase in the interest rate attached to the loan and hence maintain the value of the grant element.

Furthermore, when $G=N$, Ohlin's formula (as shown in the footnote below) reduces to $s = (1 - \frac{i}{q})$ and hence overestimates unnecessarily the values of the grant element as illustrated by the

(1) For long term loans with grace periods, Ohlin used this formula

$$s = (1 - \frac{i}{q}) (1 - \frac{e^{-qG} - e^{-qT}}{q(T-G)})$$

where s is the grant element as a per cent of the face value of the loan, i is the rate of interest, q is the discount rate, G is the grace period and T is the maturity period. For short term loans, this approximation applies: $s = \frac{(q-i)T}{2}$. See, G. Ohlin,

Foreign Aid Policies Reconsidered, Development Centre Studies, OECD, Paris, 1966.

examples given in Table [3.1]. (1) Moreover, Ohlin asserts that when the rate of discount is too high, it is possible to use the following "rules of thumb": each concession of one percentage point in the interest rate gives rise to a grant element of 4% of the face value for a 10 year loan; 7% for a 20 year loan; 9% for a 30 year loan and 10% for a 40 year loan.(2)

The attractive feature of the formula used in this chapter is that besides dealing with the different forms of loans, it also tackles the common problem that arises when $G=N$ in a more appropriate manner. This can be done by applying "L'Hospital's Rule" to formula (3.2) and the resulting formula, as derived in Appendix (3.2), that can be used to determine the present value of debt servicing on loans when $G=N$ is:

$$PV = \left[\frac{(1 - (1+i)^{-G} + (1+r)) \times ((1+i)^{-G} \log(1+i))}{(1+r) \log(1+r)} \right] / i \quad (3.5)$$

-
- (1) However, another common limitation which is shared by most of the formulae is that they do not account for the possibility that the rate of interest attached to the loan might be zero (e.g. the formula used by M.A. Mahmood, *op.cit.*). Although the case of a free interest loan very rarely occurs (in which case only the principal will be repaid which is different from the case of an outright grant which will be worth its face value), yet it does not constitute a major problem because in its presence resort can be made to the conventional discount procedure as Hawkins did. See, E.K.Hawkins, *The Principles of Development Aid*, Penguin, Harmondsworth, Middx., 1970.
- (2) cf. G. Ohlin, *Foreign Aid Policies*, *op.cit.*, p.103.

Table [3.1]: A comparison of the Grant Element When the Maturity and the Grace Periods are Equal.

The Terms of borrowing			The grant element using	
Rate of Interest	Maturity Period	Grace Period	Formula (3.5)	Ohlin's Formula
(%)	YEARS		at 10% discount rate	
3.0	8	8	31.5	70
0.75	15	15	59.3	93
5.0	4	4	13.2	50
3.5	5	5	17.7	65
1.0	10	10	40.6	90

Source: own estimates based on data compiled from various issues of the **Annual Report** of the Bank of Sudan and the records of the Sudanese Ministries of 'National Planning', and 'Finance and National Economy'.

In **Table [3.1]**, some values of the grant element obtained using formula (3.5), when $G=N$, are compared with those obtained using Ohlin's form. It is clear that the latter form overestimates the values of the grant element.

3.6 A Critique of the Grant Element Calculation

First, no allowance is made for aid tying which reduces considerably the aid component of international assistance. Theoretically, a discount rate which incorporates the effect of aid tying requires an estimate of the differential price charged for tied goods over their world market prices. In practice, such a discount rate is difficult to ascertain. However, when the excess cost of tying is very high and no concessionary interest rate is attached to the capital flow, the "value" of aid might be

negative.⁽¹⁾

Secondly, the estimates of the grant element also ignore the uncertainty on the part of the recipient country when it starts to pay the interest without actually realizing a real return on capital. This depends upon the nature of the different projects financed by foreign borrowing since the argument pertains to project-aid and in particular those projects with long gestation periods. The provision of a compatible grace period to be associated with the loan will not provide a counter argument in this case because the interest will be paid during the grace period as well.

Finally, the potential problems and serious strains that might be generated in the balance of payments due to the rise in the debt servicing liability are not encountered in this context. The effect on the balance of payments can be demonstrated indirectly by regarding high-interest short-term loans as "no aid" or aid with negative value if the interest rate is higher than the discount rate.⁽²⁾

3.7 The Grant Element to the Sudan Over Time

The behaviour of the grant element of loans to the Sudan over time as well as the factors affecting its size can be traced by working out the respective annual weighted shares of individual loans in the total inflows. This will be done by multiplying the grant element of each loan by the nominal value of the loan and dividing the sum of the product by the total amount of loans

(1) See e.g., A.P. Thirlwall, *Growth and Development*, *op.cit.*, p. 307.

(2) See e.g., J.A. Pincus, *op.cit.*, p. 362.

received in that particular year, which can be expressed as:

$$\sum_{b=1}^B (GE \times F)_b / \sum_{b=1}^B F_b \quad (3.6)$$

where $b=1.....B$ is the number of loans.⁽¹⁾ Similarly, weighted annual values can be calculated for the determinants of the grant element. These values which pertain to the grant element and its determinants are reported in Table [3.3]. To examine the time trend, the grant element will be regressed against time.

3.8 Some Comments On the Data

As stated earlier, the data on foreign loans will be expressed on the basis of aid commitments by donors rather than in terms of actual flow of funds.⁽²⁾ The data are based on contracted loans because exact figures on the terms of borrowing and conditions were not available on the basis of actual flow of funds. In effect, it is assumed that all the contracted loans are going to be disbursed immediately. Thus, when the disbursement takes place at different points of time and in different stages, the alternative uses that the loan might be put to by donors during these lags will effectively be ignored. The undisbursed balance might otherwise be borrowed from other sources during these intervals. However, it is assumed that such investment

-
- (1) The Grant element when multiplied by the amount of loans used in its calculation, is sometimes known as the "grant equivalent" namely in the IBRD calculations.
 - (2) This is why the total annual "contracted" loans during the period 1958-1979, which are reported in Table [3.3], should not necessarily conform with the gross annual foreign capital inflows actually received during the same period as shown in Table [2.1], Chapter Two (section 2.3).

possibilities will be picked up by the discount rate.

Furthermore, the grace period will be reduced considerably if the contracted loans are not disbursed immediately. The effect of this problem on the discounted figures will be minor if the disbursement period is short relative to the maturity period.

Finally, all the foreign loans have been converted into domestic Sudanese pounds according to the prevailing exchange rate when these loans were contracted with foreign lenders in order to avoid the effect of exchange rates and to maintain a consistent analysis.

3.9 Empirical Results for the Sudan 1958 - 1979

The three different forms of the official foreign assistance contracted by the Sudan during the whole period are compiled in Table [3.2]. The share of bilateral assistance in the total inflows was the highest followed by the share of multilateral aid

Table [3.2]: Sources and Size of Official Loans Contracted by the Sudan During the Period 1958 - 1979.

Source of Loans	Total amount (L.S million)	Share in total borrowing (%)
(1) Bilateral agreements	802.76620	66.7
(a) USA and West European countries	245.73118	20.4
(b) Arab countries	432.42502	35.9
(c) East European countries	124.61000	10.4
(2) Multilateral agreements	223.71700	18.6
(3) Borrowing from private sources	176.53000	14.7
Total	1203.01320	100.0

Source: based on data from the same source of Table [3.1].

and then borrowing from private sources. The amount of loans contracted with the Arab countries was the largest and constituted about 36% of the total flows.

On the other hand, **Table [3.3]** reveals that the grant element of contracted Sudanese loans fluctuated greatly over time, as did the terms of borrowing. The overall averages of the grant element, during the period under consideration, are 23%, 31% and 39% at the three discount rates which are based on the interest rates of the Eurodollar and U.K. money markets, 8% and 10% respectively. Regarding the terms of borrowing; the average rate of interest, the length of maturity and the grace period were 4%, 16 years and 6 years respectively.

When the grant element (at the discount rate based on the current annual average interest rate of the Eurodollar and U.K. money markets) is regressed against time (t), it picked a time trend showing a slight improvement. Applying the same trend approach used in the previous chapter,⁽¹⁾ the following results are obtained (with T-statistics in parentheses)

$$\begin{array}{l} \text{Log GE} = 1.21 + .135137t \\ \quad (4.58) \quad (6.70) \end{array} \qquad \begin{array}{l} R^2 = .6917 \\ DW = 2.1012 \end{array}$$

where the antilog of .135137 = 1.14469 and therefore the estimated coefficient is .14. This improvement cannot be attributed to a direct improvement in the terms of borrowing which are determined by a complex set of changing factors⁽²⁾ according to each

(1) cf. Appendix (2.1) in Chapter Two.

(2) See e.g., M. Beenstock, "Political Econometry of Official Development Assistance", **World Development**, Vol. 8, No. 2, February 1980, pp. 137-144.

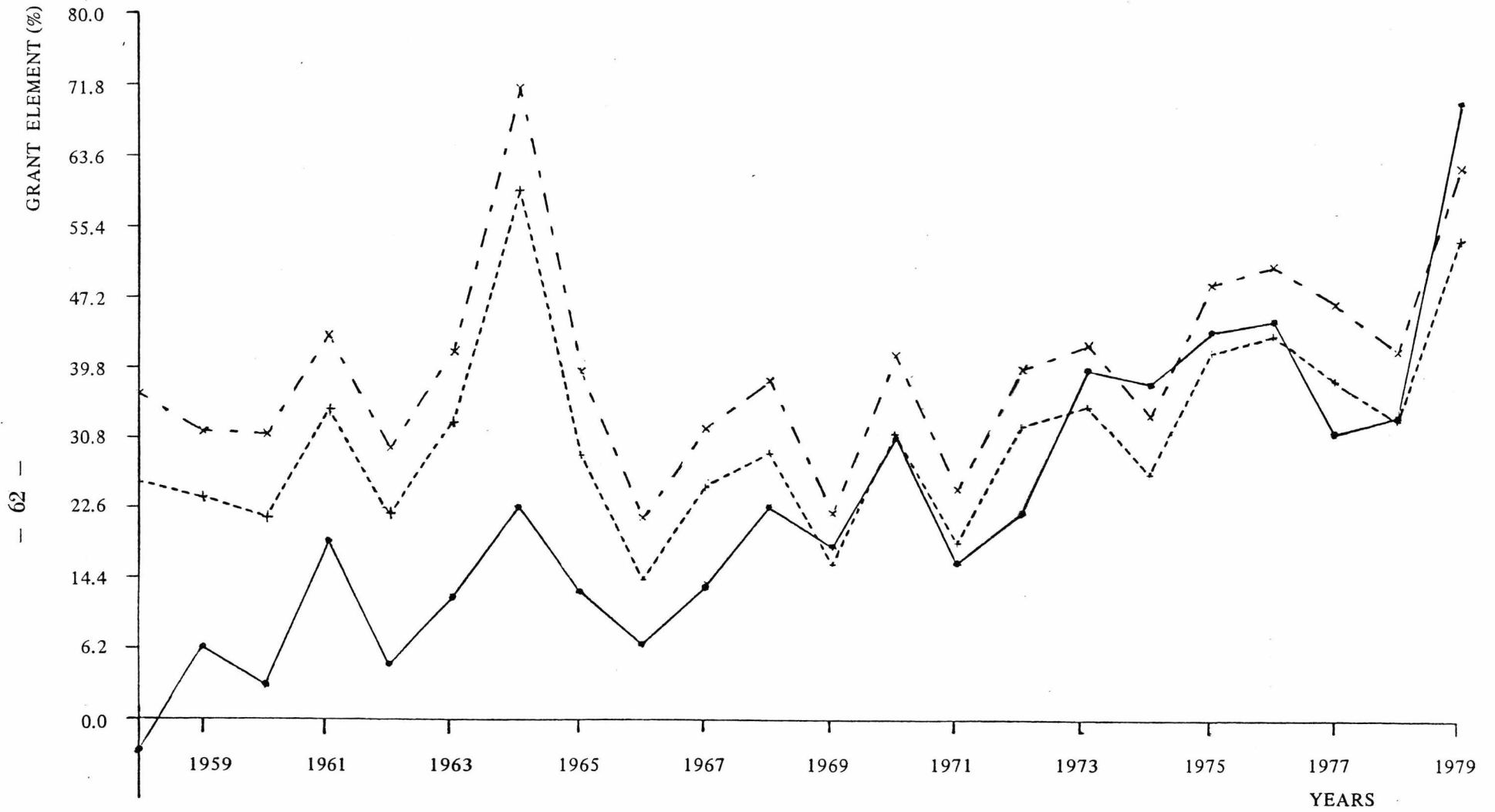
Table [3.3]: Values of the Grant Element of Official Loans and the Terms of Borrowing : A Weighted Annual Average (1958-1979)

Years	total amount of contracted loans L.S million	Average rate of interest (%)	Average repayment period (years)	Average grace period (years)	Average grant element at a discount rate based on		
					current annual average interest rates *	8%	10%
1958	13.6	5.5	17	3	-1.9	25.5	35.9
1959	7.8	3	8	8	6.2	23.7	31.5
1960	9.3	5.6	15	2	1.9	21.3	31.1
1961	31.8	4.2	17	6	18.6	34.1	42.8
1962	9.7	4.2	11	4	4.3	21.8	29.6
1963	7.4	2.7	13	6	12.1	32.6	40.8
1964	.27	5.75	40	10	22.7	59.6	71.5
1965	17.025	4.8	17	4	12.7	28.8	38.6
1966	6.62	4.9	9	3	6.6	14.2	21.4
1967	27.52	3.7	12	3	13.2	25.0	31.9
1968	24.9	3.9	16	4	22.7	29.0	37.5
1969	18.0905	4.7	8	2	18.0	16.0	22.0
1970	24.225	1.9	10	10	30.8	31.3	40.5
1971	46.1	2.6	6	8	16.1	18.5	24.8
1972	64.82668	3	16	5	22.0	32.2	38.9
1973	119.332	3.2	17	7	38.8	34.5	41.7
1974	216.72	4.9	15	5	37.2	26.6	33.5
1975	116.52	3.2	22	6	43.4	40.9	48.4
1976	108.865	3	22	7	44.6	42.9	51.0
1977	85.229	3	18	5	31.5	37.6	46.6
1978	204.91	3.9	16	6	33.4	33.0	41.1
1979	42.26	2.4	32	7	69.9	54.1	62.4
Overall average		4	16	6	23	31	39

Source: Own estimates based on data from the same source of Table [3.1]

* The annual average rate of interest prevailing at the Eurodollar and UK money markets.

Figure (3.1) : THE GRANT ELEMENT AT THE THREE DICOUNT RATES



KEY.

- AT AVERAGE CURRENT INTEREST RATES
- - + - - AT 8% DISCOUNT RATE
- - * - - AT 10% DISCOUNT RATE

individual donor (especially in the case of bilateral assistance), but it could be attributed to the worldwide increases in the rates of interest which led, through time, to an "indirect" improvement in the real grant element. The behaviour of the grant element over time at the three discount rates is further explained by **Figure (3.1)**.

The relation which exists between the grant element and its determining factors is also demonstrated by **Table [3.3]**. The grant element is negatively related to the interest rate and as the latter increases, the former decreases because higher interest rates will render the loans nonconcessionary and hence reduce the grant element in them. On the other hand, the grant element is positively related to the grace and maturity periods and as they increase, the grant element also increases. As stated earlier, this is because long maturities and grace periods are means of providing extra liquidity.

3.10 The Ranking of Donor Countries by Group

The categorization of donors in **Table [3.4]** is self explanatory. The first group includes international lending institutions such as the IBRD and IDA as well as regional development banks such as the African Development Bank. The second group includes Japan and the third group is confined to the Arab countries. The fourth group is composed of the centrally planned economies of Eastern Europe, USSR and China. The fifth group includes foreign commercial banks such as the City Bank as well as

Table [3.4]: The Grant Element of Contracted Official Loans and the Percentage Share of Donors' Group in the Annual Total Flows (1958 - 1979)

Year	(1) International Organizations				(2) USA and Western Europe				(3) Arab Countries				(4) Eastern Europe				(5) Private Sources			
	grant element at discount rates based on			% share of donors in total inflows	grant element at discount rates based on			% share of donors in total inflows	grant element at discount rates based on			% share of donors in total inflows	grant element at discount rates based on			% share of donors in total inflows	grant element at discount rates based on			% share of donors in total inflows
	current interest rates	8%	10%		current interest rates	8%	10%		current interest rates	8%	10%		current interest rates	8%	10%		current interest rates	8%	10%	
1958	-1.9	22.5	35.9	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	6.2	23.7	31.5	100	-	-	-	-
1960	2.0	23.5	34.3	58	1.8	18.2	26.7	42	-	-	-	-	-	-	-	-	-	-	-	-
1961	31.9	51.2	60.8	35.5	9.4	22.5	30.6	39.3	-	-	-	-	14.2	28.0	36.3	25.2	-	-	-	-
1962	-	-	-	-	.32	21.0	29.7	29.9	6.0	22.1	29.6	70.1	-	-	-	-	-	-	-	-
1963	-	-	-	-	12.1	32.6	40.8	100	-	-	-	-	-	-	-	-	-	-	-	-
1964	-	-	-	-	22.7	59.6	71.5	100	-	-	-	-	-	-	-	-	-	-	-	-
1965	12.7	31.2	42.4	63.4	24.7	41.6	52.5	6	12.5	23.6	31.1	10	21.3	20.3	26.5	20.6	-	-	-	-
1966	-	-	-	-	6.6	14.2	21.4	100	-	-	-	-	-	-	-	-	-	-	-	-
1967	-	-	-	-	10.4	18.0	24.0	45.6	25.1	37.3	45.6	23.5	21.9	36.4	44.8	18.2	4.9	9.3	13.2	12.7
1968	31.1	39.9	50.9	53	12.5	18.1	25.7	18.5	13.7	16.3	20.2	28.5	-	-	-	-	-	-	-	-
1969	-	-	-	-	11.7	10.1	14.5	26.5	2.0	.5	4.6	18.8	26.6	24.1	30.9	54.7	-	-	-	-
1970	-	-	-	-	18.9	19.7	27.0	22	-	-	-	-	34.2	34.6	44.3	78	-	-	-	-
1971	9.2	17.6	25.6	2.8	33.8	43.6	52.4	1.5	11.1	8.8	12.9	65.1	26.5	37.9	48.6	30.6	-	-	-	-
1972	57.8	72.2	79.8	11.4	28.9	37.9	44.4	20.5	14.0	23.6	30.5	17.1	11.6	24.6	31.2	48.3	.95	9.6	16.1	2.7
1973	77.0	71.7	79.7	16.7	44.5	39.3	46.8	21.5	25.1	23.0	29.8	21.1	31.0	25.8	33.6	26.5	12.6	8.8	14.6	14.2
1974	75.5	64.2	71.9	8.6	42.2	34.6	42.3	17.1	37.8	25.2	33.2	15.7	-	-	-	-	9.7	2.4	7.1	58.6
1975	74.8	72.2	79.8	20.9	47.5	45.2	52.3	26.2	31.5	28.9	37.1	45.3	-	-	-	-	12.7	11.7	14.9	7.6
1976	54.6	52.0	61.2	16.5	73.4	71.6	74.4	24.7	35.5	33.6	42.3	41.8	-	-	-	-	11.8	10.6	16.2	17.0
1977	43.8	56.1	65.9	16.7	9.2	13.5	20.2	3.4	28.9	34.8	43.7	79.9	-	-	-	-	-	-	-	-
1978	69.0	66.4	74.1	18.1	24.1	37.1	46.9	13.4	25.8	23.3	31.2	68.5	-	-	-	-	-	-	-	-
1979	86.2	72.2	79.8	67.2	36.5	17.0	26.7	32.8	-	-	-	-	-	-	-	-	-	-	-	-
	44.6	51.1	59.8		23.8	30.8	38.5		20.7	23.2	30.1		21.5	28.4	36.4		8.8	8.7	12.3	

Source : own calculations based on data from the same source as Table [3.1].

Table [3.5]: The Terms of Borrowing: Donor's Group Classification (1958-1979)

Year	(1) International Organizations			(2) USA and Western Europe			(3) Arab countries			(4) Eastern Europe			(5) Private sources		
	rate of interest (%)	repay period (years)	grace period (years)	rate of interest (%)	repay period (years)	grace period (years)	rate of interest (%)	repay period (years)	grace period (years)	rate of interest (%)	repay period (years)	grace period (years)	rate of interest (%)	repay period (years)	grace period (years)
1958	5.5	17	3	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	3	8	8	-	-	-
1960	6	17	3	5	13	1	-	-	-	-	-	-	-	-	-
1961	3.6	27	8	5.1	10	5	-	-	-	3.5	12	5	-	-	-
1962	-	-	-	4.7	12	4	4	10	4	-	-	-	-	-	-
1963	-	-	-	2.7	13	6	-	-	-	-	-	-	-	-	-
1964	-	-	-	5.75	40	10	-	-	-	-	-	-	-	-	-
1965	5.5	20	4	5.75	15	11	3.5	11	3	3	9	2	-	-	-
1966	-	-	-	4.9	9	3	-	-	-	-	-	-	-	-	-
1967	-	-	-	4.6	9	3	2.1	18	3	2.5	8	2	5	4	4
1968	5.2	24	6	4.7	11	1	.75	5	1	-	-	-	-	-	-
1969	-	-	-	6.1	6	2	8.8	4	1	2.7	10	2	-	-	-
1970	-	-	-	4.7	10	4	-	-	-	1.1	10	12	-	-	-
1971	6	10	4	.75	17	7	3.3	4	5	.75	10	15	-	-	-
1972	.75	40	10	4.1	21	6	3.7	10	6	2.5	10	3	7.9	7	3
1973	.75	39	10	2.6	21	6	5.2	12	4	2.1	9	7	7.4	6	4
1974	1.5	36	9	5	21	6	4.1	10	7	-	-	-	8.5	5	1
1975	.75	40	10	3.6	26	7	4.4	15	4	-	-	-	1	4	2
1976	2.4	26	8	3	27	7	1.1	40	10	-	-	-	6.2	6	3
1977	2.9	34	8	5.7	9	2	2.7	15	5	-	-	-	-	-	-
1978	1.1	36	9	4.1	19	7	4.7	10	5	-	-	-	-	-	-
1979	.75	40	10	5.56	15	1	-	-	-	-	-	-	-	-	-
Overall average	3.1	29	7	4.4	16	5	3.7	13	4	2.4	10	6	6	5	3

Source: own calculations based on data from the same source of Table [3.1].

companies such as the Arab Investment Company.⁽¹⁾

The estimates reported in Table [3.4] and [3.5] confirm that the grant element and the terms of borrowing also varied across donor groups showing an inconsistent and unpredictable pattern. Judging by the overall averages of the grant element, these groups of donors can be ranked according to their aid programmes and those which offer the "softest" terms should be preferred. As such, the International Organizations rank first, then USA and Western Europe, Eastern Europe, the Arab countries and finally private sources. Besides the inter group preference, there can also be an intragroup preference i.e. within the same donor group there are some sources which are preferable to others. For instance, among the International Organizations, the best terms were offered by the IDA (0.75% interest rate, 40 years repayment period and 10 years grace period) and they yield approximately 80% grant element at 10% discount rate. Within the second group, West Germany offered the best terms which were exactly like those of the IDA, followed by Denmark which offered loans at 0.75% interest rate, 24 years maturity period and 10 years grace period with the consequential grant element reaching approximately 67% at 10% discount rate, and thirdly the UK, which offered loans (especially in the 1970s) at 0.75% interest rate, 24 years repayment period and 10 years grace period and hence the grant element reached 61% at the 10% discount rate. This shows that these donors in the

(1) Further information on the break down of this group classification can be obtained from Table [3.9] in Appendix (3.3).

second group have met the DAC/OECD grant element target of 1969.⁽¹⁾ Saudi Arabia among the Arab countries gave loans on relatively better terms (2% interest rate, 15 and 5 years maturity and grace periods respectively) with a grant element approximately 45% at 10% discount rate. Regarding the fourth category, China offered loans on relatively softer terms (0.75% interest rate, 10 years length of maturity and 15 years grace period) with the grant element reaching 50% at a 10% discount rate.⁽²⁾

In general, the terms of bilateral assistance varied over the period under consideration and it seems that each case of a loan agreement was considered by donor countries on its own merits. This implies that the objective function differs between donors as well as within donors and consequently the terms of borrowing vary widely. However, the criteria for the distribution of bilateral assistance are largely a matter for the donor concerned. In practice, they tend to be noneconomic reflecting historical

(1) Generally, the size of the concessional loans remained low over time and therefore it did not greatly affect the grant element. Also, the increasing share of borrowing from private sources in total contracted loans (especially in the 1970s) has further contributed towards lowering the grant element in these loans.

(2) In most of the cases, the repayment of the loans offered by this group can be made in local Sudanese currency with the donor agreeing to buy the Sudan's exports. This was the case in 1970 regarding all the loans contracted with USSR in order to finance the Five Year Plan (1970-1975). This is sometimes called "reciprocal tying" and is practiced by the centrally planned economies of East Europe. These types of arrangements would relax the pressure on the foreign exchange reserves of the Sudan but they will be constrained by the limited range of products produced by the Sudan which aid donors would demand.

relations between countries as well as military and political objectives as will be further discussed in the next section. From **Table [3.4]**, it is also possible to show, in the case of the Sudan, that the political considerations have influenced greatly the inception of aid according to the Sudan's political orientation and line of policy. This is reflected in the periods of aid "concentration" or "suspension" regarding particular donor groups.

The Sudan, from when it acquired independence in January 1956 until May 1969, remained largely neutral politically as far as the East and West were concerned and, therefore, received frequent assistance from both. In May 1969, the present regime came to power and declared a socialist programme with the intention of "Liberating the Sudanese economy from foreign domination". This new tendency required an inevitable bias towards the East and a deterioration in the relations with the West. Therefore, from 1969 the bulk of foreign finance for a time was contracted with the East European group. The loans originating from Western sources during the first half of 1969 were contracted with the UK, France and Italy as well as Kuwait from the Arab countries. Coincidentally, the Arab and Western donors have scored their lowest grant elements during this year (using a uniform discount rate such as 8% or 10%) while the International Organizations suspended aid altogether. In 1970, which can be regarded as a fully socialist year, witnessing a series of nationalizations of foreign banks and companies, aid was suspended by almost all donors except, of course, the East European group which provided

78% of the total inflows. The remaining 22% was contributed by the West European group namely: Japan, Austria and Sweden.

In July 1971, the socialist programme was abandoned for internal political reasons and since then the Sudan has sought to restore better relations with the West and Arabs. Consequently, foreign assistance from these donors as well as the International Organizations started to flow again into the country. During the period July 1971 and 1973, aid continued to flow only from China among the centrally planned economies and after that aid giving by the whole group came to an end. Hence the Sudan has been dealing with the remaining donors until 1979 when bilateral Arab aid was also suspended due to the Camp David Agreement which the Sudan currently supports. By doing so, the Sudan has detached itself from the Arab's political position and consequently from the portfolio of their finance. Thus the Sudan has been left only with the International Organizations, USA and Western Europe and private sources. Since the position of the Sudan's indebtedness has been deteriorating rapidly resulting in a rescheduling of debts with these donors during the same year, it has become very difficult to obtain more aid from them. The only viable alternatives for the Sudan appeared to be, therefore, the encouragement of private foreign investment and the dependence on the IMF facilities⁽¹⁾ which are usually accompanied by austerity

(1) The behaviour of each individual donor source is demonstrated by **Table [3.9]** in Appendix (3.3). For example, the suspension of American aid to the Sudan during the period 1967-1972 was due to the deterioration of the diplomatic relations between the two countries as a result of the 1967 Egyptian-Israeli war.

programmes.

3.11 The Relevance of Economic Criteria in Aid Allocation

A legitimate question which is often asked is what economic criteria donor countries apply when they allocate aid and its terms to recipient countries. For example, is the economic situation which prevails in any recipient country of practical relevance when aid is to be distributed by donor nations? Will a relatively poor developing country receive more aid on relatively soft terms?

Since the objectives and motives of aid are obscure and differ between donor countries, it may not require an application of complicated statistical techniques to prove that a large proportion of international assistance is randomly (and unequally) distributed and that the terms of borrowing are institutionally determined.⁽¹⁾ This is why in empirical analysis the distribution of assistance among recipient countries cannot be readily explained by economic indicators such as per capita income, balance of payments difficulties and absorptive capacity of these countries.

(1) The terms of borrowing are largely influenced by internal and external factors as far as donors are concerned. For example, when the policy of softening the terms of borrowing was recommended by the DAC/OECD in 1965, the overall picture was affected by the changes in the policies of USA which hardened its terms at that time. For further details, see, OECD, **Development Co-operation**, 1967 Review, Paris, 1967, p. 75.

Davenport⁽¹⁾ and Henderson⁽²⁾ found no significant correlation between per capita assistance (as a ratio of national income) and such factors as past growth rates (as an index of absorptive capacity) and the domestic saving ratio or returns on investment (as an index of productive potential). The most consistent significant explanatory variable found by Davenport was the ratio of foreign reserves to imports. The implications of these findings were summarized by Thirlwall as follows: "It apparently pays a country to remain as illiquid as possible. Other than that, it would seem advantageous to be a small island of ex-colonial status in a politically sensitive area of the world. High levels of per capita assistance are closely associated with these characteristics".⁽³⁾ Similarly, Chenery describes the USA aid policies as follows: "In the most general sense the main objective of foreign assistance, as of many other tools of foreign policy, is to produce the kind of political and economic environment in the world in which US can best pursue its own social goals".⁽⁴⁾

(1) See, M. Davenport, "The Allocation of Foreign Aid", **Yorkshire Bulletin of Economic Research**, May 1970.

(2) See, P.D. Henderson, "The Distribution of Official Development Assistance Commitments by Recipient Countries and by Sources", **Bulletin of Oxford Institute of Economics and Statistics**, February 1971.

(3) cf. A.P. Thirlwall, *Growth and Development....*, **op.cit.**, pp. 320-321.

(4) See, H.B. Chenery, "Objective and Criteria of Foreign Assistance", in G. Ranis (ed.), **United States and the Developing Economies**, Norton and Company, New York, 1964, p. 81.

More recently, McKinlay, and McKinlay and Little⁽¹⁾ have examined the influence of the "recipient need" and the "donor interest" in aid allocation among recipient countries in the case of German, British and American aid. In both models, per capita assistance is the dependent variable. As independent variables, the donor interest model uses indicative variables of the donor's political and/or economic interest (such as the political importance to the donor, trade ties and so on) and the recipient need model uses poverty indicators (such as per capita GDP, per capita calorie consumption and the like). The regression results, obtained by applying these two models to aid data pertaining to the above three donors during the 1960s, were found to be consistent with the "donor interest" model and inconsistent with the other model lending support to the hypothesis that the inception of aid is directly related to the donor's political and/or economic interest in recipient countries.

Mosley has criticised the formulation of the recipient need model for using inappropriate econometric procedures and for not

(1) See, R. McKinlay, "The German Aid Relationship: A Test of the Recipient Need and the Donor Interest Models of the Distribution of German Bilateral Aid 1961-1970", *European Journal of Political Research*, Vol. 8, 1978, pp. 235-257; R. McKinlay and R. Little, "A Foreign Policy Model of the Distribution of British Bilateral Aid, 1960-1970", *British Journal of Political Science*, Vol. 8, Part 3, July 1978, pp. 313-332; and R. McKinlay and R. Little, "The US Aid Relationship: A test of the Recipient Need and Donor Interest Models", *Political Studies*, Vol. XXVII, No. 2, 1979, pp. 236-250.

choosing good proxies for the recipient's need.⁽¹⁾ The estimation procedure of McKinlay and Little produces biased estimates because of the apparent simultaneous causation in the model as the independent variables are influencing and also influenced by aid flows. As such, the appropriate estimation method would be a two-stage least squares instead of ordinary least squares by which the original single equation model of the recipient need was estimated. Furthermore, after choosing alternative independent variables and applying the modified recipient need model to data which relates to OECD donors during 1960-63 (to approximate the period considered by McKinlay and Little), 1971 and 1977; Mosley found that a significant correlation emerged between aid and per capita GNP as well as between aid and the country size (as a proxy for economic viability) from 1971 onwards (while the estimated coefficients on these two variables remained insignificant for the period 1960-63). In other words, the significance of the estimated coefficients was found to be increasing when moving in time from 1963 to 1977 suggesting that the recipient's need (in terms of national income and self sufficiency) was a factor exerting over time a gradual influence on aid allocation by DAC donors. Mosley also gave some explanations as to why this influence was expected to increase, such as the recognition by donor countries that some of the less poor developing countries had achieved high growth

(1) See, Paul Mosley, "Models of the Aid Allocation Process: A Comment on McKinlay and Little", *Political Studies*, Vol. XXIX, No. 2, June 1981, pp.245-253.

rates in the 1960s and therefore they became less dependent on concessional borrowing for development needs, giving more chances to those which are still poorer.⁽¹⁾ On the other hand, other explanatory variables such as life expectancy, the literacy rate and the balance of payments were found to be consistently insignificant in influencing aid giving to recipient countries.

However, after satisfying the political and strategic considerations, the economic criteria for aid distribution should logically follow at least to assess or to determine the uses that foreign assistance will be put to by recipient countries. Nevertheless, the question of "what" economic criteria to be applied remains problematic in the case of bilateral assistance (due to the numerous and different objective functions that donors may wish to maximize) unlike the case of multilateral aid where the possibility of reaching an agreement on economic criteria is highly likely. These criteria⁽²⁾ may include the productivity approach as an indicator of the recipient's ability to repay the loan, the absorptive capacity criterion, the American principle of "self help" or the criterion of potential performance and the

(1) For further details, see, P. Mosley, *ibid.*, p. 249.

(2) For a useful discussion on these criteria, see e.g., P. Rosentstein-Rodan, "International Aid for Underdeveloped Countries", *Review of Economics and Statistics*, May 1961; and R.S. Eckaus, "Economic Criteria for Foreign Aid for Economic Development", in J. Bhagwati and R.S. Eckaus (eds.), *Foreign Aid*, Penguin, Harmondsworth, Middx., 1970, pp. 142-163.

availability of foreign exchange.⁽¹⁾ The problem with these criteria is that some of them are based on the economic performance rather than the need of recipient countries (like the productivity criterion) in which case the distribution of assistance may not be related to the recipient's long term development prospects. Therefore, it can be argued that an ideal criterion should gear the allocation of assistance towards raising per capita income in recipient developing countries by a specified amount. Assuming international assistance is productive, it can be distributed on per capita income basis according to some target per capita income level that would ensure a tolerable standard of living in all poor countries.

In the case of the Sudan, it can be observed from Table [2.1] in Chapter Two (section 2.3) that the highest amount of foreign capital inflows "actually" received was in 1974 and 1979. These two particular years did not witness any social disaster or economic upheaval in the Sudan. If any thing, these two years mark a high inflation rate in Western advanced countries due to the increase in oil prices which suggests that some of the Western donors were shifting the purchasing power away from the consumer-good to the capital-good sector.⁽²⁾ In general, as has been

(1) This typifies the practice of the World Bank which meets the foreign exchange cost of infrastructural projects and, as mentioned in the previous chapter, small scale rural development projects that have been recently included. cf. the discussion in the previous chapter (section 2.4 (V)) and the references cited therein.

(2) For more details on this issue, see e.g., Andre Gunder Frank, **Crisis: In the Third World**, Heinemann, London, 1981, chapter 4.

Table [3.6]: Some Selected Agricultural Projects in the Sudan (during the 1970's)

No. Projects & dates	Total Cost in million dollars	Sources of Finance	Description of the Project
1 El Rahad Scheme: (1973)	34.6	I.D.A.; (US) A.I.D.; EEC/EDF; Kuwaiti Fund, Saudi Fund, Arab Fund for Economic Development (AFED).	Irrigated cotton and grain, an area about 820,000 acres.
2 Malakal Rice Project: (1974)	9.4	Austrian Government	Irrigated rice, an area about 100,000 acres.
3 Jebel Mara Project: (1974)	21	EEC / EDF	Irrigated and rainfed agriculture.
4 New Halfa Project: (1972)	16	EEC; Ministry of Overseas Development (UK).	Mechanized ground nut and wheat production.
5 Mechanized Farming Phase II: (1972)	26	IBRD	Improvement of mechanized farming all over the country.
6 Jonglei Development Project: (1974)	150	EEC; Dutch Government	Water saving and irrigated agriculture.
7 Savannah Development Project Phase II: (1974)	57	IBRD; Ministry of Overseas Development; Saudi Fund, Abu Dhabi Fund	Intergrated rural development; grain for local consumption, an area about 65,000 km.
8 Southern Darfur: (1974)	14.58	Ministry of Overseas Development; Abu Dhabi Fund.	Intergrated rural development; envisaged to be mechanized.
9 Seleit Project: (1976)	33	IBRD / IFC	Livestock for export.
10 Second Southern Region Rehabilitation: (1975)	96	IBRD / IFAD; Ministry of Overseas Development	Production of sorghum, oil seeds, maize, coffee, cotton.

Source: the records of the Sudanese Ministries of "National Planning", and "Finance and National Economy".

discussed in the previous chapter, the experience of the Sudan during the period under consideration reflects a close approximation to the aid policies of the World Bank (infrastructure plus rural development) according to the country's own record of planning. Investment in infrastructure was not only emphasized by the Ten and Six Year Plans (1960-1970 and 1977-1983 respectively) as well as the amended Five Year Plan (1970-1975), but also the Six Year Plan embodied the recent World Bank policy of rural development and considered it as one of the main objectives of the plan. Rural development programmes appeared to be supported by Western European donors (in particular the EEC) and the Arab countries judging by the involvement of these donors in financing a number of rural development projects in the Sudan during the 1970s as the examples in Table [3.6] illustrate. These arguments can further be explained by examining the shares of the domestic sectors of the economy in total contracted loans during the period 1958-1979.

3.12 Domestic Sectoral Accessibility to Foreign Resources

Since the destination or the purpose of the loan is also contained in the contract, it has become possible to trace the allocation of foreign resources among the different sectors of the economy. It is clear from Table [3.7] that the share of transport and communications was the highest during the whole period reaching 40% of the total contracted flows followed by the category of loans classified as "Others" which shared 23%. The lowest share was that of education which accounted for 1% of the

Table [3.7]: Sectoral Percentage Shares in total Contracted Official Loans (1958-1979)

Sectors	% Share in total Contracted Loans
Transport and communication	40
Irrigation and hydroelectric power	10
Agriculture and animal resources	14
Industry and manufacturing	12
Education	1
Others*	23
Total	100

Source: own estimates based on data from the same source of **Table [3.1]**.

* This category includes cash loans, loans without specified purposes, commodity loans which relate to the purchase of different equipment and so on.

total flows. (1)

Although among the sectors listed in **Table [3.7]** the directly productive ones are agriculture and industry, they shared only 26% of total contracted loans which is far below the share of the transport sector even if the share of irrigation (being 10%) is added to these two sectors. An example of the projects undertaken in the transport sector in the Sudan, during the 1970s, is given by **Table [3.8]**.

This pattern of resource allocation shows that the Sudanese contracted official foreign borrowing has been primarily directed towards promoting infrastructure with little emphasis on investment in directly productive projects. Also, it may explain

(1) This is because most of education aid comes in the form of scholarships, materials, grants and training which are usually registered as "technical assistance". Technical assistance has been excluded in this thesis.

Table [3.8]: Some Major Roads and Bridges in the Transport Sector During the 1970s.

No.	Projects	Length in kilometres	Starting date	Finishing date	Actually completed by March 1980 (%)	Planned to be completed by June 1980 (%)	Cost L.S million	Source of finance	
1	Port Sudan/Haya	206	Sept. 1974	Dec. 1979	100	-	22	Abu Dhabi government	
2	Haya/Kassala	350	June 1973	May 1980	94	100	23.1	Saudi Fund, OPEC and Sudan gov.	
3	Kassala/El gadaref	209	June 1975	April 1980	100	-	13.5	Saudi Fund, African Dev. Fund and Sudan government	
4	Elgadaref/Medani	277		1973	1977	100	-	74	Sudan gov. and China
5	Niyala/Kass/Zalenge	210	March 1980		1984	6	10	10	Germany, Saudi Fund, Islamic Bank and Sudan gov.
6	Kesti bridge (on White Nile)	1.1	Feb. 1976	Jan. 1980	100	-	6.5	Italy and Sudan governments	
7	Medani/Sennar	107		1976	April 1980	100	-	14.5	UK, OPEC and Sudan government
8	Sennar/Singa/El damazine	285.4	Feb. 1979	Sept. 1983	15	25	7.3	Arab Fund, KuwaitiFund, Holland and Sudan government	
9	Niyala/El fashir (maintenance)	207	Oct. 1979	July 1982	feasibility studies and preparations		n.a	Holland and Sudan government	
10	Khartoum/Medani (maintenance)	186		n.a	n.a	20	n.a	.2	Sudan government
11	Jabal Owlya/El dewaim	158	Oct. 1980	July 1983	preparations			2.5	World Bank and Sudan government
12	El dewaim/Rabeck	110		n.a	n.a	preparations		n.a	Germany and Sudan government
13	El Khartoum/Jabal Owlya	40		1970	Dec. 1977	100	-	5	n.a
14	El Kharoum/El gialli	40		1970	Dec. 1977	100	-	5	n.a
15	El dibibat/El daleng/Kadogly	187		1965	May 1978	100	-	7	n.a
16	Gouz bridge in Waw	n.a		1973	June 1974	100	-	1.2	n.a
17	Sennar/Kosti	118	March 1976		n.a	-		25	n.a
18	Hantoub bridge (on Blue Nile)	.51		1973	March 1977	100	-	(*)	n.a

Source: Ministry of Finance and National Economy, **Economic Survey 1979/80**, Kharmoum, 1980

n.a = not available.

(*) = included in the cost of project no. 4.

the acute problems of the country's balance of payments because when neglecting investment in directly productive activities, foreign loans are unlikely to pay directly for themselves from the returns on investment. The repayment of these loans is, therefore, likely to be made, at least in the short term, by depleting the country's foreign exchange reserves (or by further borrowing) which will intensify the pressure on exports and further aggravate the problems of the balance of payments.

Moreover, by examining all the contracted loans throughout the whole period, it appeared that 83% of these loans have financed specific uses (projects or otherwise). Assuming these uses would largely reflect the nature of investment programmes that would be desirable or preferable to aid donors, the sectoral shares in foreign resources can give a reasonable approximation of the variation of tying across the different sectors of the economy.

3.13. Some Conclusions

This chapter has analysed the official foreign loans which were contracted by the Sudan during the period 1958-1979. The quality of these loans has been examined by estimating the grant element or the embodied benefit in them.

The total amount of loans contracted from various sources during the whole period has reached L.S 1203 million. The highest proportion of this amount was contributed by bilateral assistance in particular from the Arab countries which shared approximately 36% of the total flows. The grant element of the overall

contracted loans fluctuated greatly over time and so did the terms of borrowing. In addition, the grant element remained low because the majority of the loans were offered on nonconcessional terms. While lower average grant elements were associated with the loans given by the Arab countries and, of course, private sources, higher grant elements were linked with those loans offered by the International Organizations. In between were the average grant elements of the loans contracted with the West and East European countries. This supports that within these categories of donors, the types of loans offered by the IDA should be encouraged while borrowing from private sources must be cut to the minimum.

In general, cash loans (particularly on bilateral basis) are difficult to obtain and the amount contracted by the Sudan was offered by private sources on very hard terms. Sometimes cash loans can be obtained from the Arab countries on relatively softer terms in comparison to those originating from private sources. Usually, the smaller the bilateral loan (whether cash or otherwise), the more generous might be the terms of borrowing.

The analysis also shows that the distribution of contracted foreign assistance between the domestic sectors of the economy was biased towards infrastructural projects leaving the directly productive sectors lagging behind. This sectoral imbalance may have been caused by aid tying as 83% of the total contracted loans were tied to specific uses, assuming these uses would reflect the nature of investment programmes that donors prefer to finance.

In addition, aid giving tends to be greatly influenced by political considerations and the experience of the Sudan confirms

that. This casts doubts on the application of any economic criteria on the part of donors when aid and its terms are to be allocated i.e. whether any relationship exists between the terms of borrowing and the economic conditions that prevailed in the Sudan when aid was given. However, the terms of borrowing are institutionally determined and they tend to fluctuate depending on the objective function that each individual donor wants to maximize. These objective functions are usually influenced by a complex set of internal and external factors and the final decision of aid allocation by donors is unpredictable. Once the political and strategic considerations are satisfied, the application of economic criteria may follow at least to determine the uses of foreign resources in the recipient country or perhaps to ensure the implementation of aid policies as seen by donors. In this connection, the experience of the Sudan, however, seems to approximate very broadly the policies of the World Bank which have been primarily concerned with the promotion of infrastructure until recently when small scale rural development programmes were also included.

It is clear then there has sometimes been a lack of policy co-ordination between aid donors and recipients which has resulted in an unnecessary wastage of resources and defective economies. This calls for a mutual confrontation of aid policies (especially in the case of bilateral assistance) and a breakthrough must be made towards aid "liberalism" from political and economic ties. The reappraisal of such policies should necessarily increase their overall efficiency if the problem of development assistance is to

be looked at as an indivisible one and to be approached as a whole. The donors' governments ought to sacrifice partly what they might regard as their legitimate interest to allow for the recognition of the recipients' interest and they should also concentrate on the question of how much to devote to aid rather than on why and to whom aid should be given. As such, the conflicting interests might be reconciled and hence aid might be more fruitful to the developing countries.

Finally, it can be argued that the concept of the grant element is a very deceptive and illusory one because the real worth of foreign assistance depends on the recipient having adequate knowledge of the other alternatives. The loans which appear to be more generous due to their lower rates of interest may be actually less valuable than others which have shorter lives and grace periods. Therefore, the "actual" contribution of these inflows to the growth process of recipient countries (i.e. after they have been subjected to effective uses) should be quantified. This would require an examination of the productivity of the inflows and their contribution towards generating more savings which is the subject matter of Chapter Five. There is also the question of aid tying or the freedom of recipient countries to use the loans as they wish which will be dealt with in the next chapter. If the excess cost of tying is very high, it will partly offset the benefits of aid and may render the value of aid negative if no concessionary interest is attached to the loan; as will be more clear in the next chapter.

Appendix (3.1)

The Derivation of Formula (3.2) Using Zeta Transformation for Truncated Functions

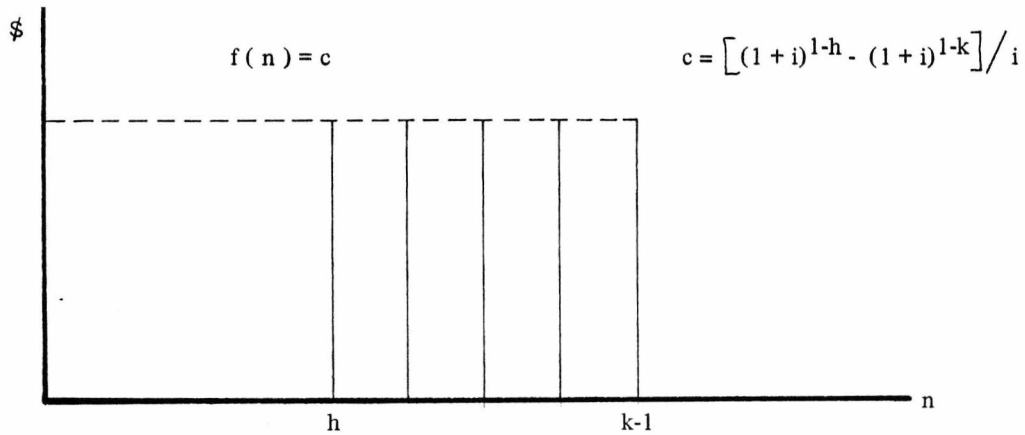
The zeta transformation of the discrete time series function $f(nT)$ is defined as:

$$z \{ f(nT) \} = \sum_{n=0}^{\infty} f(nT) / (1+zT) \quad (3.7)$$

where z is a variable; and n and T are as defined before. If z is replaced by the interest rate i and the constant length time interval T is equal to unity (i.e. the compounding period is a unit of time), then equation (3.7) can be written as

$$z \{ f(n) \} = \sum_{n=0}^{\infty} f(n) / (1+i)^n \quad (3.8)$$

which describes the present value of cash flows over time in the same manner as equation (3.1). Since in loan agreements the function $f(n)$ may change over time, then time $t=h$ will denote the time when the function starts and $t=k-1$ the time after which the function terminates i.e. $f(n)$ will have non-zero values over the interval $h \leq n \leq k-1$ and otherwise zero values. Therefore, the zeta transformation or the present value of $f(n)$ starting at $n=h$ and ending after $n=k-1$ can be graphically illustrated as follows:



This transformation can be used to determine the present value of cash loan agreements assuming a "constant" stream of debt servicing payments. The total cash repayments during a given period can be shaped in this table (where all the variables are as defined before):

Years	Interest	Debt Servicing
1	rF	-
2	rF	-
·	·	·
·	·	·
·	·	·
G	rF	-
G+1	-	$rF(1+r)^{N-G+1} / [(1+r)^{N-G+1} - (1+r)]$
G+2	-	$rF(1+r)^{N-G+1} / [(1+r)^{N-G+1} - (1+r)]$
·	·	·
·	·	·
·	·	·
N	-	$rF(1+r)^{N-G+1} / [(1+r)^{N-G+1} - (1+r)]$
N years	rFG	$(N-G)rF(1+r)^{N-G+1} / [(1+r)^{N-G+1} - (1+r)]$

The table presents the cost of interest and a constant stream of debt servicing repayments. The total amount that the borrower has to repay during the period of N years is:

$$rFG + (N-G)rF(1+r)^{N-G+1} / [(1+r)^{N-G+1} - (1+r)] .$$

It is clear that this total repayments do not reflect the true value at "present" time and therefore these annual amounts of repayments must be converted into their present values and summed up. The conversion can be done by applying the zeta transformation of the function $f(n)=c$ (as shaped in the above table) to:

(1) The annual amounts of rF during years 1 through G (with $c=rF$, $h=1$ and $k-1=G$).

(2) The annual amounts of $rF(1+r)^{N-G+1} / [(1+r)^{N-G+1} - (1+r)]$ during years G+1 through N (with $c=rF(1+r)^{N-G+1} / [(1+r)^{N-G+1} - (1+r)]$, $h=G+1$ and $k-1=N$).

Thus, the present value related to the arrangements of this kind of repayments is:

$$PV = rF [(1 - (1+i)^{-G} + (1+r)^{N-G+1}) \times ((1+i)^{-G} - (1+i)^{-N}) \\ \div ((1+r)^{N-G+1} - (1+r))] / i$$

Appendix (3.2)

The Derivation of Formula (3.5)

Suppose we have two functions $f(x)$ and $g(x)$ which are zero when $x=a$. Although the ratio $f(a)/g(a)$ is an undefined quantity $\left[\frac{0}{0} \right]$, nevertheless, the limit of $f(x)/g(x)$ as $x \rightarrow a$ may exist.

Consider the ratio of $f(x)$ and $g(x)$ and let both functions be expressed at the point $x=a$ by using Taylor's Theorem.

Then:

$$\frac{f(x)}{g(x)} = \frac{f(a) + (x-a)f'(a) + \frac{(x-a)^2}{2!}f''(a) + \dots}{g(a) + (x-a)g'(a) + \frac{(x-a)^2}{2!}g''(a) + \dots} \tag{3.9}$$

$$\text{By assumption, } f(a) = g(a) = 0 \tag{3.10}$$

Hence:

$$\frac{f(x)}{g(x)} = \frac{f'(a) + \frac{(x-a)}{2!}f''(a) + \dots}{g'(a) + \frac{(x-a)}{2!}g''(a) + \dots} \tag{3.11}$$

Consequently,

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{f'(a)}{g'(a)} \tag{3.12}$$

Provided that $g'(a)$ is non-zero, equation (3.12) shows that the limit of the ratio of the two functions as $x \rightarrow a$, where both functions are zero at $x=a$, is given by the ratio of the derivatives of the two functions each evaluated at $x=a$.

If, however, $f'(a) = g'(a) = 0$, then the same procedure must be applied. Provided the limit exists, it is usually possible to find a value of n such that

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{f^{(n)}(a)}{g^{(n)}(a)} \tag{3.13}$$

This method of evaluating limits is more conventionally expressed by writing equation (3.12) as

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)} \tag{3.14}$$

which is usually known as "L' Hospital's Rule".

Applying this rule to our case, we have the following:

$$\text{let } f(x) = (1+i)^{-x} - (1+i)^{-n} \quad (3.14a)$$

$$\text{since } a^b = e^{b \log a} \quad (3.15)$$

$$\text{then: } f(x) = \left[e^{-x \log(1+i)} - (1+i)^{-n} \right] \quad (3.16)$$

$$\text{and } g(x) = (1+r)^{n-x+1} - (1+r) \quad (3.17)$$

$$\text{then: } g(x) = \left[e^{(n-x+1) \log(1+r)} - (1+r) \right] \quad (3.18)$$

$$\text{since } f(n) = g(n) = 0 \quad (3.19)$$

$$\text{then: } f'(x) = -e^{-x \log(1+i)} \cdot \log(1+i) \quad (3.20)$$

$$= (1+i)^{-x} \log(1+i) \quad (3.21)$$

$$\text{and } g'(x) = -e^{(n-x+1) \log(1+r)} \cdot \log(1+r) \quad (3.22)$$

$$= (1+r)^{n-x+1} \cdot \log(1+r) \quad (3.23)$$

$$\text{Therefore, } \lim_{x \rightarrow n} \frac{f(x)}{g(x)} = \lim_{x \rightarrow n} \frac{f'(x)}{g'(x)} = \frac{(1+i)^{-n} \log(1+i)}{(1+r) \log(1+r)} \quad (3.24)$$

Hence, for $G=N$, the required formula would be:

$$PV = rF \left[(1 - (1+i)^{-G} + (1+r)) \times \left\{ (1+i)^{-G} \log(1+i) \right\} \div \right. \\ \left. \left\{ (1+r) \log(1+r) \right\} \right] / i$$

Table [3.9]: The Grant Element of Loans by Source of Individual Donors (1958 - 1979)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
		International Organisations	average current interest rates	-1.9	-	2.0	16.8	-	-	-	12.2	-	-	21.4	-	-	-	-	77.5	-	-	40.8	15.0
I.B.R.D.	8%	25.5	-	23.5	37.2	-	-	-	31.2	-	-	30.8	-	-	-	-	72.2	-	-	38.5	26.7	-	72.2
	10%	35.9	-	34.3	48.3	-	-	-	42.4	-	-	42.8	-	-	-	-	79.8	-	-	49.2	41.4	-	79.8
I.D.A.	average current interest rates	-	-	-	54.8	-	-	-	-	-	-	65.6	-	-	-	57.8	76.9	83.2	74.8	74.0	66.1	74.8	86.2
	8%	-	-	-	72.2	-	-	-	-	-	-	72.2	-	-	-	72.2	71.6	72.2	72.2	72.2	72.2	72.2	72.2
	10%	-	-	-	79.8	-	-	-	-	-	-	79.8	-	-	-	79.8	79.8	79.8	79.8	79.8	79.8	79.8	79.8
O.P.E.C.	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48.9	33.1	40.9	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.1	38.4	38.4	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55.4	46.4	46.4	-
African Development Bank	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	9.2	-	-	31.2	-	47.3	-	28.6	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	17.6	-	-	18.4	-	46	-	25.1	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	25.6	-	-	26.7	-	55.6	-	35.9	-
African Fund For Development	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	83.2	-	74.0	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72.2	-	72.2	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79.8	-	79.8	-	-	-

Table [3.9] : (continued)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
USA & Western Europe	Average current interest rates	-	-	-	-	22.7	24.0	-	-	-	13.6	-	-	-	-	- .27	59.2	-	-	-	-	-	-
	8%	-	-	-	-	48.9	49.5	-	-	-	22.7	-	-	-	-	3.6	37.4	-	-	-	-	-	-
	10%	-	-	-	-	59.8	58.8	-	-	-	29	-	-	-	-	6.9	44.6	-	-	-	-	-	-
U.S.A.	Average current interest rates	-	-	1.8	16.0	-7.8	-	-	-	-	-	-	-	-	-	44.0	77.5	83.2	74.8	74.0	-	-	-
	8%	-	-	18.2	31.5	13.1	-	-	-	-	-	-	-	-	-	70	72.2	72.2	72.2	72.2	-	-	-
	10%	-	-	26.7	41	21.8	-	-	-	-	-	-	-	-	-	78.4	79.8	79.8	79.8	79.8	-	-	-
West Germany	Average current interest rates	-	-	-	2.2	-	6.0	-	-	-	-	-	43.5	-	-	38.9	34.6	22.0	-	-	4.1	-	-
	8%	-	-	-	11.6	-	24	-	-	-	-	-	29.5	-	-	51.9	29.9	11.8	-	-	8.1	-	-
	10%	-	-	-	17.4	-	31.6	-	-	-	-	-	34.4	-	-	60	37.1	18.4	-	-	14.3	-	-
U.K.	Average current interest rates	-	-	-	-	-	-	-	-	-	-	-	4.6	-	-	-	11.0	-	-	-	-	8.3	-
	8%	-	-	-	-	-	-	-	-	-	-	-	3.2	-	-	-	8	-	-	-	-	5.2	-
	10%	-	-	-	-	-	-	-	-	-	-	-	7.2	-	-	-	12.5	-	-	-	-	14.9	-
France	Average current interest rates	-	-	-	2.5	-	-	-	-	-	8.9	12.5	10.1	-	-	4.9	13.8	-	15.8	-	-	-	-
	8%	-	-	-	14.2	-	-	-	-	-	19.6	18.1	8.7	-	-	13.3	10.2	-	13.5	-	-	-	-
	10%	-	-	-	21.2	-	-	-	-	-	27.2	25.7	12.6	-	-	19.7	15.7	-	21	-	-	-	-
Italy	Average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table [3.9]: (continued)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Holland	average current interest rates	-	-	-	-	-2.0	-	22.7	24.7	-3.1	5.8	-	-	-	-	-	-	-	61.8	74.0	15.5	-	-
	8%	-	-	-	-	5.9	-	59.6	41.6	5.2	10.3	-	-	-	-	-	-	-	58.6	72.2	21.3	-	-
	10%	-	-	-	-	9.7	-	71.5	52.5	12.8	14.6	-	-	-	-	-	-	-	68.2	79.8	29.9	-	-
Sweden	average current interest rates	-	-	-	-	-	-	-	-	16.8	-	-	-	41.0	-	-	9.2	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	23.7	-	-	-	42.1	-	-	4	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	30.6	-	-	-	52.1	-	-	11.8	-	-	-	-	-	-
Austria	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	12.2	-	-	10.3	-	3.7	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	12.6	-	-	7.3	-	1.9	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	16.7	-	-	11.9	-	7.7	-	-	-	-
Denmark	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	33.8	-	-	32.7	-	-	-	61.7	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	43.6	-	-	22.5	-	-	-	58.6	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	52.4	-	-	29.2	-	-	-	68	-
Norway	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36.6
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.7

Table [3.9]: (continued)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Belgium	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23.4	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.8	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.6	-	-	-	-	-
Spain	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.3	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.1	-	-	-	-
Japan	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	11.1	-	-	-	-	6.7	69.8	-	53.2	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	11.8	-	-	-	-	5.3	67.7	-	49.8	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	18.4	-	-	-	-	10.1	76.9	-	60.2	-
Arab countries	average current interest rates	-	-	-	-	6.0	-	-	12.5	-	24.7	-	2.0	-	11.9	27.1	28.2	-	30.9	38.7	27.9	15.7	-
Kuwait	8%	-	-	-	-	22.1	-	-	23.6	-	37.5	-	0.5	-	7.5	41.4	23.9	-	28.3	36.8	34.0	14.1	-
	10%	-	-	-	-	29.6	-	-	31.1	-	46.1	-	4.6	-	11.3	50.6	34.8	-	36.6	45.7	42.9	19.4	-
Iraq	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.9	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.6	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.7	-	-	-	-

Table [3.9] : (continued)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	
Saudi Arabia	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Abu Dhabi	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	18.4	41.4	-	-	-	-	28.2	43.2	-	-
A.R.E.	average current interest rates	-	-	-	-	-	-	-	-	-	41.3	13.7	-	-	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	54	16.3	-	-	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	62.2	20.2	-	-	-	-	-	-	-	-	-	-	-	-
Algeria	average current interest rates	-	-	-	-	-	-	-	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	19.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	25.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Qatar	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.5	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.9	-	-	-	-	-

Table [3.9]: (continued)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Arab Fund for Economic and Social Development	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32.7	33.8	37.7	26.6	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32.5	30.9	35.6	33.1	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42.0	40.1	45.4	42.6	-	-
Islamic Bank for Development	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38.5	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41.8	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.1	-	-
Eastern Europe U.S.S.R.	average current interest rates	-	-	-	14.2	-	-	-	-	-	-	-	35.3	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	28.0	-	-	-	-	-	-	-	32.3	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	36.3	-	-	-	-	-	-	-	40.5	-	-	-	-	-	-	-	-	-	-
Peoples Republic of China	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	36.7	26.5	-	42.0	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	37.9	37.9	-	35.2	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	48.6	48.6	-	45.4	-	-	-	-	-	-
Korea	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	36.7	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	27.5	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	34.4	-	-	-	-	-	-	-	-	-

Table [3.9] : (continued)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Yugoslavia	average current interest rates	-	6.2	-	-	-	-	-	-	-	-	-	18.1	-	-	-	11.0	-	-	-	-	-	-
	8%	-	23.7	-	-	-	-	-	-	-	-	-	16.2	-	-	-	8	-	-	-	-	-	-
	10%	-	31.5	-	-	-	-	-	-	-	-	-	21.5	-	-	-	12.5	-	-	-	-	-	-
Czechoslovakia	average current interest rates	-	-	-	-	-	-	-	11.1	-	-	-	-	-	-	-	22.8	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	20.3	-	-	-	-	-	-	-	18.8	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	26.6	-	-	-	-	-	-	-	24.9	-	-	-	-	-	-
Bulgaria	average current interest rates	-	-	-	-	-	-	-	-	-	11.9	-	-	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	36.4	-	-	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	44.8	-	-	-	-	-	-	-	-	-	-	-	-
East Germany	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	30.5	-	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	27.8	-	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	35.2	-	-	-	-	-	-	-	-	-	-
Hungary	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	23.2	-	-	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	23.9	-	-	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	30.6	-	-	-	-	-	-	-	-	-

Table [3.9] (continued)

Source	Discount Rate	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Socialist Republic of Rumania	average current interest rates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.6	-	-	-	-	-	-	-
	8%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.4	-	-	-	-	-	-	-
	10%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25.1	-	-	-	-	-	-	-
Borrowing from Private Sources *	average current interest rates	-	-	-	-	-	-	-	-	-	4.9	-	-	-	-	.95	12.6	9.7	12.7	11.6	-	-	-
	8%	-	-	-	-	-	-	-	-	-	9.3	-	-	-	-	9.63	8.8	2.4	11.7	10.6	-	-	-
	10%	-	-	-	-	-	-	-	-	-	13.2	-	-	-	-	16.1	14.6	7.1	14.9	16.2	-	-	-

Source = own estimates based on data from the same source as Table [3.1] .

* since the terms of borrowing regarding private sources are similar and generally non - concessional (because they are largely commercial in nature), it might not be necessary to disaggregate the category of private sources into its different components.

CHAPTER FOUR

SOME ASPECTS OF AID-TYING

4.1 Introduction

Aid tying will reduce the value of a capital inflow if the recipient country has to pay higher prices for the goods and services bought with the loan than the prices prevailing in alternative markets. Tying can either be by source (i.e. restrictions on where recipients can spend the assistance) or by end use (through the specification of commodities and/or projects). Spending restrictions which normally tie the assistance to purchases from the donor country are known as "procurement" restrictions or tying. On the other hand, use restrictions are usually designed to cover the foreign exchange costs of a specific project. The combination of use and spending restrictions amounts to "double-tying" i.e. the use of the foreign capital inflow will be restricted to particular projects as well as to the donor's goods and services.

In addition to the inability of the recipient country to buy in the cheapest market, there are also some other unquantifiable costs of tying. For instance, when there is double-tying, the project for which the assistance will be allocated might not suit the recipient's development programme, the technology might be inappropriate, the donor may unnecessarily raise the import content of the project and so on.

The excess cost of the tied goods will not only generate additional income to the donor country due to overpricing but it will also save the donor the cost of an export subsidy. For if the tying had not been imposed and the donor country was to remain

competitive an export subsidy may have had to be paid by the donor country.

The purpose of this chapter is to estimate the excess costs of tied loans received by the Sudan after examining the policies of aid-tying by donors, the means by which aid is tied and the justifications offered by donors for tying aid.

The analysis will cover a selected sample of some projects and commodities which were tied simultaneously (i.e double tying) throughout the period 1958-1979. The selection of this sample is primarily dictated by the availability of data. The projects that will be examined relate to textiles (including spinning and weaving of sacks and hessian cloth); well drilling; printing and bookbinding; road building and telecommunications. Then the estimated excess cost of tying can be used to assess the effect of aid-tying on the net worth or value of international assistance contracted by the Sudan. In order to do that a "shadow grant element" approach has been developed. Finally, the indirect costs of tying are also investigated by considering the terms and conditions of the contracts of some of the projects under consideration as well as the performance of some completed projects.

4.2 Types of Tying by Source

Since tying by end use deals clearly with specific projects, more attention will be given in this section to source tying which takes a number of forms and involves many complicated analytical problems. In recent years a higher proportion of aid has been given to LDCs in a non-project form and such a trend has developed

rapidly towards comprehensive source - tying by practically all donors.

Aid-tying by source can generally be defined to include all types of restrictions which limit the recipient's choice in spending aid funds on imports only from the donor country itself. These restrictions can be classified into five major forms.

(a) Formal Restrictions

Under these restrictions the recipient country will be required formally and contractually to spend aid funds on importing goods and services only from the donor source(s). In order to ensure that these restrictions are not violated, aid must be disbursed in such a way as to give rise to directly identifiable imports that can be related to a particular source or origin.⁽¹⁾ However, it might be difficult to tie aid by source when aid expenditure is not related to directly identifiable imports. This is clear, for example, in the case of the "local cost" component of project aid or the "budgetary grants" which are given by donors to recipient governments. Even under these circumstances, formal restrictions can be devised sometimes in a form of "restricted accounts" arrangements under which the recipient country will be required to spend the aid received on

(1) The disbursement procedures vary between donors depending on whether or not the recipient country operates an exchange-control system. For further details and examples, see e.g., J. Bhagwati, "The Tying of Aid", UNCTAD Secretariat, TD/7/Supp. 4, United Nations, New York, 1967; reprinted in J. Bhagwati and R.S. Eckaus, *Foreign Aid*, op.cit., pp. 235-293.

specified source(s).⁽¹⁾

(b) **Informal Restrictions**

Aid donors can also influence the recipient countries in an informal manner to spend contracted loans on purchases from the donor source itself. Many factors contribute to this process such as the competitiveness of donor countries in international markets, the prevalence of traditional trade ties with recipient countries (which secures for the donor an advantage of not competing with alternative suppliers) and the influence that the donor country may have in the recipient country through cultural and traditional ties.

Under such restrictions, any diversion by the recipient country to alternative donor sources might lead to the discontinuation or even the suspension of aid by the tying source. This is why, in many cases, informal tying operates with more efficiency.

(c) **Indirect Restrictions**

Indirect restrictions can be arranged by treating the aid flows as part of an overall trade arrangement (as in the case of the centrally planned economies). An alternative policy (which is also practiced by France) is to attach to the aid flow some provisions to guarantee that aid will be spent on the donor's

(1) Formal restrictions are widely practiced by Japan and USA. Such restrictions can further be imposed on shipping the aid-financed imports (as USA does). See Bhagwati, *ibid.*, p. 237; and also see M. UL Haq, "Tied Credits: A Quantitative Analysis", in J. Adler (ed.), **Capital Movements and Economic Development**, International Economic Association Conference, Macmillan, London, 1967.

goods and services while the donor agrees to purchase "reciprocally" from the recipient country on a preferential basis. However, when these arrangements seem to be inadequate, resort might be made to formal restrictions.

Another method which can be used whenever formal and informal restrictions are considered to be undesirable is to finance only those commodities and/or projects where the donor country seems to have an advantage in tendering or supplying the specified items. Such a policy (which is widely practiced by West Germany) can be used to reduce the local cost component of projects or the budgetary-support grants that can be obtained. This is because projects can be deliberately directed towards those using materials imported from the donor country rather than the cheaper available domestic materials that would imply local cost financing.⁽¹⁾

(d) **Export and Import Credits**

These are credits extended to importers or exporters who deal with exports from the lending countries. Two types of these credits can be distinguished. There are the "suppliers' credits" which are private export credits guaranteed partly or wholly by some institutions in the donor country. The financial support of these institutions for such credits is directly or indirectly linked to an official policy. These credits are essentially the means by which the effective export prices of capital goods are cut and they can be obtained from almost all donor countries.

(1) For a further discussion, see e.g, J. Clifford, "The Tying Aid and the Problem of Local Costs", *Journal of Development Studies*, Vol. 2, No. 2, 1966.



Therefore, the efforts of the donor countries to co-ordinate the provision of these credits and to regulate their terms by agreements, would merely reflect a form of a collusive action which would inhibit competitive cutting of prices for those exports.

The other type of credits which is relevant in the context of aid-tying relates to the public sector's export and import credits such as the sums directly given to the purchasers in the importing country on a long term basis or the credits extended by the donor country (through its exporters) on the basis of specific contracts for the supply of equipment.

(e) Aid Directly Embodied in Goods and Technical Services

Finally, of relevance to aid-tying by source are the flows which are directly embodied in the form of goods and technical assistance.⁽¹⁾

4.3 Why Tying Aid by Source ?

The primary cause of tying remains a balance of payments difficulty (in the case of donors with deficits) and balance of payments protection (in the case of those with surpluses). This minimizes for donors the loss of real income that would follow if the aid transfer did not give rise to a matching demand for imports. In other words, source tying will divert aid expenditure

(1) Aid in kind, technical assistance and export credits are sometimes grouped under "direct" restrictions or tying because these forms of assistance are linked to the very provision of aid. See e.g, UNCTAD, **The Costs of Aid-Tying to Recipient Countries**, TD/7/Supp. 8, United Nations, New York, 1967.

by recipient countries towards the donor country and prevent a leakage into alternative sources of exports, both of which will secure the position of the balance of payments in the donor country. A similar motivation, of reducing the real cost of making a certain financial transfer of resources, also underlies the desire to tie aid to industries in the donor country where there is excess capacity or already surplus stocks (as in the case of PL 480 shipments).

There is also an element of competitive aid-tying which follows from commercial pressure groups who want to benefit from the orders that they think should be procured from their own donor country (as usually happens in West Germany).⁽¹⁾ This is because aid-tying by one country on grounds such as the deficit in the balance of payments leads to aid-tying by another country whose exporters find their own markets abroad jeopardized because of such policies of other donor countries.

The tendency to tie aid can also be attributed to a combination of factors, political and economic, which lead to project-tying in the first instance and to source-tying subsequently. For example, some donor countries (like West Germany) might be keen to tie aid to specific projects because, according to their experience, this will probably lead to the most efficient utilization of aid. At the same time, those donor

(1) Competitive aid-tying which is promoted by commercial interests is quite distinct from the competitive aid-tying that occurs between deficit countries with one country tying aid to divert expenditure from the other country whereas the other does the same to divert expenditure in the contrary direction.

countries might feel that by financing conspicuous projects which are easily identifiable in the public mind, they will secure political credibility for their aid programmes in recipient countries. But since in practice the credit goes to those who actually built the project rather than those who financed it, it has become politically desirable to tie aid to both projects and source simultaneously.

Although the fundamental argument for tying aid by source is to prevent a deterioration in the donors' balance of payments (especially those with deficits), Bhagwati maintains that the expenditure of the recipient country on the donor's goods and services due to aid-tying will not by itself lead to an improvement in the balance of trade unless there was a matching release of domestic resources to finance the transfer involved as a result of aid-tying by source.⁽¹⁾ Actually, it will not improve if the cause of the donor's balance of payments deficit is an excess demand for resources in which case the real problem will be whether the aid outflow can be granted at all. Even when the domestic resources were freed to finance the outflow of aid which is tied by source, there are also other factors to be accounted for when the impact of tying on the donor's balance of payments is examined. One important factor is the switching of resources that might be undertaken by the recipient country (i.e. one form of purchase is substituted for another) which may limit the gains to the donor from tying aid. The effect of switching can be partially (or wholly) offset by two opposing factors. First, there will be

(1) See, J. Bhagwati, "The Tying of Aid," *op. cit.*, pp. 250-52.

induced imports from spending the assistance in the recipient country, some of which is likely to be bought from the donor country. Also, there will be a "reflection" effect as a result of the aid being spent in third countries which import from the donor country.⁽¹⁾ Finally, the net effect of aid-tying on the balance of payments must be adjusted for the fact that much of the tying is competitive. The net improvement for the deficit countries therefore will be less than the gross effect because their policies would tend to neutralize one another on the one hand, and because the reciprocal tying by the surplus countries will also work to offset any favourable impact of the balance of payments on the other. This is why the empirical estimates of the net effects of aid-tying on the balance of payments of donor countries are very difficult to conduct.

However, the existing empirical evidence seems to suggest that aid-tying by source may be a successful policy instrument for diverting aid expenditure to the donor's exports of goods and services, and hence it prevents a deterioration in the donor's balance of payments as a result of the aid outflow, provided that a matching release of domestic resources is undertaken by the donor.⁽²⁾

(1) For an empirical demonstration, see e.g., B. Hopkins and Associates, "Aid and the Balance of Payments," *Economic Journal*, March 1970.

(2) See e.g., A. Krassowski, "Aid and the British Balance of Payments," *Moorgate and Wall Street Review*, Spring 1965; L. Lynn Jr, *An Empirical Analysis of US Foreign Economic Aid and the US Balance of Payments 1954-63*, Unpublished Ph.D Thesis, Yale University, 1966; W. Hicks, "Estimates of the Foreign Exchange Costs of Untied Aid," *Southern Economic Journal*, Vol. 30, 1963; and J. Bhagwati, "The Tying of Aid," *op. cit.*

On the other hand, the measured resource cost of "untying aid" by donors was recently found to be of an insignificant influence on aid policy which was motivated so much by the pressures of domestic and international political considerations.⁽¹⁾ Finally, of relevance to the efforts of untying aid, Levitt has developed a method by which each donor can determine its exchange gains and losses from giving assistance in order to explore ways of untying as well as increasing assistance without increasing the net exchange loss to any donor.⁽²⁾

4.4. The Cost of Tying to Recipient Countries

Whatever the specific type of restrictions, tying reduces the value of aid to recipient countries because of the excess cost incurred by these countries as a result of the restrictions imposed on their choices of the sources of supply. These restrictions are likely to give rise to costs of various types and magnitudes depending on the form of tying, the characteristics of the recipient's economy, the degree of its dependence on aid in general and on a specific donor in particular.

On the other hand, source-tying will be irrelevant in its "intent" so long as the recipient country would have liked to spend (from its total pool of foreign exchange of aid and export earnings) on purchases from the tied source an amount which equalled or exceeded that which is explicitly source tied, after

(1) See e.g., A.G.Coverdale and J.M.Healey, "The Real Resource Cost of Untying Bilateral Aid," **Bulletin of Oxford Institute of Economics and Statistics**, Vol.43, No.2, May 1981.

(2) See, M.Levitt, "Aid and the Balance of Payments : The Scope for Untying and for Increasing Aid," **Manchester School**, September 1970.

considering the relative competitiveness of various alternative sources of supply.⁽¹⁾ The possibility of substitution (or switching), with the intention of untying, will not work fully when the funds which would be spent from the total pool on the donor's goods and services fall short of the total given tied aid. In this case, as Bhagwati describes it, there will be left a "hard core" of tied aid which is effective even when all the substitution possibilities have been exploited.⁽²⁾ The cost of tying to recipient countries would, therefore, involve an examination of this hard core tied aid as well as that of the items that would have to be imported (up to the value of this hard core) from the tied aid sources. These costs of tying can be broadly classified as "direct" and "indirect" costs. Let us discuss first the direct costs.

(i) The Direct Costs of Tying

The direct costs of tying can be defined as the excess price actually paid by the recipient country over the lowest price which the country could have paid had the aid not been tied. Within this category, a distinction has to be made between the costs which the recipient country can evade, in the event of project and/or source tying, and those costs which it has to bear irrespective of its efforts for untying.

(1) But, when tying is done by specifying commodities in which the donor country has the least advantage, it will secure to the donor all the possible orders from all the foreign exchange resources which the recipient country might devote to tender and ensure thereby the full "additionality" of tied-aid purchases.

(2) J. Bhagwati, "The Tying of Aid," *op. cit*; p.255.

In the case of project-aid, the costs of tying can partly be avoided or minimized through a worldwide tender policy. The effectiveness of this policy depends on the method by which the projects are allocated to tied sources. This method can either involve a simultaneous tendering for different projects or an exclusive choice of the source prior to the invitation of tenders. In these cases, tendering on projects will not necessarily be comprehensive or successful, since the projects will be ostensibly assigned to different tied sources, unless the recipient country has access to free funds which are relatively larger than the tied funds and that the tied funds are spread over a large number of sources.⁽¹⁾ In addition to that, most of the developing countries are not technically equipped to implement competitive tendering and indeed they may remain so will the prospects of aid remain unclear.

In practice, however, several projects will be associated with certain sources simply because these sources will probably finance such projects and this is why, in many cases, the recipient countries will not be able to follow a proper tendering procedure. For example, a certain project might be allocated from the very beginning to a particular foreign firm which will automatically get the orders (like the case of the Italian firm which studied, financed on a basis of source-tied aid and executed the two Kenaf factories in the Sudan).⁽²⁾ On other occasions, the

(1) Furthermore the sequential character of aid flows prevents the utilization of simultaneous tendering for different projects. For more details, see J. Bhagwati, *ibid.*

(2) These projects will be further discussed towards the end of this chapter.

aid will be allocated to a specific project according to a feasibility study which has been made by a firm from the donor country in collaboration with some firms and/or the government in the recipient country in which case tendering will be regarded as irrelevant. Under these circumstances, Ul Haq has suggested that the recipient country should try both to invite a worldwide tender and to threaten to shift the project(s) to alternative sources if the aid source proved to be unduly expensive.⁽¹⁾

However, it seems unlikely that monopolistic overpricing will disappear when the projects are associated with certain donor sources, at least the overpricing resulting from the extension of the domestic "market variety" will prevail in this situation.⁽²⁾

In the case of non-project aid, the recipient country may partly avoid the costs of tying by switching of resources. As in the case of project aid, similar difficulties will arise from the methods by which the governments in recipient countries operate their exchange systems to control imports and how far these methods will allow, in practice, the suppliers from tied-sources to exercise monopolistic pricing. However, switching possibilities

(1) See, M. Ul Haq, *op. cit.*

(2) For example, the US suppliers sometimes treat the prices of aid-financed sales as equivalent to domestic sales and therefore they charge f.o.b. prices on this basis. But, the competitive f.o.b. export price charged by many manufacturers is usually assumed to be lower than the domestic price because the international market is considered to be more competitive owing to the pressure of foreign suppliers. The evidence on this issue is contained in, for example, M. Gilbert, **A Sample Study of Differences Between Domestic and Export Pricing Policy of United States Corporations**, Temporary National Economic Committee Monograph, No. 6, Part 1, Washington D.C., 1940.

depend on several factors many of which can hardly be quantified. Switching is likely to be limited if the recipient country retains a small amount of free foreign exchange at its disposal relative to the tied amount of aid and also if it depends heavily on one donor country for assistance. This would mean that the recipient country lacks the necessary flexibility for successful switching and hence it cannot evade source restrictions by resorting to alternative sources.⁽¹⁾ Successful switching also depends on a sufficient programming of imports by recipient countries, but this might lead to the tightening of procurement restrictions and might even jeopardize the aid flows.

In practice, aid is often tied by specific projects as well as by commodity specifications (i.e. double-tying) in which case the substitution possibilities for the recipient country are greatly reduced or even eliminated, depending on how effectively this policy is used and how the recipient country would successfully overcome all the complex problems, discussed above, when they are combined together.

(ii) The Indirect Costs of Tying

The indirect costs of tying, though not essentially quantifiable, are also of great significance in the analysis of aid-tying. These costs can be grouped into the following three categories:

(a) The excess costs of later purchases related to the original tied purchase such as the relatively high prices paid by

(1) For a further discussion, see e.g., UNCTAD, *The Costs of Aid-Tying....., op. cit.*

the recipient country for inputs or spare parts and the long delays in delivering them.

(b) Costs arising from monopolistic practices by suppliers from the tied source because of their awareness of the limited range of choice available to the recipient country and thus their ability to take advantage of such apparent captivity. Hence, the suppliers might not provide the "fringe benefits" which would normally accrue to the buyer (or the recipient) in a commercial contract.⁽¹⁾ These may include the lack of interest in the servicing of machinery, inadequate follow up of projects, failure to assist in the training of local personnel and so on.

(c) Finally, the most significant among the indirect costs are the development costs. Restrictions on the source of procuring imports may seriously influence the recipient's plan formulation and implementation as well as the choice of appropriate technology. The plan formulation may not only be complicated by the uncertainty of not knowing how much of the expected inflow of aid will be source tied and in what form, but also the selection of projects may be unfavourably affected by the restrictions imposed by the donor country on the eligibility of specific commodities for aid-financing. Two development plans might therefore be needed by recipient countries when they ask for foreign assistance, one which reflects the recipient's own

(1) Similarly, there will be also a much wider scope for the suppliers to increase the direct costs. See, J. Bhagwati, "The Tying of Aid," *op. cit.*, pp. 264-66.

development objectives and another modified one in anticipation of aid-tying.⁽¹⁾ Furthermore, the delays and uncertainties which characterize aid-tying practices may aggravate the usual difficulties of plans implementation and project follow-up in developing countries.

To sum up, aid-tying by source will generally impose costs including monopolistic overpricing by foreign suppliers even when appropriate procurement policies are practiced by recipient developing countries. These costs are likely to be escalated when the donors also restrict the end use of source-tied aid by project or otherwise. The magnitude of these costs varies with the flexibility (in substitution) that the recipient country can have by diversifying its sources of foreign finance; the extent to which the exploitation of this flexibility can be allowed by the donor countries; and the willingness as well as the ability of the recipient country to exploit the substitution and competitive possibilities (as they exist) through optimal procurement and related policies. There are also the indirect costs of aid-tying and although they cannot be easily quantified but still they have to be accounted for in the analysis of excess costs of aid-tying.

4.5. The Implications of Aid Tying on Welfare

The analysis of aid-tying implicitly assumes that the practices of tying the procurement of imports to the tying source

(1) For a further discussion on this issue, see e.g., H.W. Singer, "External Aid : For Plans or Projects?," *Economic Journal*, Vol.75, 1965, pp. 539-545.

would increase the prices of (some or all) these imports relative to alternative sources of supply. This increase in the prices will obviously reduce the quantity purchased of tied goods and hence inflict a welfare loss to the recipient country through the real income effect. However, if the price change is compensated by an income change, then the income effect can be offset and the recipient country will remain on its initial level of welfare. The implications of aid-tying can therefore be illustrated by determining the excess cost that the recipient country pays for a tied bundle of goods as well as the compensatory flow which if paid to the recipient country would make it as well off as it was prior to tying. Then the cases of over/undercompensation should be distinguished. This line of analysis follows Samuelson's "overcompensation" theorem which states that in the event of a price change, if income is also changed in order to restore the consumption of the original bundle, then overcompensation will follow accordingly unless the consumption patterns are assumed to be fixed.⁽¹⁾ Therefore, the implications of aid-tying on the recipient's welfare can be illustrated diagrammatically as in **Figure (4.1)** using indifference curves analysis.

The budget line VA represents the available combinations of goods x and y from a given untied aid flow where the recipient's equilibrium is determined by bundle E. If the purchase of commodity x is tied by source (but not y which can be obtained

(1) See, Paul A. Samuelson, "Consumption Theorems in Terms of overcompensation rather than Indifference Comparisons", *Economica*, Vol. XX, No. 77, February 1953, pp. 1-9.

original level of welfare (i.e. prior to tying), the budget line will shift parallel to VB (through E) to the position NC where bundle R provides the new equilibrium position. Thus the movement along the original indifference curve (U_u) from E to R is due to the "overcompensation effect" while that from T to R is due to the "income effect". There will be an overcompensation because the purchase of x did not increase (relative to its original level at bundle E) even when the recipient country is compensated for the losses arising due to the increase in the price of x. In other words, the additional income generated by the recipient country in the form of compensation did not induce an increase in the demand for x. Hence, the amount by which the recipient country would be overcompensated constitutes a deadweight loss to the donor country as a result of the price distortions caused by tying.

In the case of undercompensation, the recipient country will be compensated until it is able to buy at the new high price of tied x the bundle which could have been bought with the untied aid at the original price of x. Hence, the recipient country will move from T (parallel to VB) and settle at the intermediate equilibrium position Q where the new budget line N'C' intersects with the original budget line VA. By definition, bundle Q cannot be "better" than E otherwise the recipient country would not have chosen previously E in preference of any other bundle that could have been bought with the original untied aid VA. Also, in this case, the compensation given to the recipient country did not induce an increase in the purchase of x to the level that could have been obtained at bundle E with untied aid because the

increase in the price of x is more than to be offset by compensation.

4.6 Estimates of the Direct Excess Costs of Aid Tying for the Sudan

Aid-tying, in general, not only imposes different direct costs on the recipient country but also it acts as a constraint on the recipient's freedom to allocate resources in the best possible way and hence causes a welfare loss. Therefore, the calculations of the excess costs of tying should stress the effect of tied loans on their efficiency in providing economic assistance as well as the extent to which the excess costs offset the other benefits of international assistance.

The direct costs of tying in this analysis are calculated by determining the mark up (say ϵ) of overpriced tied goods relative to the prices of alternative sources of supply. The mark up is calculated by taking the difference in price between the lowest quotations of the tying source and the lowest quotations for the same good (or a similar one) as offered by other sources of supply; and the result is divided by the latter.⁽¹⁾

In order to calculate this ϵ , the following steps were followed:

(a) The original quotations for machinery and equipment of the different tied contracts assembled from Sudanese data which pertain to the projects under consideration, have been converted into Sudanese currency using the prevailing exchange rate when

(1) This approach has been used by UL Haq, *op.cit.*

these contracts were signed.⁽¹⁾

(b) In order to compare quotations of tied machinery and equipment with alternative quotations from competitive sources of supply, more than fifty British firms (as well as some agents of foreign firms in Britain) which produce the same machines were asked to provide quotations. These alternative quotations obtained from current alternative sources of supply were then deflated to their real values that correspond to those at the date of signing the tied contracts. In order to do that, the difficult problem of choosing a proper deflator arose. However, since most of the quotations of machinery and equipment were collected from British sources, the use of a British cost of plant index as a deflator seemed reasonable. This index is also very difficult to determine because the price change of machinery and equipment over time varies considerably between machines given the varying cost of materials, capital/labour costs and changes in technology. Nevertheless, the alternative quotations which were currently obtained from non-tying sources were deflated to their real levels when the tied contracts were signed by using the U.K. Industrial Output Price Index (UKIOPI) which is reported in **Table [4.1]**. Then the deflated quotations were also converted into their Sudanese equivalent according to the prevailing exchange rate which corresponds to the date of signing the contract.⁽²⁾

(1) The exchange rates were obtained from the IMF, **International Financial Statistics**.

(2) By following this sequence, the effect of the series of devaluations of the Sudanese pound which started from 1978, can be avoided.

**Table [4.1]: THE U.K. INDUSTRIAL OUTPUT PRICE INDEX (UKIOPI)
1969-1982**

Year	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
UKIOPI														
1975 = 100	50.5	54.1	59.0	62.1	66.7	81.8	100.0	117.3	140.5	153.3	172.0	200.0	221.3	237.2

Source: Various issues of the IMF, **International Financial Statistics**.

* The Index of April 1982.

However, the estimates of the direct costs of tying for the Sudan using the UKIOPI as a deflator tend to be very high resulting in an overall weighted average of 125% as can be seen from **Table [4.2]**. In order to check the performance of the UKIOPI, we wrote back to the British companies which supplied the alternative quotations, asking them for information on the price increases in their equipment over the deflated periods, which pertain to the various tied contracts. Although these companies might not be expected to reveal the true price increase of their equipment because this is a very sensitive issue, nonetheless, from the replies received, it seems that the price increase reflected by the UKIOPI is quite reasonable. For example, according to the information obtained from the British firms involved, price increases in fibre processing plants during the (deflated) period 1975-1982 was 110% while the UKIOPI shows a price increase of 137% over the same period. As for textile machinery (in particular weaving), prices have increased by 150% during the period 1974-1982 in comparison to the 190% increase reflected by the UKIOPI. Furthermore, the price increase in road

equipment seems to be 70% during the period 1977-1981 and according to the UKIOPI the increase was 57% over the same period. On balance, however, the UKIOPI should approximate the price increase over the deflated periods and hence the measured high excess costs of tying cannot be attributed to an overdeflation as a result of using the UKIOPI as a deflator.

Furthermore, the measured high excess costs of tying cannot be attributed to the effect of exchange rates because such a possibility has been accounted for during the process of deflation according to the procedure described in step (b). Finally, by asking the competitive alternative sources of supply from the very beginning for f.o.b. export prices, against which the tied quotations were compared, the effect of transport costs is effectively eliminated.

4.7 The Empirical Evidence

It is very difficult to arrive at an overall precise estimate of the amount of money that the Sudan could have saved from the obtained international assistance by buying from the international market had the assistance not being tied. Due to the lack of adequate information on all the credits as well as the problems involved in comparing different equipment having different specifications and capacities, the estimates of the direct costs of tying are usually regarded as approximations.

Table [4.2] summarizes the estimates of the mark up or the cost difference implied by tying the assistance to the purchases of donor's overpriced goods; while the detailed information has been reported in **Table [4.3]**. Both tables are based on 8 tied

projects which were also tied by source (i.e. double-tying) except the case of the printing press which was tied by source only as the machinery and equipment for this project were drawn against a general commodity loan contracted with West Germany. The total cost of these projects amounts to L.S 30 million but the specific items of equipment that have been included in the estimates of the direct costs of tying were worth about L.S 11 million.

The comparison of price quotations is largely confined to the items of equipment with similar specification, capacity and quality. In some cases, the comparison is based on price quotations for a complete project and in others it is based on the unit cost of each selected machinery item. The overall weighted average price for these projects tends to be 125% higher than international prices. It can also be seen from **Table [4.2]** that within the tying sources, donors like USA, Belgium and Italy seem to be harder in their tying practices.

In addition to the high mark up that the donors have imposed on the Sudan regarding these tied credits, the terms of borrowing on which the credits were offered were also very hard and nonconcessionary; and hence the associated grant elements (at the different discount rates used in Chapter Three)⁽¹⁾ were very low as can be seen from **Table [4.4]**. In this case, as pointed out in the previous chapter, the "value" of the credits could be negative. However, the exact mechanism through which the excess costs of tying would affect the real worth of the assistance is

(1) c.f. the discussion contained in Chapter Three, section 3.4.

not yet clear. One possible approach that has been used by the UNCTAD⁽¹⁾ is to regard the excess cost of tying as tantamount to increasing the effective rate of interest attached to the loan by the magnitude of the excess cost (i.e. an increase of 12.5% according to our estimates). As an example, the overall rate of interest obtained in Table [4.4] will be 19.8% instead of the 7.3% as a result of the excess costs of tying in which case the value of the loans involved may be negative. This means that the terms

Table [4.2]: The Excess Costs of Tying the Purchase of Machinery of Some Selected Projects in the Sudan (1969-1977).

No.	Name of project	(1)	(2)	(3)
		lowest quotations from tied source (country)	lowest quotations from alternative sources of supply (country)	excess costs of tying of tying $\left[\frac{(1) - (2)}{(2)} \right] \%$ using UKIOPI
1.	Well Drilling	Yugoslavia	Great Britain	117.4
2.	Printing Press	West Germany	" "	96.8
3.	Shendi (Gadow) Textile Factory	Italy	Great Britain, Japan and USA	123.0
4.	The Six Weaving Factories	Belgium	Great Britain, Japan and USA	165.7
5.	Abu Naama's Fibre Processing Back Up Project	Italy	Great Britain	56.1
6.	Tonj's Fibre Processing Back Up Project	"	" "	125.1
7.	The 22 Automatic Telephone Exchanges	Japan	USA	75.8
8.	Road Building Equipment	USA	Great Britain	248.3
Overall weighted average				125

Source: own estimates based on data compiled from the Sudanese Ministry of Finance and National Economy as well as various British, American and Japanese firms.

(1) See, UNCTAD, The Costs of Aid-Tying..., op. cit., p.3.

Table [4.3]: The Higher Prices Paid for Machinery Items Under Tied Credits : A Sample of Selected Sudanese Projects (1969 - 1977)

No.	Nature of the project; source of credit; year of the contract and some selected machinery items	(1)	(2)	(3)
		lowest quotations of tied source FOB; in Sudanese Pounds	lowest quotations of alternative sources of supply deflated by the UKIOPI	Percentage of excess cost of aid-tying $\left[\frac{(1) - (2)}{(2)} \right] \%$
	Well Drilling; Yugoslavia (1969):			
	1. Reciprocating deep well piston pump complete with accessories	2586.000	892.670	189.7
	2. Sucker rods ¾" A.P.I.	30.724	4.730	549.6
	3. Hoist complete with 200 ft. wire rope ½"	437.000	201.750	116.6
	4. Rising main 4" I.D.P.I. (per foot)	1.500	.750	163.2
	Printing Press; West Germany (1973):			
	1. Total cost of machinery for the press	190617.720	96850.832	96.8
	Shendi (Gadow) Tectile Factory; Italy; (1974):			
	1. Cotton production card Mod C40	16864.466	5056.579	233.5

Table [4.3] cont.

	(1)	(2)	(3)
2. Drawframe for cotton Mod S20	6723.778	3371.053	99.5
3. Cotton ring spinning frame Mod RC/701 (per spindle)	39.700	15.150	162.0
4. Hopper for waste Mod B11/1	5717.370	2696.842	112.0
5. Hopper feeder Mod B72/1	7128.430	3792.432	87.9
6. Automatic single shuttle weaving loom Mod T5C IXI	3569.787	1404.605(UK)	154.1
	3569.787	1077.000(Japan)	231.5
	3569.787	1800.000(USA)	98.3
7. Open width continuous washing and bleaching range	163327.070	78657.894	107.6
8. Chainless mercerising range - type IMS 30	176222.660	56184.210	213.7
9. Giant jiggers with cover - type F03	36508.915	19663.659	85.7
10. Hot air stenter frame for drying	66996.100	50565.789	32.5
11. Open width continuous washing range after printing Mod RHONE	111083.020	67421.052	64.8
12. Inspecting measuring rolling up machine - type VI/A	13569.787	4213.816	222.0
13. Pneumatic calender 5 cylinder - type CP5	28555.509	22473.684	27.1

Table [4.3] cont.

	(1)	(2)	(3)
The Six Weaving Factories, Belgium (1974):			
1. Automatic single shuttle weaving loom	2249.590	1404.605(UK)	60.2
	2249.590	1077.000(Japan)	108.9
	2249.590	1800.000(USA)	25.0
2. Inspecting measuring rolling up machine	13397.130	4213.816	217.9
3. High speed winding machine	200.970	112.368	78.8
Abu Naama's Fibre Processing Back-up Project; Italy (1975) :			
1. The total cost of machinery	4055362.100	2598566.000	56.1
Tonj's Fibre Processing Back-up Project; Italy (1975):			
1. The total cost of machinery	5850397.000	2598566.000	125.1
The 22 Automatic Telephone Exchanges; Japan (1975):			
1. The average cost per line	110.679	62.944(USA)	75.8

Table [4.3] cont.

	(1)	(2)	(3)
Road Building Equipment; USA (1977):			
1 Seaman Model MA Trailer-mounted (single axle) maintenance bituminous distributor - 600 gallon capacity. Spray bar nozzle spaced on 4 inch centres. Bar length 6 ft., hand spray attachment 1 inch x 15 ft.	5759.158	3172.005	81.6
2. Seaman senior bituminous distributors. Mounted on heavy duty chassis. Tank to hold 2000 gallons. Rear mounted engine drive. Dual fuel tanks	20252.402	5117.117	295.7
overall weighted average			125

Source: own estimates based on data from the same source of Table [4.2]

Table [4.4]: Terms of Borrowing, Value of Grant Elements and Excess Costs of Aid Tying:
A Sample of Selected Sudanese Projects (1969 - 1977)

No.	Nature of tied project	Value of the tied loan L.S million	Year	The Tying Source	Terms of Borrowing			The grant element at a discount rate based on			The excess costs of aid tying using UKIOPI %
					rate of interest (%)	maturity period (years)	grace period (years)	current interest rates**	8%	10%	
1	Well Drilling	4.3	1969	Yugoslavia	3	7	1	18.1	16.2	21.5	117.4
2	Abu Naama's Kenaf Fibre Prod. Plant	1.1	1972	Italy	7	8	4	5.0	14.5	21.6	-***
3	Tonj's Kenaf Fibre Production Plant	2.8	1973	Italy	7	8	2.5	15.3	10.8	17.6	-***
4	Printing Press *	0.6	1973	West Germany	-	-	-	-	-	-	96.8
5	Shendi (Gadow) Textile Factory	7.6	1974	Italy	8	8	1	14.1	4.2	10.8	123
6	The Six Weaving Factories *	5.0	1974	Belgium	-	-	-	-	-	-	165.7
7	Abu Naama's Back up Project	4.1	1975	Italy	8.5	5	1	3.3	1.8	6.7	56.1
8	Tonj's Back up Project	5.9	1975	Italy	8.5	5	2	6.1	4.6	9.5	125.1
9	The 22 Automatic Telephone Exchanges	1.7	1975	Japan	8	5	.5	2.9	1.7	6.3	75.8
10	Road Building Equipment	0.7	1977	USA	8	6	1.5	.95	4.8	10.2	248.3
Overall weighted average					7.3	6.5	1.5	10.2	6.7	12.4	125

Source: *Own estimates based on data from the same source of Table [4.2].

** The terms of borrowing for these contracts are not available.

*** The average rate of interest prevailing at the Eurodollar and UK money markets (see Table [3.3] in Chapter Three).

They are not included in the estimates because quotations from alternative sources of supply are not available.

of borrowing on which these loans were initially offered will be hardened because the recipient's repayments will be larger than the actual value of aid received. But this is not sufficient to justify the addition of the excess costs of tying to the rate of interest on foreign borrowing and it may, indeed, be very misleading in reflecting the true value of the assistance because the future interest payments on foreign borrowing will be unnecessarily increased.

Alternatively, the effect of aid-tying on the value of the assistance can be more appropriately assessed by determining the "shadow" value of the grant element. Recalling from Chapter Three (section 3.5) that the grant element as a per cent of the face value of the loan (GE) can be determined by calculating first the present value of all future repayments on the loan (PV), using a proper discount rate, which should then be deducted from the nominal value of the loan (F) and the net result should be divided by F. This relationship is expressed by equations (3.3) and (3.4) in Chapter Three as follows:

$$GE = \left(\frac{F-PV}{F} \right) 100 \quad (4.1)$$

or

$$GE = \left(\frac{1-PV}{F} \right) 100 \quad (4.2)$$

In order to work out the shadow value of the grant element, the present value of all future repayments on the nominal value of the loan (or PV) should be determined first⁽¹⁾ because the repayments should cover fully the nominal value of the loan whether the loan

(1) PV is determined according to equation (3.2) in Chapter Three.

is tied or not. But a tied loan would actually worth less than its face value because of the effect of the excess cost of tying and thus the nominal value of the loan should be "deflated" to its real value by the proportionate excess cost of tying. Since in this analysis the excess cost of tying is defined as the mark up on the price of tied goods (ϵ), F would be deflated by $1 + \epsilon = \pi$ where π is 1+% mark up on the price of tied goods. Then from this real value of the loan (or F/π) the already discounted future repayments (or PV) should be deducted, rather than being deducted from the nominal value of the loan (or F). In symbols, the shadow grant element (GE^*) can therefore be expressed as:

$$GE^* = \left(\frac{F^* - PV}{F^*} \right) 100 \quad (4.3)$$

or

$$GE^* = \left(1 - \frac{PV}{F^*} \right) 100 \quad (4.4)$$

where F^* is the real value of the loan i.e. F/π and $\pi = 1 + \epsilon$. According to equations (4.3) and (4.4), if the present value of future payments on the nominal value of the loan exceeds the real value of the loan after allowing for the effect of overpricing due to the practices of aid-tying, then the real worth of the assistance would be negative. This approach implies that the effect of aid-tying on the value of the assistance can be offset by softening the terms of borrowing.

It is clear from the examples provided in Table [4.5] that the real worth of the tied credits may become negative because aid-tying makes the recipient country effectively to repay more than the actual value of the aid received.

Table [4.5]: Examples of the Effect of Aid-Tying on the Value of the Assistance

No.	Nature of the tied project	The tying source	Year	(4) (5)		(6)			(7)		
				Value of the tied loan (F)	Real Value of the tied loan (F/π)	Present Value of Future repayments on the nominal value of the loan (PV); discounted by			Shadow Grant Element $\left[GE^* = \left(\frac{(5) - (6)}{(5)} \right) \% \right];$ at a discount rate based on		
				in L.S million		Current interest rates	8 %	10 %	Current interest rates	8 %	10 %
(1)	Well Drilling	Yugoslavia	1969	4.3	1.97	3.52	3.60	3.37	negative	negative	negative
(2)	Shendi (Gadow) Textile Factory	Italy	1974	7.6	3.41	6.52	7.31	6.77	"	"	"
(3)	Abu Naama's Back Up Project	Italy	1975	4.1	2.63	3.96	4.02	3.82	"	"	"
(4)	Tonj's Back Up Project	Italy	1975	5.9	2.62	5.54	5.62	5.34	"	"	"
(5)	The 22 Automatic Telephone Exchanges	Japan	1975	1.7	0.97	1.65	1.67	1.59	"	"	"
(6)	Road Building Equipment	USA	1977	0.7	0.22	0.69	0.66	0.62	"	"	"

Source: own estimates based on Table [4.4].

Regarding the analysis as a whole, it should be mentioned that the cost difference approach used in estimating the direct excess costs of aid-tying concentrates only on the actual cost incurred by the recipient country and does not take into account whether the recipient might have been able to reduce the costs of tying still further (for instance, by following a better procurement policy) even within the context of tying. Furthermore, it is not clear from the obtained data whether the Sudan had invited international bids and hence its effectiveness in minimizing the excess costs of tying cannot be assessed. Notwithstanding these limitations, it can be argued that, no matter how the overall excess cost of tying might be below the estimated 125%, it is unfair that a country like the Sudan should render such a subsidy to the exporters of certain developed donors and also repay the same subsidy with interest in later years.

4.8 Further Observations on Sudanese Tied Projects

Apart from the direct costs of aid-tying which have been already estimated in terms of the differential price charged for machines, this section provides some additional information on the performance of some of the tied projects after they have been completed. It also deals with the various terms embodied in some of the contracts and the conditions under which some projects have been executed. This will largely approximate the additional costs that were incurred throughout the period of the contracts i.e. the indirect costs.

(i) Well Drilling

The contract for drilling and erecting 400 tube wells was

signed with a Yugoslav company in 1969. The foreign exchange component of this project was estimated to be about L.S 4.3 million worth of machinery and equipment which would be exclusively procured from Yugoslavia. This cost was fully financed by a Yugoslavian loan according to the terms stated in Table [4.4]. Furthermore, the repayment of the credit and the interest was agreed to be in Sterling pounds according to the prevailing exchange rate at the time of signing the contract.⁽¹⁾ It was further agreed that the credit component of the contract should not be affected in any way by a devaluation of the Sterling pound, US dollar or the Sudanese pound.⁽²⁾ As far as the local costs are concerned, the contractor also reserved the right to adjust the prices in proportion if they are affected by devaluation.⁽³⁾

(ii) Textiles: The Experience of Weaving

It was in December 1974 that a Belgian consortium signed a contract with the Sudan government to construct and commission six weaving factories in different parts of the country. All the six weaving mills were planned to produce import substitute grey fabrics. The foreign exchange cost of these factories was

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- (1) All the estimates of the project were expressed in Sudanese pounds which were based on the following exchange rates: 1 Sudanese pound = 1.1965 Sterling pounds; and 1 Sudanese pound = 2.8716 US dollars.
 - (2) However, safeguarding against currency fluctuations when the repayments of loans are made typifies most of the contracts tied by source. For instance, in the case of Italy, the prices and/or costs will be continuously adjusted to any variation in the exchange rate between the US dollar and the Italian Lira. The mechanism by which this adjustment takes place is normally embodied in the price variation or escalation formula.
 - (3) These details have been extracted from the original contract.

estimated by the Belgian firm to be around L.S 5 million. This cost was financed by a Belgian loan as the procurement of machinery and equipment was tied by source to Belgium.

These factories have experienced various problems during and after their construction. For instance, in two cases there were serious problems stemming from the wrong choice of the site.⁽¹⁾ One factory was built on the lowest ground in the area and, hence, suffered serious flooding. It cost a further L.S 25,000 to excavate half a meter all around the premises of the factory and to cover it with plastic sheets for drainage purposes.⁽²⁾ Changing the site or excavating a large capacity basin near the factory was regarded as too expensive at that time. Similarly, the site of another factory was also chosen wrongly such that a seasonal river would have cut it off from the town (near which it should have been built) and from supplies for over five months of the year. At any rate, this problem was discovered in time and the location of the factory was changed.⁽³⁾

By examining one of the factories which has been completed in 1978, it was found that shortages of skilled labour, insufficient

(1) See, **Sudanow**, Khartoum, April 1978, pp. 29-30.

(2) Since the feasibility study of most of the projects is usually done abroad in isolation from the surrounding environment, these kind of mistakes are bound to happen; and this is how the local cost component is always wasted in paying for such mistakes.

(3) However, in most contracts (particularly those signed with Japan) the contractors tend to release themselves (contractually) from not being held responsible if they failed to fulfil their obligations (as stated in the contract) in the event of any unforeseeable causes such as fire, floods or (as the Japanese put it) acts of God.

supply of yarn and lack of fuel were the main reasons that prevent the factory from working in full capacity.⁽¹⁾

(iii) **Producing and Processing Fibre**

The contracts for the two Kenaf factories (at Abu Naama and Tonj) for producing and processing fibre, which were signed in two phases (1972-73; and 1975), have been granted to an Italian firm. The first phase covered the construction of the two factories as well as all the related civil engineering work and the initial management. The total estimated cost of this phase for both factories reached about L.S 4 million which was to be financed by the Italian firm on a loan basis, repayable in hard currency according to the terms provided in Table [4.4]. Besides the interest attached to the loan, there was also an additional 2.5% commission payable to the firm in order to get the loan from the Italian government.⁽²⁾ Furthermore, a cost increase of up to 15% was allowed against inflation. However, when the contracts of the two factories were compared by a Sudanese Committee, it was found that the quotations for the Tonj project (1973) were higher than those of Abu Naama's (1972) by 31% despite the similarity of machinery and equipment.⁽³⁾ Furthermore, the contract of Tonj does not include a training programme or a guarantee period of five

(1) See, Sudanow, April 1978, *op.cit.*

(2) Sometimes, the total value of the contract also includes contingency items which are often worth more than 5% of the total value of the contract. These items, which do not relate to the project that is covered by the contract, are to be agreed upon by both parties and also they must be procured from the donor source only. This phenomenon is prominent in some of the Japanese contracts.

(3) The records of the Ministry of Finance and National Economy.

years as in the case of Abu Naama. Also as can be seen from **Table [4.4]**, the grace period for EL Tonj's loan was shortened to two and a half years instead of the four years granted in Abu Naama's contract. The Italian firm has attributed the increase in machinery prices to an increase in wages of labour as well as a rise in the prices of raw-materials in Italy which have been reflected, in turn, in the price of machinery. On the other hand, the firm has justified the tightening of its terms regarding EL Tonj's contract on profits grounds. According to the firm, the generous terms of Abu Naama's contract were offered at the expense of its own profits because the firm wanted to start business in the Sudan and therefore the second contract would have to be adjusted to allow for more profits.⁽¹⁾

The second phase which was known as "back up projects" involved the contracts for the supply of all harvesting and processing machinery of Kenaf, the construction of retting basins (to extract the fibre) and a refining and processing plant. The back up contracts for both factories, which were signed by the same Italian firm in 1975, were to cost about L.S 10 million.⁽²⁾ The firm was also to cover the initial cost of importing equipment and materials on a basis of loan finance according to the terms shown in **Table [4.4]**.

The Abu Naama factory was completed and started production in 1976. The factory was designed to produce, at full capacity, 11

(1) **Ibid.**

(2) It is worth mentioning that the two contracts of the first phase are not included in the estimates of the excess cost of tying because the required quotations from alternative sources of supply were not obtained.

million of sacks per year which represents about 25% of the total domestic demand. The factory was unable to meet this target because it has been operating on a basis of one shift due to shortages of labour in particular during the harvesting period. In addition to that the lack of efficient transport has prevented the scheme from drawing on nearby villages as a source of labour supply. Resort has to be made to manual harvesters because the machines which were basically bought for this purpose proved to be unsuitable and failed to function.⁽¹⁾ This has led to a fall in production. For example, out of the 10,000 feddans which were cultivated during the season of 1980-1981 (though 30,000 were initially planned), only 4,000 were harvested i.e. the production of 6,000 feddans was wasted.⁽²⁾

Although the project has been handed to the Sudan government, but the irrigation system and the retting basins were not yet completed. Retting, therefore, has to be done in the nearby canals and as a result the workers were exposed to dangerous diseases while the quality of fibre was lowered below the standard required for sacks processing.⁽³⁾ However, besides the usual domestic problems (such as the failure of power, the irregularity of the payments of workers, the absence of preventive medicine and health service, the lack of transport and shortages of fuel) which threaten the future of the project, the factory might collapse any

(1) See, *AL Sahafa*, Khartoum, 12.4.1981.

(2) 1 feddan = 1.04 acre.

(3) Retting is a chemical operation which should be done at a certain degree of heat in order to guarantee the required standard of fibre.

time because the machines have been erected on a physically unstable foundation.⁽¹⁾

The other factory (at Tonj) has remained incomplete until now, having suffered from cement shortages and transport delays. Also, the majority of the machines which arrived on site have been damaged.⁽²⁾ Therefore, the Italian firm threatened to quit unless the damaged machinery could be replaced and all the materials arrive on site very promptly (i.e. within a few months time). In fact, the construction work on this factory stopped completely in 1977 due to the shortages of cement. Cement shortages, which were only associated with the two Kenaf projects (at both Tonj and Abu Naama), have been prominent mainly because the Italian firm has tried to control the domestic market of cement and to stipulate its prices from the date of signing the first- phase contract of Abu Naama in 1972. On the other hand, the Italian firm allowed itself to include a price escalation clause against inflation.⁽³⁾

(1) See, AL Sahafa, 12.4.1981, *op.cit.*

(2) See e.g., **Sudanow**, Khartoum, February 1979, pp. 43-46.

(3) The escalation clauses, which are usually embodied in the contracts, vary between donors and they take different forms. Most donors (like Italy and Belgium) take into account the element of inflation and, therefore, they use in the escalation formula that they apply over the whole contract period an index of inflation such as the retail price index as well as the basic wages index and the cost of material and labour in general. Also, sometimes they simply impose over a specified period of time a fixed annual percentage increase in the price of materials covered by the contract (as the Japanese do). Other donors (in particular Japan) give weight to the opportunity cost of capital and hence they include an average monthly cash earning index in the escalation formula and confine this to the procurement of spare parts.

Therefore, the cost of the Tonj scheme has risen considerably especially for the back up project which reached in 1979 about US \$19 million (instead of the original US \$16 million). Despite the fact that the project was showing no progress, the company has received a partial settlement in April 1977 when the repayment of its loan was due in October 1976; otherwise the company threatened to discontinue. However, the situation of the project seems to require a revised budget reinforced by extra funding if it is to be completed.

(iv) **The Satellite System**

It seems more reasonable to give an idea about the whole project of the Satellite network since the contract of the automatic telephone exchanges which has been included in the sample of tied projects was only an integral part of this system.⁽¹⁾ The work on the Sudan Domestic Satellite System (Sudosat) began in 1976 after the Sudan Telecommunications Public Corporation (STPC) signed a contract of US \$45 million with an American company on the basis of tied-aid.⁽²⁾ The Sudosat project was designed to revolutionize the Sudan's communications system through the use of Satellite technology to provide nationwide colour TV, telephone, telex and telegraphic services.⁽³⁾ The project included the installation of the ground network for 14 stations, 5 automatic telephone exchanges and the construction of

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- (1) The whole Satellite system, which was also financed on a basis of a source-tied loan, was not included in the estimates of the excess costs of tying due to data constraints.
- (2) The STPC used to be called the Department of Telecommunications.
- (3) See, **Sudanow**, Khartoum, December 1979, pp. 29-31.

220 KW broadcasting station in southern Sudan.⁽¹⁾ The contract was signed with this American company merely because it has already installed similar systems in Kenya and Uganda . Also of relevance to this discussion is the fact that Sudosat has been preceded in 1972 by a radio microwave system which cost around US \$20 million and was installed by another American company which happened to be in the Sudan until 1977 when the microwave system was completed; and hence it has also participated in the installations of some of Sudosat's ground stations.

When Sudosat was handed to the STPC towards the end of 1978, it was far from complete. In addition to the telex and telegraphic links which were to be fixed in most of the ground stations, about 5 stations (out of the total of 14) were waiting for their automatic telephone exchanges to be installed. With the majority of the ground stations off the air due to technical or electronic defaults and the system still incomplete, it has been discovered not only that some of the equipment installed by the American company was not up to the specifications, but also the company has left without finishing the contract.⁽²⁾ Therefore, the STPC has decided to test all the stations and to reject any equipment which fails to match the specifications unless it is replaced. This test should presumably have taken place while the company was still in the Sudan and before the final hand over of the project which is the conventional procedure that is normally followed in contracts.

(1) The Japanese contract (for supplying and installing another 22 automatic telephone exchanges) which has been included in the estimates of the excess costs of tying, is a separate contract.

(2) Sudanow, December 1979, **op.cit.**

However, the cost of replacing the rejected machinery, which was paid by the American company, reached over one million Sudanese pounds.⁽¹⁾

Several problems have been responsible for not completing as well as running Sudosat. The difficulty of transport (being aggravated by shortages of fuel) and the fluctuations of power have caused delays in installing the system and also caused inconveniences in running it. Moreover, despite the replacement of the improper equipment, the breakdown has continued because the technology was originally unsuitable for an environment like the Sudan.⁽²⁾ Also, the shortages of spare parts tend to constitute the most serious problem for Sudosat as it kept most the stations off the air and indeed this might happen to the whole system. Another problem affecting the efficient running of the stations is the shortage of trained manpower as those who will be trained do not stay on their jobs and migrate to the neighbouring Arab countries.

Due to these problems which threaten the future of the project, the STPC hired in 1976 the Norwegian firm "Norconsult",

(1) **Ibid.**

(2) For instance, according to Sudosat's technicians, the project's computer is not only very sophisticated but also it is not adaptable to slightly dusty conditions and/or high temperature. However, the advanced sophistication of the American technology (which might not be needed by third world countries) extends even to the simple case of road building which has been examined in the estimates of the excess costs of tying. We found that similar machines (which can do the same job and perhaps with the same efficiency) can be obtained from alternative sources (e.g. British) with much less complication in technology and at a very reasonable price in comparison to that of the USA.

under a contract of one million Sudanese pounds, in order to advise on the management of Sudosat and the microwave system. The firm estimates show that it will cost at least an annual expenditure of US \$0.5 million on spare parts in order to keep the stations operating.⁽¹⁾ However, with time and experience, this cost might be reduced by 50% which still means an expenditure of over US \$3 million during the project's 15 year life span. More importantly, the consignments of spare parts must be carefully planned to arrive in time, in particular when many spare parts have to be specially constructed.

Given these problems facing Sudosat, it will be legitimate to ask why such a sophisticated expensive system was originally chosen? The Sudanese who planned Sudosat seem to agree that the Sudan could have continued with the relatively cheaper and less vulnerable alternative of the microwave system but they also argued that this system could have taken a longer time to be completed relative to Sudosat. Furthermore, political and security considerations played a significant role in giving Sudosat a priority.⁽²⁾

Another important question that can also be asked is who will benefit from Sudosat?; given the fact that in one of the towns where a ground station was installed there was only one TV owner, the prices of the telex system (when it was completed) were largely prohibitive to most customers except perhaps a few rich businessmen, and also given the limited use of telephones in many

(1) Sudanow, December 1979, *op.cit.*

(2) *Ibid.*

towns in the Sudan. However, although TV ownership and telephone use can be expected to increase, will the growth in demand warrant the expenditure on the project?; knowing that (during the 15 year life expectancy of the US \$45 million Sudosat project) the project will require a sum of US \$ 15 million for renting Satellite space (i.e. a million dollars per year) in addition to the US \$3 million or more for the procurement of the necessary spare parts that will keep the station running.⁽¹⁾ The STPC seems to think (rightly or wrongly) that there will be a sufficient domestic demand that will be stimulated by introducing a highly sophisticated and fully computerized new system (known as CN/CNT) which might be completed in 1985. Under this new system, the subscriber will be able to dial directly through worldwide.

4.9 Conclusions

In this chapter the direct costs of tying the purchases of machinery and equipment of some Sudanese projects to the donor's source have been quantified using a cost-difference approach. The analysis has covered 8 tied projects which were also tied by source (i.e. double-tying). The estimated overall weighted average of the excess cost of tying these projects tends to be 125% higher than the international market.

The analysis also shows that in addition to the hard terms on which the credits for financing these projects were offered, the

(1) For instance, in one of the towns in the South there were only 87 private and 178 government telephone lines whereas the Southern capital (Juba) itself has just 247 government and 253 private lines. See e.g., Sudanow, *ibid.*

cost of these projects was also made more expensive by including in the contracts price escalation clauses, additional commissions which are payable on top of the rate of interest attached to the credits and contingency items which do not relate to the projects under consideration. On the other hand, the donors tend to control the domestic Sudanese market by stipulating the prices of the domestic materials required for the projects, to safeguard against any fluctuations in their currency in order to keep the value of the loans intact and to free themselves from any unforeseeable hazardous factors which might lead to the failure of executing the contract. Therefore, given the measured high excess costs of the tied Sudanese credits as well as the nonconcessionary terms on which these credits were offered, it has been shown that the value of these credits was negative.

By examining some of the completed projects, it appears that most of the projects have been handed to the Sudan's government before being fully completed as well as suffering from continuous technical defaults. In some cases the installed machines were not compatible with the contract's specifications and in others the erection of a whole factory was done on a physically unstable foundation. This means that there must be a proper follow up of projects' execution as well as a comprehensive technical check before finally accepting a completed project. Furthermore, the completed projects have suffered from several domestic problems major among which are the fluctuations of power, the lack of sufficient manpower, shortages of fuel and delays of transport. These factors not only contributed to the incompleteness of these

projects but also they have caused inconveniences in running them.

Ideally, aid should be untied since tying reduces the efficiency of loans in providing economic assistance. However, if the practices of aid-tying by donors cannot be avoided on grounds of the balance of payments protection, then the recipient countries must do their best in order to minimize the excess costs of tying by adopting proper procurement policies, designing efficient programming of imports, inviting worldwide tenders and utilizing the competitive substitution possibilities whenever they exist. On the part of donors, the disadvantages of tying to recipients can be mitigated if the donors can accept the repayment of tied loans in the local currency of debtor countries or by buying their exports (i.e. reciprocal tying) and thereby mitigating the pressure on the foreign exchange reserves of these countries. The problem with this scheme is the limited range of the goods produced by developing countries which will be demanded by the developed donors. Another proposal would be the extension of bilateral arrangements between donors which would allow the assistance from one donor to a developing country to be exchanged with another one originating from another donor country and hence the tying levels will be maintained the same while the competitive opportunities will be increased to recipients. Similarly, multilateral purchasing arrangements can be devised in order to enable recipient countries to buy in the cheapest markets within a group of countries which can be chosen such that the gains and losses from "untying" the assistance would cancel out.

CHAPTER FIVE

FOREIGN CAPITAL INFLOWS, DOMESTIC SAVINGS AND ECONOMIC GROWTH

5.1 (a) **Macroeconomic Theories of Foreign Aid**

The macroeconomic approach to the impact of foreign capital inflows on the economic development of LDCs examines the effect on the growth and savings rates of these countries when receiving foreign assistance. The theories involved in this analysis have passed through three main phases.

In the first phase, capital imports were regarded not only as exogenous net increments to the capital stocks of recipient countries but also as a supplement to foreign exchange in a situation where the recipient's growth is foreign exchange limited. Therefore, given the marginal propensity to save and the incremental capital-output ratio (ICOR), a country would experience a certain increase in its growth rate as a result of receiving a given amount of aid.

The second phase emphasized that aid in practice has sometimes been used for consumption purposes (i.e. a substitute for domestic saving rather than a supplement). In addition, foreign capital inflows tend to raise the capital-output ratio (COR), i.e. to reduce the productivity of capital, by financing prestige projects. The net result may be that aid does not lead to the predicted extra growth. Indeed it has been argued that the growth rate is even retarded by aid. The supporting empirical

evidence for these propositions was derived from cross-country regressions which showed a negative correlation between foreign and domestic savings and inconclusive evidence as to the relation between aid and growth.

The third phase criticised the analysis of the second phase for ignoring, among other things, the sources of bias in the data, especially that aid has been conflated with other resource inflows. When these sources of bias were corrected for, a positive correlation between aid and growth emerged from the empirical analysis.

After discussing these three stages (which will be referred to as the orthodox models, the debate and further comments and contributions respectively) in more detail the second part of the chapter will examine the empirical evidence for the Sudan.

(i) **The Orthodox Models**

The traditional view on the impact of foreign capital inflows on the economies of LDCs assumes that these inflows will add to investment and domestic savings and therefore affect income positively.⁽¹⁾ In particular what came to be called dual gap

(1) See e.g., M. Millikan and W. Rostow, **A Proposal: Key to an Effective Foreign Policy**, Harper and Row, New York, 1957; and also P. Rosenstein-Rodan, "International Aid for.....", **op.cit.**

analysis,⁽¹⁾ which incorporates the traditional view, was held to provide a comprehensive theoretical framework for examining aid to LDCs. The dual gap model stresses the dual role of foreign assistance in the development process, as a supplement to domestic savings on the one hand and as a supplement to foreign exchange on the other when the growth of a developing country is constrained by its inability to import the required inputs. It has also provided a basis for estimates of foreign resource requirements for LDCs in order to achieve self-sustaining growth⁽²⁾.

The dual gap model assumes a lack of substitutability between imports and domestic resources, fixed factor proportions and a rigid relationship between both imports and investment and imports and output. Then using a Harrod-type relationship, saving and investment - good imports are required for a developing country to achieve a target rate of growth i.e. $g=s/c$ or $g=s\sigma$ where g is

(1) A substantial part of the work in this area has been undertaken by Chenery and associates. See e.g., H. Chenery and A. Strout, "Foreign Assistance and Economic Development", **American Economic Review**, September 1966; H. Chenery and M. Bruno, "Development Alternatives in an Open Economy: The Case of Israel", **Economic Journal**, March 1962; H. Chenery and A. MacEwan, "Optimal Patterns of Growth and Aid: The Case of Pakistan", **Pakistan Development Review**, Summer 1966, I. Adelman and H. Chenery, "Foreign Aid and Economic Development: The Case of Greece", **Review of Economics and Statistics**, February 1966; H. Chenery and P. Eckstein, "Development Alternatives for Latin America", **Journal of Political Economy**, July/August 1970 (Supplement).

(2) It is useful to remind the reader at this point that this thesis is not concerned with the estimates of aggregate foreign resource requirements for the Sudan but rather with the analysis of the foreign assistance actually received and its contribution to the development process.

the growth rate ($\Delta Y/Y$), s is the saving ratio, c is the ICOR ($I/\Delta Y$) which is the reciprocal of the productivity of capital σ , I is investment and Y is output. If a country receives an amount of foreign capital equivalent to (a) , then the growth rate would rise to $g=(s+a)\sigma$. This defines the relation between savings and growth.

Similarly, the relation between investment-good imports and growth is determined by the incremental output-import ratio m' or ($\Delta Y/M$) i.e. $g=im'$ where i is the import ratio (M/Y) and M is imports. Thus the growth rate would rise to $g=(i+a)m'$ as a result of an amount of capital imports equal to a . Denoting the target growth rate by g^* , the required saving ratio by s^* and the required import ratio by i^* , then investment requirements (as a proportion of output) can be calculated as $s^*=g^*c$ (or $s^*=g^*/\sigma$) and the import requirements (as a proportion of output) will be $i^*=g^*/m'$.

When actual domestic savings are not compatible with the required level of investment that would achieve g^* , a saving-investment gap will exist i.e. $s^* - s = a$. Likewise, if the minimum required imports for g^* are calculated to be more than can be obtained given maximum feasible exports, an export-import (or a foreign exchange) gap will exist i.e. $i^* - i = a$. Growth is said to be investment limited when the domestic resource gap is dominant and trade limited when the foreign exchange gap is bigger. The ex post identity of the two gaps is an accounting identity given the dominant constraint on growth. Ex ante, however, they do not have to be equal.

Since the two gaps are not additive, foreign capital inflows will bridge the dominant gap and the other will be automatically covered. When the domestic resource gap is dominant, it can be narrowed through the increase in savings as a result of an increase in national income by more than the increase in investment i.e. the marginal propensity to save should exceed the average propensity to save. However, the self-sustained growth which the dual gap model postulates (i.e. the need for further assistance will cease) would be achieved only if $s' > g^*/\sigma$ where s' is the marginal propensity to save. Therefore, the larger the saving-investment gap, the less likely this condition can be satisfied because the more the marginal propensity to save must exceed the average in order to eventually close the gap.

Alternatively, when the foreign exchange gap is dominant, it will become less limiting provided that exports grow at a faster rate than national income and/or the import-investment coefficient falls indicating that more capital goods are being produced domestically i.e. the marginal import ratio must be below the initial average import ratio.

The preceding discussion established that capital imports can accelerate the growth rate. The questions of how capital imports are financed and how the terms of borrowing may affect the growth rate were discussed in a debate between Ball⁽¹⁾ and Massell⁽²⁾. The resulting model which incorporates these considerations, as

(1) See, R.J. Ball, "Capital Imports and Economic Development: Paradox or Orthodoxy", *Kyklos*, No. 3, 1962.

(2) See, B.F. Massell, "Exports, Capital Imports and Economic Growth", *Kyklos*, No. 4, 1964.

will be further discussed in the next chapter, shows that capital imports will accelerate the growth rate of output provided that the new inflows of foreign capital exceed the losses in domestic savings which pay for the interest on past loans. Even if interest charges are met by further borrowing, foreign capital inflows should always have a favourable effect on the growth rate of output until the borrower is internationally classified as uncreditworthy. Furthermore, the rate of growth of national income will be faster with capital imports so long as the productivity of capital exceeds the rate of interest attached to the loans.

The implicit assumption made by these models is that foreign capital inflows do not reduce the productivity of capital and the domestic saving ratio. This assumption has been disputed by many critics and subsequently the foundation of the dual gap analysis was shaken.

(ii) **The Debate**

The critics of the dual gap analysis vary from those who expose the practical weaknesses of the model on the one hand, and those who reject it on theoretical as well as empirical grounds on the other.

Fei and Ranis⁽¹⁾, for instance, have criticized the dual gap model for "indefinite behavioural assumptions" and "unresolved" identification problems. Bruton⁽²⁾ has examined the factors which

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- (1) See, J.C.H. Fei and G. Ranis, "Foreign Assistance and Economic Development: Comment", **American Economic Review**, September 1968, pp. 897-912.
- (2) See, H.J. Bruton, "The Two Gap Approach to Aid and Development: Comment", **American Economic Review**, June 1969, pp. 439-446.

determine the gaps and questioned the effectiveness of aid in closing the dominant gap. Similar arguments have been also developed by Joshi⁽¹⁾ who emphasized the range of objectives and policies open to most LDCs which have a bearing on both foreign exchange and saving requirements. Given time, the distinction between the two gaps is seen as irrelevant.

It is apparent that the most controversial assumptions are the inflexible composition of imports and the rigid relationships between imports and investment and imports and output. When there is complete substitutability between imports and domestic resources, there can only be one gap, in theory, ex ante as well as ex post. However, factor proportions may be slow to adjust and substitution between foreign and domestic resources may be a gradual drawn out process which allows an empirical dual gap analysis to be undertaken at particular points in time but not over a very long period.

Other critics have attacked the orthodox theories by considering the ultimate consequences of foreign aid from two different points of view. Friedman⁽²⁾ and Bauer⁽³⁾ are doubtful about the effectiveness of foreign aid. Friedman maintains that bilateral aid would not only be wasted but also it will discourage foreign governments from creating an environment favourable to

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- (1) See, V. Joshi, "Saving and Foreign Exchange Constraints", in P. Streeten (ed.), *Unfashionable Economics*, *op.cit.*, pp. 111-133.
 - (2) See Milton Friedman, "Foreign Economic Aid: Means and Objectives", *Yale Review*, June 1958, pp. 501-516.
 - (3) See, P.T. Bauer, "UNCTAD and Africa", in G.M. Meier (ed.), *Leading Issues in Economic Development*, 2nd ed., Oxford University Press, 1970, pp. 280-284.

private investment. Bauer argues that aid encourages the increase of defence expenditure and the pursuit of inflationary financing of wasteful plans. Furthermore, the inflows of foreign aid may be linked with policies which serve to reduce private investment and even encourage the flight of capital. Bauer attributes the low level of output per capita in LDCs to the existence of customs and institutions in these countries which are unfavourable to economic growth rather than to the deficiency of domestic savings. Therefore, the provision of foreign aid will not accelerate the rate of growth and under such circumstances would adversely affect it and ultimately retard it⁽¹⁾.

On the other hand, radical critics have pointed to the adverse effects of foreign assistance on the propensity to save of LDCs and on the efforts of the governments of these countries to mobilize domestic resources for development purposes. This argument was initially developed by Griffin⁽²⁾ when he criticised dual gap analysis for excluding the possibility that capital imports can supplement domestic consumption i.e. aid can be a substitute for domestic savings rather than a supplement. To substantiate this argument, Griffin maintains that there can only be one constraint on investment in the long run through savings, given that the dual gap model is a long run growth model, because it is unlikely that an economy will remain so rigid as not to produce capital goods, export goods or import substitutes. The

(1) See, P.T. Bauer, **Dissent on Development: Studies and Debates in Development Economics**, Weidenfeld and Nicolson, London, 1971.

(2) K.B. Griffin, "Foreign Capital, Domestic Savings and Economic Development", **Bulletin of Oxford Institute of Economics and Statistics**, May 1970.

foreign exchange constraint might appear when governments are unwilling rather than unable to introduce policies which would earn or save foreign exchange, for instance, the unwillingness to reduce consumption in order to expand exports or to reduce the level of imports. Regarding Griffin's general proposition, Rahman⁽¹⁾ has demonstrated that if people follow the principle of maximizing social utility, an inverse relationship would probably exist between foreign capital inflows and domestic savings.

However, Griffin's main contention is that aid to LDCs has done nothing to raise the rate of economic growth not only because of the depressive impact of capital imports on the rate of domestic savings but also because any addition to saving will be offset by a rise in the COR as foreign assistance tends to be biased towards financing prestige and infrastructural projects as well as social overhead capital. Ultimately, aid might even have an immiserizing effect. The argument can be summarized in this equation⁽²⁾

$$g = \frac{s+(1-\lambda)F}{c+q} - \frac{s}{c} \quad (5.1)$$

where g is the growth rate due to capital imports, s is the original domestic saving ratio, F is capital imports as a proportion of national income, λ is the proportion of capital imports consumed, c is the COR and q is the amount by which the capital-output rises due to capital imports. It is clear that g

(1) See, M.A. Rahman, "The Welfare Economics of Foreign Aid", *Pakistan Development Review*, Summer 1967.

(2) See e.g., C. Kennedy and A.P. Thirlwall, "Foreign Capital, Domestic Savings and Economic Development: Comment", *Bulletin of Oxford Institute of Economics and Statistics*, May 1971, pp. 135-138.

may be very low (or even becomes negative) if λ is high and q is sufficiently high to offset the small addition to saving which might take place.

In order to examine the behaviour of λ in equation (5.1), Griffin assumes that consumption is a positive function of total available resources i.e. national income plus net capital imports.⁽¹⁾ This is because in most cases foreign capital transfers can be firmly expected and treated as part of total income when decisions of domestic expenditure are made unlike the case of unanticipated capital transfers which will be regarded as transitory and may be largely saved. The normal marginal propensity to consume will therefore apply to the case of anticipated foreign capital transfers and the consumption function would be⁽²⁾

$$C = d + a(Y+A) \quad (5.2)$$

where C is consumption, Y is national income and A is net foreign capital inflows. Since domestic savings, (S) is equal to $Y-C$, it follows that

$$S = -d + \beta Y - aA \quad (5.3)$$

where $\beta = 1 - a$. Then by suppressing the intercept and dividing through by Y , equation (5.3) can be written in a ratio form as

$$\frac{S}{Y} = \beta - a \frac{A}{Y} \quad (5.4)$$

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- (1) This hypothesis was first proposed by Haavelmo and tested by Rahman. See, M.A. Rahman, "Foreign Capital and Domestic Savings: A Test of Haavelmo's Hypothesis with Cross-Country Data", **Review of Economics and Statistics**, February 1968, pp. 137-38.
- (2) See, K.B. Griffin, "Reply", **Bulletin of Oxford Institute of Economics and Statistics**, May 1971, pp. 156-61.

which shows that the higher the ratio of aid to income, the smaller will be the rate of domestic savings. This is the equation which Griffin had regressed and his results showed a negative correlation between domestic and foreign savings as can be seen from Table [5.1].

Griffin mentioned also various ways, depending on place and time, by which domestic savings might be reduced as a result of an increase in foreign capital inflows. The major argument seems to be that the recipients' governments will be induced to increase expenditure on consumption and become less vigorous in their saving efforts. Accordingly, attention will be diverted away from mobilizing domestic resources for development purposes. Similarly, capital imports may lower private savings if they were transferred by specialized domestic banks to private indigenous entrepreneurs as loans on soft terms. This may act as a disincentive for local investors to save. Furthermore, the penetration of private foreign investment might pre-empt the investment opportunities for local investors in which case the supply of indigenous entrepreneurs and the domestic savings would be reduced.

On the other hand, Griffin's explanation as to why foreign capital inflows tend to raise the COR relates to a larger extent to the motives of aid donors. He stresses the tendency of capital imports to change the pattern of domestic investment in LDCs in favour of social overhead capital and economic infrastructure. The neglect of directly productive activities and this bias towards financing only prestige projects have led to a deterioration in the "effectiveness" of investment to the disadvantage of recipient

countries. Therefore, aid may not only lead to lower domestic savings, it may also retard the long run economic growth.

Elsewhere, Griffin and Enos⁽¹⁾ have examined the impact of foreign capital inflows on the rate of economic growth of some developing countries by regressing the growth rate of national income against foreign capital inflows (as a ratio of national income) and found that the coefficient of correlation was insignificant and small (and in some cases negative).

(iii) **Further Comments and Contributions**

Griffin's propositions regarding the effect of foreign assistance on domestic savings (it would be reduced) and the COR (it would be raised) have invoked several arguments from critics. The shared disagreement with Griffin's analysis among most of the critics relates to whether any causality exists regarding the alleged negative relationship between foreign and domestic savings. Also, Griffin fails to explain how the aid effect can be improved.

Kennedy and Thirlwall⁽²⁾ argued that a reduction in domestic savings (i.e. an increase in consumption) would not necessarily result from an increase in foreign capital inflows, and even if it did, it should not lead to a rejection of capital imports if consumption is desirable or productive. Furthermore, when Griffin considered the projects with high CORs that foreign capital is allegedly financing, he has ignored the external repercussions and

(1) See, K.B. Griffin and J.L. Enos, "Foreign Assistance: Objectives and Consequences", **Economic Development and Cultural Change**, April 1970, pp. 313-327.

(2) See, C. Kennedy and A.P. Thirlwall, "Foreign Capital, Domestic....", *op.cit.*, pp. 135-138.

the spillover effects of these types of investment. Thirlwall⁽¹⁾ elsewhere has discussed the interpretation of the statistical negative association that Griffin has found between domestic savings and capital imports. Since domestic savings (S) are usually defined in LDCs as investment (I) less capital imports (F), i.e. $S=I-F$, it then follows when F rises and I rises by less than F, S must fall for the equality to hold. Therefore, the negative statistical relationship between S and F cannot necessarily be interpreted as a weakening of the development effort: it may simply reflect the fact that a proportion of capital imports is directly consumed.

Stewart⁽²⁾ has pointed out that the regression of domestic savings (defined as $I-F$) against F (defined as the deficit of the balance of payments on current account) will usually have a coefficient which is a negative fraction i.e. any increase in the deficit on current account will have a consequential reduction in domestic savings, other things remain equal. She further argued that even if foreign capital inflows finance projects with relatively high CORs, it does not necessarily follow that the overall impact on the development effort should be negative. This would further require the assumption that the non-aid effort is adversely affected to offset the rise in income due to capital imports otherwise the impact of foreign aid on future levels of

(1) See, A.P. Thirlwall, Growth and Development..., **op.cit.**, p. 300.

(2) See, F. Stewart, "Foreign Capital, Domestic Savings and Economic Development: Comment", **Bulletin of Oxford Institute of Economics and Statistics**, May 1971, pp. 138-49.

income would be still positive (although it might be small). She referred to some cases where the provision of aid might distort (directly or indirectly) the non-aid effort. For instance, when aid is available for the direct foreign exchange costs of certain projects (as used to be the rule of the World Bank), the recipients' governments might be induced to shift their own efforts towards such projects. Sometimes aid also reduces the efforts elsewhere in the economy by diverting the scarce local resources to the aid projects only.

Eshag⁽¹⁾ concentrated on the implicit assumptions which he argues are necessary for Griffin's conclusions to hold. These assumptions include the elasticities of supply of labour and of goods and services in LDCs are zero (i.e. the productive resources were fully utilized prior to the receipt of aid) and that the domestic resources used with foreign assistance in new investment projects are entirely diverted from other productive activities. Then by retaining the assumption of a dominant foreign exchange constraint and relaxing the assumption of a zero elasticity of labour supply (because of the unutilized redundant labour in most LDCs, idle land and equipment), he argued that domestic savings will be expected to increase as a result of a foreign capital influx. This is because some idle domestic resources will now be used given the foreign resources for new investment projects. In addition, provided that the growth in public consumption does not

(1) See, E. Eshag, "Foreign Capital, Domestic Savings and Economic Development: Comment", **Bulletin of Oxford Institute of Economics and Statistics**, May 1971, pp. 149-156.

exceed the increase in the government's tax revenue plus the rise in private savings (which both will be generated due to the increase in domestic income), the rise in savings due to the multiplier effect may counteract the fall due to consumption out of foreign assistance. In regard to the negative correlation between domestic savings and aid revealed by Griffin's regression equation, Eshag argued that a fall in the value of exports, which often results in a deterioration of the balance of payments is likely to cause a fall in domestic income and the saving ratio.

Papanek ⁽¹⁾ criticised the macroapproach to foreign aid for treating total foreign resource inflows and aid as synonymous. He called for a disaggregation of total capital imports into their different forms and a separate analysis of aid, especially when domestic saving is defined as $I-F$. Then by considering what he described as a "set of plausible saving functions", he argued that a positive association between foreign aid and domestic savings could be theoretically expected. According to him, foreign capital inflows will raise domestic savings if: (1) growth is constrained by a shortage of foreign exchange, (2) capital imports increase the incomes of industrialists and exporters and (3) the recipient's government has no effective mechanism to reduce savings. He regarded the negative correlation between domestic and foreign savings that Griffin had found as a measure which involved only a "correlation" but no "demonstrated causality". He

(1) See, G. Papanek, "The Effect of Aid and Other Resource Transfers on Savings and Growth in Less Developed Countries", *Economic Journal*, September 1972, pp. 934-50.

maintained that both savings and high foreign capital inflows are likely to be caused by a third factor namely the poor or deteriorating economic and political situations in LDCs. When aid is the major component of foreign transfers and low savers receive more aid because of their greater need⁽¹⁾, low savings and high foreign capital inflows would obviously be correlated in cross-country analysis. Therefore, if the inflows are inadequate to supplement low domestic savings in order to provide sufficient resources for growth, high inflows will also be associated with low growth rates.

Papanek also criticized the method of calculating domestic savings. He argued that grants for consumption should not be deducted from investment when domestic saving is calculated because the counterpart increase in consumption will result in a misleading reduction in the savings rate. Newlyn⁽²⁾, on the other hand, argues that this should not be the case when the correct definition of the current account deficit is used. Current transfers, as distinct from capital transfers, will be included in the current account. Then using the standard United Nations

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- (1) Conceptually, causality could run the other way and the argument could be reversed. The countries which grow more rapidly would receive more foreign aid because of their better performance. However, there is no strong empirical support for such an argument as Papanek himself found out. Regarding the allocation of aid according to the recipient's need, see the discussion in Chapter Three (section 3.11) and the references cited therein.
- (2) See, W. Newlyn, "The Effect of Aid and Other Resource Transfers on Savings and Growth in Less Developed Countries: Comment", **Economic Journal**, September 1973, pp. 867-69.

procedure, consumption grants will be included in the current transfers and thus will not be deducted from investment when "national savings" are calculated. Only if consumption grants are inappropriately treated as capital items will the confusion referred to by Papanek arise. The confusion will be due to an inappropriate specification of capital inflows rather than anything else that relates to the accounting convention. Newlyn suggests that the unambiguous alternative would be the use of investment or consumption (instead of savings) as the dependent variable in regression analysis when the impact of foreign capital inflows on domestic savings is to be examined.

Mosley ⁽¹⁾ has recently considered the empirical analysis of Papanek ⁽²⁾ and argued that the estimated single equation model by ordinary least squares (OLS) would be inappropriate if some of the independent variables are endogenous to the system under examination. This should be the case with aid which both "influences" and is also "influenced" by the recipient's income level. Once strategic and political considerations are satisfied, aid can be assumed to be released proportionately according to recipients' needs following the simple principle of progressivity. Therefore, a close approximation of the true model would be to regard economic growth as a function of domestic savings and foreign finance, and also, foreign finance as a function of

(1) See, Paul Mosley, "Aid, Savings and Growth Revisited", **Bulletin of Oxford Institute of Economics and Statistics**, May 1980, pp. 79-95.

(2) See, G. Papanek, "Aid, Foreign Private Investment, Savings and Growth in Less Developed Countries", **Journal of Political Economy**, January/February 1973, pp.120-130.

growth.⁽¹⁾ This relationship should be appropriately estimated by means of a two-stage least squares (2SLS) technique if reliable and unbiased estimates are to be obtained. Mosley has also stressed the lagged response of development indices, the dependent variable, to aid, the independent variable. He argues for the introduction of a lag structure in the estimating equations because of the delays in the disbursement of aid commitments on the one hand, and the gestation period that elapses between the disbursement and the realization of returns on investment on the other.

(b) The Empirical Evidence

Table [5.1] summarises some of the existing empirical evidence on the relationship between domestic savings and foreign capital inflows. The evidence is based on both time series and cross-sectional analysis; and it generally indicates the existence of a negative correlation between domestic savings and capital imports. When investment is treated as a dependent variable, the estimated coefficients appear to be positive and less than unity. Although Table [5.1] is largely self explanatory, some comments can also be made.

Griffin,⁽²⁾ and Griffin and Enos⁽³⁾ in a cross-sectional study of 32 developing countries, during the period 1962-64, have

(1) Papanek's estimated equation is:
Growth = 1.5 + 0.20 (savings) + 0.39 (aid) + 0.17
(foreign private investment) + 0.19 (other financial
inflows)

$$R^2 = 0.37$$

See, G. Papanek, *ibid.*, p. 121.

(2) K.B. Griffin, "Foreign Capital...", *op.cit.*

(3) K.B. Griffin and J.L. Enos, "Foreign Assistance...."
op.cit.

found a negative significant correlation between domestic and foreign savings. Using the cross-country data published by Chenery and Strout,⁽¹⁾ Rahman⁽²⁾ has reported a negative correlation between domestic savings and capital imports casting doubts on the presumption that foreign capital can be used only for augmenting investment and not as a substitute for savings.

When the time series results for the same countries studied are compared, as shown in **Table [5.2]**, the regression coefficients of all the 4 countries studied by Weisskopf⁽³⁾ show negative signs within the range of zero and minus one. The same is true for 6 out of the 9 countries studied by Chenery and Eckstein⁽⁴⁾ while the remaining 3 coefficients show very small positive signs. However, the wide disparity among the coefficients estimated by Areskoug⁽⁵⁾ renders his results less reliable.

The empirical findings of Chenery, EL Kington and Sims⁽⁶⁾ have also shown a negative correlation between domestic and foreign savings with an estimated coefficient - 0.49. Using 85

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- (1) H. Chenery and A. Strout, "Foreign Assistance and Economic...", **op.cit.**
 - (2) M. A. Rahman, "Foreign Capital and Domestic...", **op.cit.**
 - (3) See, T. Weisskopf, "The Impact of Foreign Capital Inflows on Domestic Savings in Underdeveloped Countries", **Journal of International Economics**, Vol. 2, No. 1, February 1972.
 - (4) H. Chenery and P. Eckstein, "Development Alternatives...", **op.cit.**
 - (5) See, K. Areskoug, **External Public Borrowing: Its Role in Economic Development**, Praeger, New York, 1969.
 - (6) See H. Chenery, H. EL Kington and C. Sims, "A Uniform Analysis of Development Patterns", **Economic Development Report**, No. 148, Centre for International Affairs, Harvard University, July 1970.

Table [5.1]: The Effect of Capital Imports on Saving or Investment

No.	Author	No. of observations	Time Series or cross-section	Saving or investment	Effect of aid on saving or investment
1	Griffin (1970); and				
2	Griffin and Enos (1970)	32	C	S	-0.73
3	Rahman (1968)	31	C	S	-0.25
4	Areskoug (1969)	22	T	I	+0.40
5	Weisskopf (1972)	38	T	S	-0.23
6	Chenery (JPE, 1970)	16	T	S	+0.64 to -1.15
7	Chenery (EDR, 148, 1970)	90	C	S	-0.49
	Chenery (EDR, 148, 1970)	90	C	I	+0.11
8	Papanek (JPE, 1973)	85	C	S	-1.00
9	Mosley (1980)	83	C	S	-0.11

Source: The results of the first seven studies were reported in Papanek, "The Effect of Aid....", *op. cit.*; and the rest were extracted from the original sources.

Table [5.2]: Time Series Evidence on the Effect of Capital Imports on Saving.

Country	Weisskopf (generally 1953 - 1966)	Chenery (JPE) (generally 1950 - 1964)	Areskoug (generally 1950 - 1964)
Colombia ⁽¹⁾	-0.07	-0.36	-1.53
Costa Rica	-0.58	-0.26	
Honduras	-0.88	-0.25	
Mexico	-0.06	-0.76	-0.58
Chile		-0.42	+0.01
Brazil		+0.07	-1.02
Guatemala		+0.02	+4.30
Panama		-1.15	-0.57
Paraguay		+0.04	+1.54

Source: Papanek, "The Effect of Aid.....", *op. cit.*

(1) For 1950 - 63 Griffin's coefficient is -0.84.

observations for the 1950s and 1960s, Papanek's⁽¹⁾ empirical findings have shown a significant negative correlation between domestic savings and aid on the one hand, and a significant positive correlation between aid and growth on the other. In order to allow for the effect of the energy crisis, Mosley⁽²⁾ has examined a sample of 83 developing countries during the 1970s and his 2SLS estimates revealed a weak and insignificant negative correlation between growth and aid while the OLS estimates showed a strong and significant negative correlation between aid and savings.⁽³⁾

To conclude: there are, however, two consequences of the use of foreign resources in order to accelerate the process of self-sustained growth which may, nevertheless, frustrate that growth. The first is the difficulty, to which Dacy⁽⁴⁾ has drawn attention, of adjusting the government budget to the "discontinuation" of foreign assistance, given the built in character of government consumption expenditure patterns resulting from the use of foreign finance. This is initially a domestic fiscal problem which might be solved by appropriate phasing of the tax effort. The other consequence of dispensing with foreign finance is the almost certain emergence of a trade constraint in which case foreign

(1) G. Papanek, "Aid, Foreign Private..." *op.cit.*

(2) P. Mosley, "Aid, Savings...", *op.cit.*

(3) There are also similar studies which dealt with the experience of individual developing countries, see e.g., N. H. Leff, "Marginal Savings Rates in the Development Process: The Brazilian Experience", *Economic Journal*, September 1968, pp. 610-23.

(4) See, D. C. Dacy, "Foreign Aid and Growth in Less Developed Countries", *Economic Journal*, September 1975.

finance would be instrumental in stepping up the rate of growth unless the domestic saving ratio is very low, the foreign inflows are dissipated in additional consumption or the terms of borrowing are too hard. Under these circumstances, it is possible that the subsequent growth rate will fall below what it would be without aid once aid is discontinued.

Despite the diversity of approach to the impact of foreign capital inflows on the economic development of LDCs which this survey reveals, there are still enormous conceptual and statistical problems which remained partially unsolved. In particular the controversy over the specification of savings functions has not been resolved satisfactorily to give a reliable evidence on the relationship between foreign aid and domestic savings. Nevertheless, once domestic savings are properly calculated, they should be unambiguous in regression analysis. According to Newlyn, the use of consumption or investment as the dependent variable rather than saving will be unequivocal.⁽¹⁾

5.2 The Empirical Evidence for the Sudan

The remaining part of this chapter concentrates on the empirical findings for the Sudan when the effects of both official and private external borrowing on the development process are examined.

First, the impact of official capital inflows on domestic expenditure is investigated: namely the impact on consumption and investment expenditures. In order to do this, resort has been made

(1) See, W. Newlyn, "The Effect of....", *op.cit.*

to the available approaches in the literature of aid as well as the theories of consumption and investment. Furthermore, the effects of official foreign capital inflows on the Sudanese economic growth are also assessed. A macroeconomic model which explains these effects on the basis of a simplified version of the dual gap analysis, as well as the national income accounting relationships, has been explored and estimated. In addition to that some further arguments are offered in order to explain or to justify the results obtained.

The same analytical framework has been applied to external private capital flows when their contribution towards the rate of economic growth is also examined.

In this chapter, data on actual annual receipts of foreign capital inflows was used as has been done in Chapter Two (see Chapter Two, Table [2.1], section 2.3).

(i) Official Foreign Capital Inflows and Consumption Expenditure

This section examines Griffin's proposition (i.e. aid is a substitute for domestic savings) and assesses whether official capital imports supplement or supplant the rate of domestic savings in the Sudan. To avoid ambiguity, as stated earlier, it will be more convenient to examine this hypothesis using a consumption function approach rather than a saving function. As such, the marginal propensity to consume out of borrowed capital will be estimated by incorporating capital imports into a conventional functional form of consumption. This requires the assumption that consumption is a function of total available

Table [5.3]: Sudanese GDP, Consumption, Savings, Official Capital Imports, Private Foreign Inflows, Investment, Imports and Exports (L.S million): 1958-1979.

Year	GDP (1)	Total consumption (2)	Domestic savings (3)	Net Official Capital imports (4)	Net Private foreign inflows (5)	Investment (6)	Imports (7)	Exports (8)
1958	346.2	310.1	18.8	6.4	-1.2	37.7	57.6	51.1
1959	349.6	334.3	37.9	7.0	0.2	34.6	62.8	60.9
1960	386.8	338.1	48.7	8.1	0.7	46.4	63.7	63.4
1961	420.0	362.0	58.0	12.3	8.9	49.1	82.9	62.2
1962	456.2	387.9	68.0	11.6	6.1	54.5	89.3	79.0
1963	464.1	409.3	54.8	8.9	6.1	69.4	97.6	78.7
1964	476.8	426.8	50.0	11.5	8.4	70.9	95.5	68.9
1965	496.9	445.4	51.5	8.3	2.1	62.9	72.2	67.9
1966	497.5	434.3	61.3	10.7	2.0	75.6	77.4	70.7
1967	536.1	476.9	59.2	9.3	0.7	73.0	74.3	74.6
1968	583.3	521.3	61.3	5.5	8.6	80.8	83.8	85.6
1969	585.1	505.3	79.8	7.2	2.3	85.1	89.3	86.2
1970	652.5	559.6	62.3	-3.7	-0.6	84.4	100.1	103.9
1971	752.1	684.4	67.6	-11.6	2.5	72.9	115.4	114.4
1972	876.8	776.5	64.5	8.9	3.2	83.9	117.9	124.4
1973	1246.2	1026.5	103.9	4.6	-5.2	117.7	151.8	152.2
1974	1510.8	1378.5	132.3	101.2	-12.2	177.4	247.5	122.0
1975	1681.0	1451.9	130.0	21.6	2.9	163.8	359.9	152.5
1976	1954.8	1667.0	155.0	0.9	20.1	164.8	341.4	193.0
1977	2011.7	1779.0	180.0	-11.7	20.0	202.2	376.5	230.2
1978	2426.4	1898.0	206.0	21.0	1.0	179.5	449.5	202.3
1979	2784.4	2024.0	239.0	174.3	0.9	141.2	477.3	232.7

Source : Bank of Sudan, Department of Statistics and **The Six Year Plan**. Column (4) refers to capital imports less payments of interest and amortization. Columns (3) and (4) do not add up to (6) because column (4) reflects only the actual annual amounts of official capital inflows received. Column (5) is calculated as net private capital plus direct private investment : the series of the private flows is completed from the IMF **Balance of Payments Yearbook**.

resources i.e. national income and foreign capital inflows. Hence, the consumption function would be represented by equation (5.2) and this simple linear function can be estimated⁽¹⁾

$$C_t = a_0 + a_1 Y_t + a_2 A_t + \mu_t \quad (5.5)$$

where μ is the error term, t is time, C , Y and A are as defined in equation (5.2).

Using equation (5.5), "total" domestic consumption (C) is regressed on GDP (Y) and official net capital imports (A). The results obtained, as can be observed from Table [5.4], show a significant positive correlation between income and domestic consumption which lends support to the conventional macroeconomic theory of consumption. The results also reveal a high positive and significant correlation between net official capital imports and domestic consumption with the observed marginal propensity to consume out of borrowed foreign capital reaching 0.63 (equation (1) in Table [5.4]). Contrary to what the dual gap analysis postulates, such a high proportion of consumed foreign capital will leave a small amount of foreign resources to be switched into investment projects. In other words, official foreign capital inflows have been used as a substitute for domestic savings which implies a fall in the saving ratio. When the ratio of domestic saving (where saving is calculated according to the standard United Nations procedure i.e. not as I-F) is regressed against the

(1) This equation is similar to the one estimated by Areskoug who included a third composite explanatory variable, namely private capital flows plus official reserve changes. See, K. Areskoug, External Public..., *op.cit.*, p. 75.

Table [5.4]: Results of Regression Analysis Relating Total Consumption (C) to GDP(Y) and Net Foreign Capital Inflows (A) for the Sudan (1958-1979): Dependent Variable is Total Current Consumption (C_t).

No.	Regression coefficients on independent variables (t-statistics in brackets)							R^2	DW
	constant	Y_t	A_t	Y_{t-1}	C_{t-1}	A_{t-1}			
(1)	5.88 (.58)	.862 (14.53)	.634 (2.18)				.9978	2.198	
(2)	-4.03 (-.43)	.681 (12.87)	.786 (4.02)	.211 (1.537)			.9988	1.852	
(3)	.152 (.011)	.727 (10.42)	.714 (2.56)		.179 (1.15)		.9978	2.076	
(4)	.736 (.67)	.67 (13.69)	.669 (3.42)	.498 (1.36)	-.32 (-1.07)		.9991	1.750	
(5)	-3.70 (-.41)	.689 (13.88)	.769 (3.44)	.198 (.88)	.012 (.04)	-.434 (-1.18)	.9992	2.028	

Source: own estimates based on Table [5.3].

share of net capital imports in GDP (i.e. estimating equation (5.4)), the result showed a significant negative correlation between the two variables. This is in line with Griffin's findings as Griffin and Enos argued, when interpreting their results which are reported in Table [5.1], that: "The regression results suggest that in general, an extra dollar of aid is associated with a rise of consumption of about seventy-five cents and a rise of investment of about twenty-five cents".⁽¹⁾

The fall in the domestic savings rate can be attributed to a reduction in both public and private savings. Given the structure of the Sudanese income distribution which shows extreme inequality,⁽²⁾ the availability of foreign capital inflows might

(1) See, K.B. Griffin and J.L. Enos, "Foreign Assistance...". *op.cit*, p. 321.

(2) Inequality in the Sudan is investigated by I.H. Yassin, **Inequality of Income Distribution in the Sudan: An Empirical Evidence**, Unpublished M.A. Dissertation, University of Kent at Canterbury, September 1979.

have discouraged the government from taxing conspicuous consumption which reduces savings. The reduction in private savings, on the other hand, could be related to the availability of imported new products facilitated by the infusion of foreign capital. The new products could find their way to disposable incomes through international and local demonstration effects. Therefore, the existence of high income inequality coupled with a demonstration effect, across the different income groups, provide strong incentives to consume rather than to save.⁽¹⁾ More generally, the fungibility of aid into consumption expenditure is very difficult to investigate because this requires an application of microeconomic analysis to the public sector in order to distinguish the amount of aid allocated to development and recurrent budgets.⁽²⁾ Although this analysis cannot be conducted due to data constraints, nevertheless, the high share of bilateral assistance and borrowing from private sources in total contracted loans during the period under consideration (see Table [3.2] in Chapter Three, section 3.9) indicates that more formal freedom was acquired by the Sudan in spending aid on consumption expenditures rather than on investment projects which are normally tied by multilateral assistance.

It is clear from Table [5.4] that the basic estimated

(1) For a useful discussion, see e.g., B.R. Hazari, "Foreign Aid, Conspicuous Consumption and Domestic Savings: Some Theoretical Observations", *Journal of Development Studies*, Vol. 12, No. 2, January 1976, pp. 197-207.

(2) For more details, see e.g., P. Mosley, "Aid, Savings...", *op.cit.*, pp. 86-90.

variables of equation (5.5) have shown a consistent stable pattern when different lag structures are introduced. The addition of lagged income (Y_{t-1}) to equation (5.5) is consistent with a version of Duesenberry's⁽¹⁾ relative income hypothesis, assuming the highest experienced income in the past (Y_{\max}) is equal to Y_{t-1} .⁽²⁾ Since Y_t and Y_{t-1} are highly related (as $r_{Y_t Y_{t-1}} = .989$, where r is the simple correlation coefficient), the estimated coefficient on Y_{t-1} is insignificantly different from zero at the 5% level of confidence (see equation (2) in Table [5.4]). Furthermore, the incorporation of a lagged value of the dependent variable (C_{t-1}) is attributed to Brown⁽³⁾ who assumed that people usually change their behaviour slowly and hence previous consumption affects both current consumption and income. Although Brown's formulation embodies Koyck's⁽⁴⁾ suggestion, of substituting the lagged values of the independent variables for a single lagged value of the dependent variable in which case multicollinearity may be avoided, there will be still collinearity problems between Y_t and C_{t-1} (where $r_{Y_t C_{t-1}} = .984$) which may

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- (1) Duesenberry's original formulation relates to individual households and is expressed in terms of relative income: $(C_{it} / Y_{it}) = a + \beta (\bar{Y}_{it} / Y_{it}) + \mu_{it}$ where \bar{Y}_{it} is mean income and i refers to individual households. See, J.D. Duesenberry, **Income, Saving and Theory of Consumer Behaviour**, Harvard University Press, Cambridge, 1949.
 - (2) For this treatment, see e.g., D.G. Mayes, **Applications of Econometrics**, Prentice Hall International, London, 1981, pp. 35-36.
 - (3) See, T.M. Brown, "Habit Persistence and Lags in Consumer Behaviour", **Econometrica**, Vol. 20, No. 3, 1952.
 - (4) See, L.M. Koyck, **Distributed Lags and Investment Analysis**, North Holland, Amsterdam, 1954.

render the estimated coefficient on C_{t-1} insignificant (at the 5% level) and/or negative as can be seen from equations (3) and (4) in Table [5.4].⁽¹⁾ However, the problem of estimating lagging relationships does not end at this level but any further complications will be beyond the objective of the estimates in this chapter.⁽²⁾

(ii) Official Foreign Capital Inflows and Investment Expenditure

This section investigates the impact of official capital imports on investment (i.e. it examines the marginal propensity to invest out of borrowed capital). Since the main objective is not to determine the level of (or the demand for) investment, a simple functional form, which assumes investment is determined by income including that obtained from abroad, will be estimated. This form can be specified as

$$I_t = \beta_0 + \beta_1 Y_t + \beta_2 A_t + \mu_t \quad (5.6)$$

where I is gross investment, t , Y , A and μ are as defined in equation (5.5). Not only does this function embody the Haavelmo's hypothesis (according to which investment is a function of total available resources including those from abroad) but also it is widely used in the literature of aid. For instance, while Leff⁽³⁾ regards investment as a function of the level of national income in the previous year and the current volume of net foreign capital inflows, Areskoug⁽⁴⁾ regards it as a function of net

(1) For a further discussion on multicollinearity, see e.g., A. Koutsoyiannis, **Theory of Econometrics**, 2nd. ed., Macmillan, London, 1977.

(2) For a further analysis, see e.g., D.G. Mayes, **Applications of Econometrics**, *op.cit.*, Chapter 2.

(3) See, N.H. Leff, "Marginal Savings Rates...", *op.cit.*

(4) See, K. Areskoug, **External Public...**, *op.cit.*, p.75.

public external borrowing, the level of GNP and private capital flows plus official reserve changes.

On the other hand, foreign capital inflows can be incorporated into a general functional form which can be derived from the theory of investment. This general form can also be estimated in order to examine the behaviour of the estimated coefficients of equation (5.6) as has been done in the case of capital imports and consumption expenditure.

In the theory of investment, which is inherently a dynamic one, an important distinction is made between models which emphasize the role of output (such as the flexible accelerator models), and whose justification is generally rather ad hoc,⁽¹⁾ and models which emphasize the role of relative prices (neoclassical models) which are derived from explicit optimizing models. Since investment cannot be treated in isolation from the size of the capital stock which it helps to build up, thus investment is a "flow" concept. The capital stock (K_t) at the end of period t is composed of the capital at the end of the previous period (K_{t-1}) less capital consumed during that period (D_t) plus the level of total investment, I_t^G , such that

$$K_t = K_{t-1} - D_t + I_t^G \quad (5.7)$$

Net investment (I_t^N) which contributes to the increase in capital stock is thus

$$I_t^N = K_t - K_{t-1} = I_t^G - D_t \quad (5.8)$$

Therefore, while gross investment should always be non-negative, as capital consumption cannot by definition be negative, net

(1) See e.g. D.G. Mayes, Applications of Econometrics, op.cit., chapter 4.

investment will be positive, zero or negative according to whether

$$I_t^G \geq D_t$$

The determinants of the desired level of capital stock as well as the rate at which investment would achieve the desired returns are the most important factors which determine the level of investment. In practice, these factors are often confused. In this connection, Haavelmo⁽¹⁾ argues that the demand for investment cannot be simply derived from the demand for capital. The demand for a finite addition to capital stock can result in any rate of investment (ranging between zero and infinity) depending on the additional hypothesis introduced regarding how fast capital users would react. For simplicity, let it be assumed that the desired stock (K_t^*) is always achieved by the end of each period. Output (Y_t) and capital can be assumed to have a fixed relation so that⁽²⁾

$$Y_t = aK_t^* \quad (5.9)$$

or reversing the relation

$$K_t^* = bY_t \quad (5.10)$$

where $b=1/a$. Substituting (5.10) into (5.8) and ignoring capital consumption:

$$I_t^N = b(Y_t - Y_{t-1}) \quad (5.11)$$

which gives the simple accelerator model of investment, because investment depends on the rate of growth of output.

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- (1) See, T. Haavelmo, *A Study in the Theory of Investment*, University of Chicago Press, 1960.
(2) The fixed relationship between capital and output can be derived from the usual neoclassical production function under the assumption of fixed factor prices and constant returns to scale.

Capital consumption is usually assumed to be proportional to capital stock in the previous period, that is⁽¹⁾

$$D_t = aK_{t-1} \quad (5.12)$$

Substituting (5.10) and (5.12) into (5.7) and rearranging terms, a simple investment function can be obtained:

$$I_t^G = bY_t - b(1-a)Y_{t-1} \quad (5.13)$$

whereby investment is a function of current and lagged output. However, since it is difficult in practice to achieve the desired capital stock, it will be more reasonable to assume that only a proportion (δ) of the difference between the desired capital stock (at a point in time) and the stock in the previous period can be obtained, such that

$$K_t - K_{t-1} = \delta(K_t^* - K_{t-1}) \quad 0 < \delta < 1 \quad (5.14)$$

Using (5.14), (5.9) and (5.12), (5.13) can be reformulated as

$$I_t^G = \delta bY_t - \delta b(1-a)Y_{t-1} + (1-\delta)I_{t-1}^G \quad (5.15)$$

which shows that the partial adjustment of the capital stock results in the addition of a lagged dependent variable to the right hand side of equation (5.13). The general functional form reflected by equations (5.13) and (5.15)⁽²⁾ is a common feature of

(1) For a justification, see e.g., D.W. Jorgenson and J.A. Stephenson, "Investment Behaviour in US Manufacturing, 1947-1960", *Econometrica*, Vol. 35, 1967, pp. 169-220.

(2) See e.g., R. Eisner, "A Distributed Lag Investment Function", *Econometrica*, Vol. 28, 1960, pp. 1-30; F. De Leeuw, "The Demand for Capital Goods by Manufacturers: A Study of Quarterly Time Series", *Econometrica*, Vol. 30, 1962, pp. 407-423; S. Almon, "The Distributed Lag Between Capital Appropriations and Expenditures", *Econometrica*, Vol. 33, 1965, pp. 178-196; and M.K. Evans, *Macroeconomic Activity*, Harper and Row, New York, 1969.

many investment functions. Following closely (5.13) and (5.15), a lagged value of Y and I will be added to the explanatory variables of the basic estimating equation (5.6).

Hence, by combining the relationships expressed by equation (5.6), (5.13) and (5.15); gross investment (I) is regressed on GDP (Y) and net official capital imports (A). The results obtained are reported in Table [5.5] from which it can be observed

Table [5.5]: Results of Regression Analysis Relating Gross Investment (I) to GDP (Y) and Net Foreign Capital Inflows (A) for the Sudan (1958-1979): Dependent Variable is Gross Current Investment (I_t).

No.	Regression coefficients on independent variables (t-statistics in brackets)							R^2	DW
	constant	Y_t	A_t	Y_{t-1}	I_{t-1}	A_{t-1}			
(1)	20.43 (2.78)	.084 (12.18)	.323 (3.06)				.9566	1.755	
(2)	19.52 (4.77)	.030 (1.46)	.347 (3.30)	.059 (1.61)			.9649	1.502	
(3)	16.68 (3.02)	.035 (1.50)	.345 (3.24)	.042 (1.31)	.142 (.78)		.9662	1.698	
(4)	12.96 (2.09)	.040 (1.84)	.354 (3.38)	.024 (.69)	.320 (1.40)	-.177 (-1.24)	.9696	2.122	
(5)	20.72 (5.01)		.384 (3.67)	.092 (19.25)			.9602	1.714	

Source: own estimates based on Table [5.3].

that there is a significant positive correlation between foreign capital inflows and investment with the marginal propensity to invest out of borrowed external capital (MPIBEC) reaching 0.32 (according to equation (1) in Table [5.5] which is the basic

estimated equation). This MPIBEC is consistent with the estimated marginal propensity to consume out of foreign capital (see equation (1) in Table [5.4]) and hence it confirms that instead of all borrowed foreign capital being invested, a large proportion was consumed. In comparison with the empirical evidence assembled in Table [5.1], this result is to some extent similar to that obtained by Areskoug (MPIBEC=0.40) but significantly different from that obtained by Chenery, EL Kington and Sims (MPIBEC=0.11). Furthermore, when Leff's equation, which has been discussed earlier, is fitted (equation (5) in Table [5.5]), the obtained result also differs substantially from that of Leff's whose estimated MPIBEC for Brazil during the period 1940-1960 reached 0.849.⁽¹⁾

However, when the lag structure is introduced (through equations (5.13) and (5.15)), the estimated coefficients on A_t have shown a consistent behaviour but those on Y_t have been disturbed, mainly because of autocorrelation. For instance, in equation (4) of Table [5.5], I_t and I_{t-1} are highly related ($rI_t I_{t-1}=.924$) as well as Y_t and Y_{t-1} ($rY_t Y_{t-1}=.966$) to the extent that their individual effect is difficult to disentangle: a typical case of multicollinearity. Clearly, a simple function like (5.15) does not provide a satisfactory solution. This solution requires a more complex analysis which is beyond the scope of this chapter.⁽²⁾

(1) See, N.H. Leff, "Marginal Savings Rates...", *op.cit.*, p. 616, footnote 1.

(2) For a further analysis, see e.g., D.G. Mayes, *Applications of Econometrics*, *op.cit.*, Chapter 4.

(iii) **Effects of Domestic Expenditure on the balance of Payments**

Domestic expenditure in terms of investment and consumption will undoubtedly affect the balance of payments. The total effect on the balance of payments cannot be fully assessed without incorporating the effect of the debt servicing burden as a result of accumulated borrowing through time. While debt servicing will be explored in the next chapter, the use of net capital imports (gross inflows less amortization and interest) for the purposes of this section would suffice when a simple correlation of the trade deficit (imports less exports or $M-X$) with net official capital imports (A) is to be examined.⁽¹⁾ But this exercise may not be useful since the trade deficit itself is commonly used as a proxy for capital imports (as discussed in section 5.1(a)(iii)). In addition, it will be very difficult to distinguish the effects of domestic expenditure on the balance of payments from those which will be generated by other factors such as the fluctuations in export supply or the changes in imports prices. Therefore, the effect of domestic expenditure on the balance of payments can be drawn by considering the likely effects of foreign capital inflows on imports and exports.

(1) When $(M-X)$ is regressed against $GDP(Y)$ and A , this result is obtained:

$$(M_t - X_t) = -53.56 + .084 Y_t + .994 A_t \quad R^2 = .8175 \\ (-3.91) \quad (1.37) \quad (2.35) \quad DW = 2.028$$

Although this result supports the common use of $(M-X)$ as a proxy of capital imports because the estimated coefficient on A_t is approaching unity, it should be noted that net official capital imports are determined in this thesis by subtracting the debt service payments from the gross annual receipts of inflows.

However, when total imports (M) are related to (A), the estimated coefficient appears to be marginally greater than unity which suggests that capital imports stimulate imports by an amount greater than the inflows themselves.⁽¹⁾ This is not surprising given the fact that imports during the last decade had increased by more than 400% (as can be observed from Table [5.3]), showing an annual rate of growth of about 21% while exports were growing at a rate of 8%. Furthermore, the Six Year Plan (1977/78-1982/83) maintains that 90% of the overall calculated required capital will be utilized to finance merchandise imports(see Chapter Two, section 2.4(iii)) .

On the other hand, the effect of capital imports on exports can be seen through the effects on export proceeds. As discussed in Chapter Two (section 2.3(i) and (ii)), the repayments of debts tend to absorb a large annual proportion of export proceeds as a result of which the debt service ratio reached 23.9% in 1979, which indicates the pressure that would be exerted on the balance of payments.

(iv) Official Capital Imports and Economic Growth

The lack of a theoretical framework in which the likely effects of foreign assistance on the rate of domestic economic growth can be examined, constitutes a troublesome omission in the

(1) The Result obtained is:

$$M_t = 71.7 - .128 Y_t + 1.042 A_t \quad R^2 = .9203$$

(3.41) (-4.91) (3.70) DW = 1.564

When exports are included in the regression equation assuming exports will have an import content, the estimated coefficient was found to be insignificantly negative without affecting substantially the values of the estimated coefficients on Y and A.

literature of aid. For example, in examining these effects, Griffin and Enos⁽¹⁾ have simply regressed the rate of growth of national income against foreign capital inflows (as a ratio of national income) while Papanek⁽²⁾ has disaggregated the foreign inflows into their different components. Nevertheless, the impact of capital imports on the rate of economic growth can be examined on the basis of a simplified version of the dual gap analysis similar to that derived by Voivodas.⁽³⁾

In dual gap analysis, capacity output and the change in capital stock are related as follows:

$$dY_t = \frac{1}{c} I_t \quad (5.16)$$

where Y_t is capacity output, $I_t = dK_t$ is the change in capital stock and c is the ICOR.⁽⁴⁾ The underlying relationship (like that of equation (5.9)) is the production function $Y_t = \frac{1}{c} K_t$ in which capital and labour are assumed to be employed in fixed proportions, given no shortage of labour to constitute a constraint on output.

Savings are related to output and income by this function

$$S_t = sY_t \quad (5.17)$$

where S is total savings and s is the average and marginal propensity to save.⁽⁵⁾

(1) K.B. Griffin and J.L. Enos, "Foreign Assistance...", *op.cit.*

(2) G. Papanek, "Aid, Foreign Private...", *op.cit.*

(3) See, C.S. Voivodas, "Exports, Foreign Capital Inflows and Economic Growth", *Journal of International Economics*, Vol. 3, 1973, pp. 337-349.

(4) The time dimension of all derivatives is omitted for simplicity.

(5) Besides equating the average and marginal rates of savings, this relationship also ignores the effects of the differences in the distribution of income among the different groups in the economy.

Similarly, imports are related to output and income by this simple function

$$M_t = m Y_t \quad (5.18)$$

where M is total imports and m is the average and marginal propensity to import.

Exports are regarded as exogenously determined and their growth rates are assumed to depend on the rate of growth of foreign output and the foreign elasticity of demand, such that

$$X_t = X_0 (1+e)^t \quad (5.19)$$

where X_t is total exports in period t , X_0 is exports in the initial period and e is the given rate of growth of exports.

Furthermore, dual gap analysis concentrates on an investment function in which both domestic and foreign capital goods enter in fixed proportions as follows

$$I_t = \min (aI_t^d + bM_t^k) \quad (5.20)$$

where I_t^d stands for domestic investment resources and M_t^k for imports of capital goods. Needless to say this particular formulation is not the only one relevant to the dual gap analysis. For example, McKinnon⁽¹⁾ has used a fixed proportion of domestic and foreign capital goods in the overall production function, $Y_t = \min (aK_t^d, bK_t^f)$. Both formulations stress the lack of substitutability between domestic and foreign resources in the process of production.

To complete the model, equilibrium conditions and identities need to be introduced, specifically from the national accounting

(1) See, R. McKinnon, "Foreign Exchange Constraint in Economic Development and Efficient Aid Allocation", *Economic Journal*, June 1964.

relationship $Y = C + I + X - M$ (where $C = Y - S$ is total consumption, while government expenditure is not treated separately). The equality can be derived as

$$I_t - S_t = M_t - X_t = F_t \quad (5.21)$$

$$M_t = M_t^k + M_t^c \quad (5.22)$$

$$I_t = I_t^d + M_t^k \quad (5.23)$$

where M_t^c is the total amount of consumer-good imports in period t .

The model essentially postulates two limits to the size of capital formation as specified by equation (5.20). One limit ($I_t = aI_t^d$) arises when there are insufficient domestically produced capital goods in which case investment and growth will be constrained by the limitation of domestic resources. The other limit to capital formation appears when capital-good imports are insufficient (i.e. $I_t = bM_t^k$) where investment and growth will be constrained by the limitation of foreign resources. When the domestic resource constraint is operative, equation (5.20) reduces to $I_t = aI_t^d$. Substituting (5.23) into (5.21) and the result into (5.16), the reduced form of the model (after dividing through by Y_t) becomes:

$$\frac{dY_t}{Y_t} = \frac{a}{c} \left(\frac{S_t}{Y_t} + \frac{F_t}{Y_t} - \frac{M_t^k}{Y_t} \right) \quad (5.24)$$

which shows a positive relationship between capital imports (as a ratio of total output) and the rate of growth of output.

An alternative formulation can be derived by further exploring the national income account relationships, from which it can be obtained $S_t = Y_t - C_t$, and hence

$$I_t = S_t + M_t - X_t \quad (5.25)$$

Rewriting (5.16) as $I_t = cdY_t$ and using (5.21), (5.35) can be rewritten as $cdY_t = S_t + F_t$ (5.26)

Dividing through by cY_t : $\frac{dY_t}{Y_t} = \frac{1}{c} \left(\frac{S_t}{Y_t} + \frac{F_t}{Y_t} \right)$ (5.27)

Similarly, in the presence of the foreign exchange constraint, equation (5.20) reduces to $I_t = bM_t^k$. Using equations (5.22), (5.21) and (5.16); the reduced form of the model becomes

$$\frac{dY_t}{Y_t} = \frac{b}{c} \frac{F_t}{Y_t} + \frac{X_t}{Y_t} - \frac{M_t^c}{Y_t} \quad (5.28)$$

because $M_t^k = F_t + X_t - M_t^c$. Once more, equation (5.28) specifies a positive relationship between F_t/Y_t and dY_t/Y_t with the intermediate link being capital good imports.

An alternative approach can be formulated by expressing imports (required for growth) as a proportion of investment, such that from (5.16) can be obtained

$$M_t = miI_t = mic dY_t \quad (5.29)$$

where mi is the import-investment coefficient. The condition that

$$F_t = M_t - X_t \text{ (i.e. } M_t = X_t + F_t \text{) gives}$$

$$mic dY_t = X_t + F_t \quad (5.30)$$

Dividing through by $mic Y_t$, one obtains

$$\frac{dY_t}{Y_t} = \frac{1}{mic} \left(\frac{X_t}{Y_t} + \frac{F_t}{Y_t} \right) \quad (5.31)$$

This analysis assumes that all foreign capital inflows will be devoted to domestic capital formation and that the ICOR does not change when the foreign inflows are received. Such assumptions, as pointed out earlier, have been questioned by various authors who argued that given any plausible welfare function, which includes present and future consumption, an optimal allocation of resources will lead to part of the foreign

inflows to be allocated for present consumption and the rest to domestic savings and investment. This implies a saving function of this form

$$S_t = sY_t - \lambda F_t \quad \lambda < 1 \quad (5.32)$$

where λ is the proportion of capital imports that will be consumed. Using (5.32), (5.21) i.e. $I_t = S_t + F_t$ and (5.16), it can be obtained

$$\frac{dY_t}{Y_t} = \frac{s}{c} + \left(\frac{1-\lambda}{c} \right) \frac{F_t}{Y_t} \quad (5.33)$$

Provided that $\lambda < 1$, the positive relationship between F_t/Y_t and dY_t/Y_t will not be disturbed. Only when foreign capital inflows lead to an increase in the overall ICOR the possibility of a negative relationship between F_t/Y_t and dY_t/Y_t may arise, as discussed earlier. Then (5.33) becomes

$$\frac{dY_t}{Y_t} = \frac{s}{c'} + \left(\frac{1-\lambda}{c'} \right) \frac{F_t}{Y_t} \quad c' < c \quad (5.34)$$

which is closer to equation (5.1)

Using Sudanese data, equation (5.31) or (5.27) can be estimated in order to assess the impact of official capital imports on the rate of economic growth in the Sudan. In consistency with the analysis in this chapter, equation (5.31) is estimated and the best statistical fit is obtained when the variables are expressed in real terms.⁽¹⁾ The GDP is deflated by the wholesale price index (Pw) while exports and net official

(1) As discussed in Chapter Two (section 2.5), when the dual gap analysis was applied to the Sudan, the two gaps were found to be roughly equal, with the domestic resource gap just dominant so assuming that either gap of the two is dominant will not make much difference. See, M. EL Shibly and A.P. Thirlwall, "Dual Gap Analysis...", *op.cit.*

capital imports are deflated by the import price index (Pm) assuming that both will be devoted to purchasing a volume of imports. Then the rate of growth of real GDP (Y^* or $[\Delta Y/Y]/P_w$) is regressed on the rate of growth of real exports⁽¹⁾ (X^* or $[\Delta X/X]/P_m$) and the ratio of net official capital imports to real GDP (A^* or $[A/P_m]/Y^*$). The result obtained is as follows (with t-statistics in parentheses)

$$Y^* = 1.098 + .314X^* - .590 A^* \quad R^2 = .583$$

(2 .65) (2.86) (-1.12) DW = 2.156

The result shows a significant positive correlation (at the 5% level) between the growth of exports and the rate of economic growth as well as a negative but insignificant correlation between foreign capital inflows and economic growth.⁽²⁾ This indicates that the contribution of international assistance towards Sudanese economic growth is negligible. The explanatory power of the equation reflects the influence of other factors on growth such as domestic political factors, climate and the possession of scarce natural resources.

(1) The use of the growth rate of exports rather than the export ratio tends to give a better statistical fit. The effect of the growth of exports in this context was mentioned by Mosley but he did not include it in his explanatory variables because he was mainly concerned with further improving the regression equation estimated by Papanek. See, P. Mosley, "Aid, Saving...", *op.cit.*, p.82.

(2) However, a similar result is obtained when equation (5.27) is fitted, a positive significant correlation is observed between the ratio of real domestic savings and growth as well as a negative insignificant correlation between the ratio of real net capital imports and growth.

Table [5.6]: Index of Prices for the Sudan (1958 -1979)
1963 = 100

Year	Wholesale	Consumer	Exports	Imports
1958	103	94	101	96
1959	96.6	94	91	89.1
1960	98.9	94	111	99.7
1961	102	94	106	92
1962	103	96	106	93
1963	100	100	100	100
1964	112	104	107	90
1965	102	102	117	81
1966	106.6	103	108.8	88.3
1967	122	114	105.1	112.4
1968	117.7	103.1	106.2	104.7
1969	120.5	115.9	118	115.1
1970	126.7	120.7	119.2	120.9
1971	121.2	122.4	124.5	129.3
1972	132.2	138.9	129.5	134
1973	153.1	160.2	139.5	144
1974	194.7	202	147.5	160
1975	224.9	250.3	130.2*	196.9*
1976	n.a	254.6	115.7	196.2
1977	"	297.1	146.0	194.7
1978	"	356.2	193.5	229.4
1979	"	465.8	n.a	n.a

Source: IMF **International Financial Statistics**, various issues.

* From this year, the series is completed from the Ministry of National Planning, **Sudan Foreign Trade Indices 1970 - 1978**.

n.a = not available.

As Table [5.6] shows, the price indices are incomplete in particular the wholesale price index. However, when a simple time trend equation was used in order to complete the series, the re-estimated coefficients of equation (5.31) retained their signs but the explanatory power of the equation was substantially reduced.⁽¹⁾

As pointed out by Mosley⁽²⁾, the problem with this analysis as a whole is the apparent simultaneity between aid and growth which renders the estimated coefficients of equation (5.31) biased. In order to obtain unbiased estimates, a system of simultaneous-equation which would be estimated by means of 2SLS should be used instead of a single-equation model which involves OLS. However, when the simultaneous-equation model was estimated using the same Sudanese data, no sound results that can be reported were obtained. This could be due to the deficiencies of data. This is why, in interpreting the results obtained in this section, these limitations should be observed.

(v) Explanatory Comments and Arguments

The observed depressive impact of international assistance on the rate of Sudanese economic growth can be rationalized by further investigating the "effectiveness" of investment.

As has been shown in Chapters Two and Three (section 2.4(v) and 3.12 respectively), foreign capital inflows were biased towards financing infrastructural projects and tied to specific

(1) The result obtained is (with t - statistics in brackets)

$$Y^* = 1.063 + .161X^* - .629A^* \quad R^2 = .200$$

(2.61) (2.19) (-.803) DW = 1.94

(2) See, P. Mosley, "Aid, Savings...", *op.cit.*, p.80.

uses which were not necessarily developmental in nature. This has led to a sectoral and regional imbalance because most of the inflows were relatively concentrated in the northern region leaving behind the southern part of the country in its poor conditions.

Regarding the directly productive activities financed by foreign borrowing, in addition to the examples cited in Chapter Four (section 4.8), EL Rasheed⁽¹⁾ has also found that the capacity utilization of publicly owned factories, which were largely financed by foreign borrowing, was very low averaging 27% of the expected capacity in 1969/70. Also, they incurred a total loss of L.S 919.4 million in 1974/75. On the other hand, the investments which were largely financed by domestic resources such as food processing factories (that seem to be largely labour intensive) have shown a relatively higher rate of capacity utilization. In this connection it can be argued that the low productive capacity which characterizes the public factories may be largely attributed to the introduction of inappropriate techniques of production as well as the quality of the plants associated with foreign borrowing. Normally, the quality of such plants is not the best.

Moreover, the high import content which dominates the Sudanese projects (Chapter Two, section 2.2(ii)) has led to an increase in the demand for imports (in addition to the local costs associated with such projects) which exerted a further pressure

(1) See, S. EL Rasheed, "The Experience of Public Industrialization in the Sudan", in A.M.EL Hassan (ed.), **Essays on the Economy and Society of the Sudan**, Vol. 2, Economic and Social Research Council, Khartoum, 1977.

on government expenditure to the extent that the inflationary pressures on the economy were enhanced. Furthermore, the increasing demand for imports has created a severe problem of foreign exchange shortages and allowed for the existence of a corrupt uncontrollable domestic black markets which further aggravated the inflationary pressures. Due to the foreign exchange crisis, the government has been continuously forced to relax controls on imports and to liberalize trade which may not necessarily be development oriented. This is why the series of devaluations of the Sudanese pound which has been imposed by the IMF between 1978-1982 along with some other restrictions on government spending in order to deter imports might be offset by trade liberalization and the net result may be therefore massive imports.⁽¹⁾ Under these circumstances, the profitability of investment projects is likely to be negatively affected because both the foreign exchange cost and the local cost component will increase. In addition to the high excess costs of tying (Chapter Four) which would increase the foreign exchange cost if projects were financed by foreign borrowing, the foreign exchange cost will also be higher because of the consequential increase in the value of required imports as a result of devaluation and subsequently the local cost component of investment projects will also increase due to the inflationary repercussions. However, a comprehensive examination of the effect of the foreign exchange rate policy pursued by the Sudan on the profitability of investment projects

(1) To summarize the situation, the official exchange rate of the Sudanese pound dropped from L.S = 2.87 \$ in 1978 to about L.S = 0.7 \$ in 1982.

requires a separate cost-benefit analysis of individual projects which is beyond the scope of this thesis.⁽¹⁾

(vi) **Private Capital Imports and Economic Development**

This section concentrates on the analysis of the impact of private foreign inflows on the Sudanese economic development. As stated in Chapter Two (section 2.1), the major types of flow within the category of the private flows are direct investment, portfolio investment and the provision of export credits. According to the available data, private capital imports were calculated in this study as mentioned at the bottom of Table [5.3]. Applying the same analytical macroeconomic framework used in the previous sections, the impact of private capital imports (A_p) on consumption (C), investment (I) and the rate of economic growth (Y^*) is examined by adding net private capital inflows as another explanatory variable to the previous regression equations which pertain to the above cases. By doing so, the analysis becomes closer to that of Papanek⁽²⁾ who disaggregated capital imports into their different forms. It is worth mentioning that the data on private capital is very crude and therefore the results obtained will be approximations. These results can be represented as follows⁽³⁾

(1) The effect of the depreciation of Sudanese currency on farm mechanization, for example, has been examined by R. Disney and A. A. El Bashir, "Mechanization, Employment and Productivity in Sudanese Agriculture", **Journal of Development Economics**, forthcoming, 1983.

(2) See, G. Papanek, "Aid, Foreign Private...", **op.cit.**

(3) A^* denotes net real private foreign inflows deflated also by the import price index. Furthermore, equation (3b) corresponds to the case when the indices were completed by fitting a time trend equation as has been done in section 5.2(iv).

$$\begin{array}{l}
 (1) \quad C_t = 6.79 + 0.858 Y_t + .618 A_t + .654 A_{Pt} \quad R^2 = .9973 \\
 \quad \quad \quad (.58) \quad (13.39) \quad (2.24) \quad (.54) \quad DW = 2.143 \\
 (2) \quad I_t = 20.61 + .086 Y_t + .304 A_t - .145 A_{Pt} \quad R^2 = .9568 \\
 \quad \quad \quad (2.92) \quad (10.52) \quad (2.23) \quad (-.274) \quad DW = 1.734 \\
 (3a) \quad Y^* = 1.077 + .529X^* - .298 A^* - 4.18 A^* \quad R^2 = .6578 \\
 \quad \quad \quad (3.60) \quad (3.18) \quad (-.345) \quad (-.528) \quad DW = 2.131 \\
 (3b) \quad Y^* = .08 + .208X^* - .727A^* - 2.78 A^* \quad R^2 = .2773 \\
 \quad \quad \quad (3.02) \quad (2.52) \quad (-.949) \quad (-.39) \quad DW = 2.014
 \end{array}$$

These results confirm the evidence in the preceding sections in revealing that private capital imports are positively correlated with consumption and negatively correlated with investment and growth. While all the previously estimated coefficients retained their signs and (roughly) their magnitudes, all the estimated coefficients on net private capital imports tend to be insignificant (at the 5% level) which means that the contribution of private capital inflows towards domestic consumption, investment and economic growth is negligible. However, the introduction of A_p^* (in equation (3a) and (3b)) has improved the goodness of fit (relative to the results obtained in section 5.2(iv)).

Finally, the observed negative correlation between private capital imports and investment could be due to the fact that private capital inflows (especially direct foreign investment) were not directed towards productive investments, they were rather being concentrated in the trade and marketing sectors⁽¹⁾ at least

(1) A concise discussion of foreign investment in the Sudan is contained in I.H. Yassin, "Private Foreign Investment in the Sudan and the Case of Kenana Sugar Project", Mimeographed, University of Kent at Canterbury, April 1982.

until the early 1970s. Hence, the potential positive effect of the private capital inflows in raising aggregate investment have been offset by the types of activities that they have financed as, for instance, in the case of trade and marketing, capital will flow back to the home country rather than staying in the host one.

5.3 A Conclusion

This chapter has examined the impact of official foreign capital inflows on the Sudanese domestic saving rate and the rate of economic growth. The evidence shows no significant correlation between the growth rate and capital imports mainly because the beneficial effects of international assistance on domestic growth have been neutralized by a substantial spillover of the assistance to consumption i.e. capital imports have been used to replace government savings, thus releasing additional resources for consumption purposes. Although a positive correlation between domestic investment and foreign assistance has been observed, the nonproductive nature of this investment (whether in the form of economic infrastructure and social overhead, or otherwise) and its probable association with a high capital-output ratio (or a low efficiency) have rendered investment ineffective and further neutralized the expected beneficial effects of official capital imports on domestic growth.

As far as private inflows are concerned, the evidence suggests that their role in the development process has remained neutral and persistently insignificant, which is in concurrence with their nonproductive uses in the Sudan.

However, as Dacy points out, despite the observed insignificant effect of foreign capital inflows on the growth of income, it may well be that the level of income remains higher than what it would have been without the foreign inflows.⁽¹⁾

(1) See, D.C. Dacy, *op.cit.*

CHAPTER SIX

THE BURDEN OF SERVICING EXTERNAL DEBT

6.1 Introduction

In recent years the external debt of developing countries has shown an alarming growth. The implied repayments create a present and future strain on their balance of payments. In 1971, total outstanding debt had reached \$80 billion while debt service payments amounted to nearly \$7 billion (or 40% of the new capital inflows).⁽¹⁾ Worries were expressed then; according to the Pearson Commission, the debt service payments (as a per cent of gross assistance) would exceed 100% in 1977 if the level of new assistance remains constant until that time.⁽²⁾ In fact by the end of 1978 the external debt of LDCs had increased to about \$250 billion and by the end of 1980 it had reached \$456 billion.⁽³⁾ Furthermore, the debt service burden related to this indebtedness has become heavier as the share of commercial lenders in total debt has increased.⁽⁴⁾

There is little evidence that most developing countries will be able to reduce this debt burden by substantial repayments without further borrowing from abroad. This is because most of

(1) See e.g., A.P. Thirlwall, *Growth and Development...*, *op.cit.*, p. 301.

(2) See the Pearson Report, *Partners in Development...*, *op.cit.*

(3) See D. Avramovic, "The Developing Countries after Cancun", *Journal of World Trade Law*, Vol. 16, No. 1, January/February 1980.

(4) For more details on commercial borrowing by LDCs, see e.g., R. O'Brien, "Assessing the Credit Risks of the Developing Countries", *Euromoney*, Vol. 9, October 1975.

these countries have failed to convert foreign borrowing into activities which would earn or save foreign exchange and this is why they have experienced debt problems and defaults.⁽¹⁾ Debt problems and defaults have occurred, although varying between developing countries according to each country's economic structure as well as the size and nature of borrowing, as a result of an initial accumulation of debt followed by short term borrowing from commercial sources due to worldwide recession.

The growing threat of third world debt has led to continuous discussions and rescue operations by donor countries in order to keep the international financial system going. For instance, the 1982 Frankfurt meeting of the major five industrial countries (USA, Japan, France, Britain and West Germany) was organized to discuss the continuing threat to the international banking system posed by the burden of third world debts.⁽²⁾ The major purpose of the meeting was to strengthen the IMF financially (by increasing its quotas up to 50%) in order to facilitate the rescheduling of loans for some of the major debtor countries including⁽³⁾

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- (1) The term default in this context refers to all events of deferred contractual payments as well as debt relief agreements such as rescheduling or refinancing.
 - (2) See the **Financial Times**, Thursday, December 2nd., 1982.
 - (3) Given the "size" of debt incurred by countries like Mexico and Brazil as well as their "political power" measured by the weight attached to them by Western donors, it is possible that such countries can induce more favourable terms of borrowing if they threaten to default hoping that the Western banking system would collapse. However, the event of default is probabilistic because default may or may not be selected in a given economic situation depending on random political factors.

Mexico, Brazil and Argentina.

The need for foreign resources by LDCs is increasing despite their inability to service the debt. However, the consequences of indebtedness remain problematic since it is not possible to fix an upper limit to the ratio of debt service to foreign exchange receipts after which the borrower would default. Although there are no precise criteria by which this upper limit can be determined, there are some factors which warrant consideration when dealing with the question of indebtedness. This question is now investigated by exploring the theoretical approach to indebtedness according to which the experience of the Sudan will be examined.

6.2 External Debt and the Dual Gap Analysis

As discussed in the previous chapter, the question of how the terms of borrowing may affect the growth rate of a capital importing country has been discussed in a debate between Ball⁽¹⁾ and Massell.⁽²⁾ The resulting model can be represented as follows⁽³⁾:

$$\text{let} \quad 0 = Y + r D \quad (6.1)$$

where 0 is output, Y is income, r is the rate of interest on foreign borrowing and D is debt; as the difference between domestic output and income is factor payment abroad. From equation

-
- (1) See, R.J. Ball, "Capital Imports and Economic...",
op.cit.
- (2) See, B.F. Massell, "Exports, Capital Imports....",
op.cit.
- (3) See, A.P. Thirlwall, Growth and Development... ,
op.cit., pp. 298-300.

(6.1), one can obtain

$$\Delta O = \Delta Y + r \Delta D \quad (6.2)$$

In addition: $\Delta O = \sigma I$ (6.3)

where σ is the productivity of foreign capital and I is investment. While

$$I = s Y + \Delta D \quad (6.4a)$$

and then $I = sO - srD + \Delta D$ (6.4b)

where s is the marginal propensity to save. Substituting (6.4b) into (6.3) and dividing through by O , we get

$$\frac{\Delta O}{O} = \sigma \left(s + \frac{\Delta D - srD}{O} \right) \quad (6.5)$$

which shows that the rate of growth of output will be accelerated by capital imports as long as the new inflows exceed the loss of domestic savings (or the outflow) in the form of payments on past loans. Furthermore, when $rD = \Delta D$ i.e. past debts are met by further borrowing, the rate of growth of output will be still higher than the rate obtainable only from domestic savings as long as $s < 1$. In this case, the developing country can continue borrowing until it is regarded internationally as uncreditworthy.

Regarding the effect on the growth rate on income, from equation (6.1) one can have

$$\Delta Y = \Delta O - r \Delta D \quad , \quad (6.6)$$

and substituting (6.4b) into (6.3) and the result into (6.6), we get

$$\Delta Y = \sigma (sO + \Delta D - srD) - r\Delta D \quad (6.7)$$

since $Y = O - rD$, (6.7) can be rewritten as

$$\Delta Y = \sigma sY + \Delta D (\sigma - r) \quad (6.8)$$

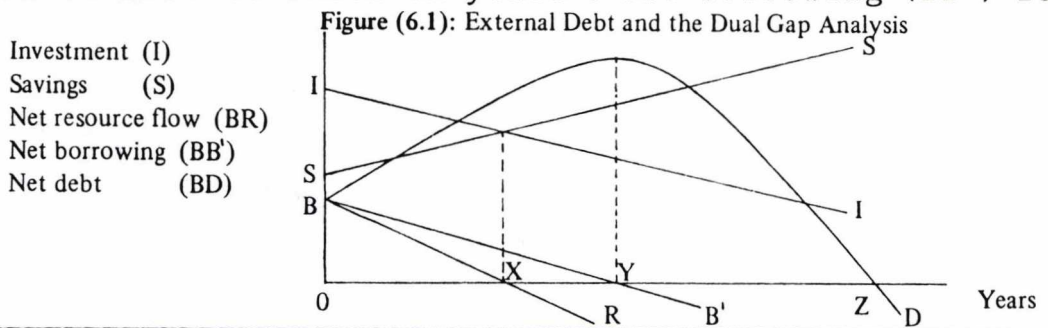
Dividing through by Y , then we obtain

$$\frac{\Delta Y}{Y} = \sigma s + (\sigma - r) \frac{\Delta D}{Y} \quad (6.9)$$

which shows that capital imports will accelerate the rate of growth of income as long as the productivity of capital exceeds the rate of interest on foreign borrowing i.e. investment is profitable as long as the rate of returns exceeds the rate of interest.

It should be noticed that this analysis assumes that σ and s are not adversely affected by capital imports for if ΔD reduces σ and s , only a fraction of ΔD may be invested.⁽¹⁾

Foreign debt can also be diagrammatically integrated with the dual gap analysis in order to show the time sequence of the saving-investment gap (which is analogous to the case of the export-import gap) against net resource flows, net borrowing and net indebtedness.⁽²⁾ From Figure (6.1), the saving-investment gap is given by the difference between the two curves SS and II . The net resource flow (BR) required to bridge the gap (in order to achieve a target rate of growth) declines steadily and becomes a net resource outflow after OX years. Net borrowing (BB') lasts



- (1) This is Griffin's argument which has been discussed in the previous chapter. See, K.B. Griffin, "Foreign Capital....," *op.cit.*
- (2) See, A.P. Thirlwall, Growth and Development...., *op.cit.*, p. 303.

longer in order to allow the recipient country to pay for interest charges on accumulated debts. Net borrowing then terminates after OY years and at this point net indebtedness (BD) starts to decline till year Z after which the borrower becomes a net creditor (assuming that the borrower will convert the resulting excess saving over investment due to borrowing into a balance of payments surplus until all past loans are repaid).

6.3 The Growth-Cum-Debt Model

Borrowing and repayment of foreign debts have been incorporated into a model of economic growth by Avramovic and associates⁽¹⁾ along the lines established by Alter.⁽²⁾ Since borrowing on conventional terms would result in an outflow of interest and amortization, the model regards the debt service payments as a charge on real income and savings of recipient countries.⁽³⁾ These repayments will be met either by expanding exports, reducing imports or further borrowing abroad.

The need for foreign resources in this model is derived as a gap between investment requirements and savings. Since the model assumes that the incremental capital-output ratio (ICOR) is equal to the average capital-output ratio, investment would increase at the same rate as income. Furthermore, given that the initial

(1) See, G. Avramovic, et.al., *Economic Growth...*, **op.cit.**

(2) See, M.G. Alter, "The Servicing of Foreign Capital Inflows by Developing Countries", in H.S. Ellis and H.C. Wallich (eds.), **Economic Development of Latin America**, St. Martin's Press, New York, 1961, pp. 139-160.

(3) Normally the interest rate attached to the loan is contractually fixed and will not be affected by any fluctuations in interest rates.

average saving rate is lower than the marginal rate, savings would increase at a rate lower than that of income. However, as time passes, the average rate of savings would approach that of output i.e. the rate of growth of savings, due to foreign borrowing, would ultimately approximate to the rate of growth of investment and income.

The growth-cum-debt process depends on four variables: the size of investment that the developing country can undertake; the rate of return on investment; the rate of re-investment from the surplus generated by the new investment and the rate of interest attached to foreign borrowing. Given these variables, three issues need to be investigated in this process.

First, is the question of whether the increase in the interest burden exceeds the increase in national income. This will be determined by whether or not domestic savings will increase due to the foreign borrowing. The condition for saving to increase is implied by equation (6.9) i.e. domestic savings will increase if income increases and income will increase if the productivity of capital exceeds the rate of interest on borrowing.

Second, there is the question of whether foreign debt (as a ratio of national income) has a rising or falling trend. This depends on the interest rate on foreign borrowing as well as both the average and marginal savings ratios. At one extreme, if saving matches investment requirements (i.e. the debt accumulates at a rate equal to the rate of interest); and if the rate of interest exceeds the rate of growth of income, debt (as a proportion of income) will rise. At the other extreme, if saving exceeds

investment by an amount just sufficient to pay for the interest on past debts, then there will be no increase in indebtedness. Between these two extremes, given the size of foreign debts relative to national income and also given a marginal saving rate greater than the investment ratio, there will be some rate of interest at which debts will increase at the "same" rate as national income. Assuming no debt at the beginning of the period, Hayes⁽¹⁾ has shown that this critical rate of interest (r) would be a function of the initial and marginal savings ratio (S_0 and s respectively), the incremental capital-output ratio (c) and the desired or target rate of growth (g), such that⁽²⁾

$$r = \frac{g (S_0 - s)}{S_0 - cg} \quad (6.10)$$

since the model derives the need for foreign resources as a gap between investment requirements and domestic savings, the initial saving ratio (S_0) must therefore be below cg for otherwise there will be no gap; and the marginal saving rate should exceed the average in order to hope to close the gap. In other words, the denominator of (6.10) measures the current gap (relative to income) while the numerator measures the difference between current and ultimate savings (relative to income). A feasible rate of growth (i.e. the rate which implies an eventual self-sufficiency) must fall between s/c and S_0/c where the critical

(1) See, J.P. Hayes, "Long Run Growth and Debt Problems", in D. Avramovic, et.al., *Economic Growth...*, *op.cit.*

(2) The derivation of this formula is contained in Appendix (6.1).

rate of interest will then be higher than the target rate of growth except at the maximal growth rate where $g = r$.⁽¹⁾ For example, if $s/c = 5\%$ and $S_0/c = 1\%$ but foreign borrowing can be obtained only at an interest rate of 5.5%, then the highest rate of growth which can be financed by "repayable" borrowing will be 3.6%.

The third issue which should also be considered is the ratio of debt service payments to export earnings (or the debt service ratio) as a measure of the borrower's proneness to default which might also serve as an indicator for future servicing capacity as far as new borrowing is concerned. Debt service payments are usually required in convertible currencies and hence they become a fixed charge on export earnings. As the export earnings of most LDCs tend to fluctuate, thus the higher the debt service ratio, the greater the likelihood of default for any fluctuations in export proceeds. Furthermore, it may also be important for the borrower to consider the ratio of debt service payments to new capital inflows. The repayments will exceed the new inflows if the new rate of interest exceeds the rate of growth of investment; and output will fall if the new capital inflows are less than the amount of savings which paid for past debts as it is clear from equation (6.5).

However, these models share the common weakness of depending on knowledge of savings performance and on a stable capital-output ratio which are both imperfectly known in LDCs and cannot be

(1) See e.g., G. Ohlin, **Aid and Indebtedness**, OECD, Paris, 1966.

assumed to remain stable over a long period of time. Therefore, these models are deficient when used for prediction but they can provide long term implications of loan finance. As Avramovic⁽¹⁾ concluded, no solution to the problem of indebtedness is provided nor any statistical indicators that would conclusively show the limits of indebtedness or borrowing are identified. Such models, however, can show how the external debt of a particular country might grow over time.

6.4 Estimating Which Countries are Most at Risk of Default

A question which is often asked by donors is whether the LDCs will be able to meet their repayments obligations without running into difficulties or defaults. This question has been examined by considering the short term prospects of the major debtor countries. One technique which predicts external debt reschedulings or defaults involves the application of a particular econometric specification. This has been undertaken for 25 developing countries for the years 1970, 1976 and 1977 by using discriminant functions (Frank and Cline)⁽²⁾ and logit analysis (Feder and Just).⁽³⁾ Both systems yield a single-equation function which incorporates a set of variables considered to influence debtor countries in their decision as to rescheduling external debt i.e. the indicators of the debt servicing capacity (DSC).

(1) See, D. Avramovic, et.al., Economic Growth..., *op.cit.*, p.94.

(2) See, C.R. Frank and W.R. Cline, "Measurement of Debt Servicing Capacity: An Application of Discriminant Analysis", *Journal of International Economics*, Vol. 1, 1971, pp. 327-344.

(3) See G. Feder and R. Just, "A Study of Debt Servicing Capacity Applying Logit Analysis", *Journal of Development Economics*, Vol. 4, 1977, pp. 25-39.

The basic econometric form of the analysis of Frank-Cline and Feder-Just is given in Table [6.1]. According to the discriminant function, if its value for a particular country in a given year exceeds the critical level, the country is predicted to reschedule its external debt otherwise no default is predicted. The logit function, on the other hand, has no critical value as such but it can be manipulated to yield a probability (between zero and unity)

Table [6.1]: The Equations Used in the Discriminant and Logit Analysis

(1) Frank-Cline Discriminant Function

$$35.6X_1^2 - 342.8 X_1X_2 - 54.4X_2^2 + 42.1X_1 + 73.1X_2 \geq 9.643$$

where

X_1 = debt service payments/merchandise exports
 X_2 = amortization/outstanding debt (disbursed); end-year.

(2) Feder-Just Logistic Form

$$\ln \left(\frac{P}{1-P} \right) = 59.2X_3 + .4X_4 - 39.6X_5 - .01X_6 - 2.9 X_7 - 52.6X_8$$

where

X_3 = debt service payments/exports of goods and services.
 X_4 = imports (\$)/foreign exchange reserves (end-year) in SDRs.
 X_5 = amortization/outstanding debt (including undisbursed); end-year.
 X_6 = income/capita (1972 \$).
 X_7 = capital inflow/debt service.
 X_8 = average real export growth rates (previous 8 years).
 P = probability of default or rescheduling.

Source: extracted from G.W. Smith.⁽¹⁾

(1) See, G.W. Smith, "The External Debt Prospects of the Non-Oil Exporting Developing Countries", in R.C. Cline (ed.), **Policy Alternatives for a New International Economic Order**, Praeger, New York, 1979, Chapter 4.

that a given country will reschedule or default during a given year. The Frank-Cline equation contains only two variables namely the traditional debt service ratio and the ratio of amortization to outstanding debt. Despite its simplicity, the equation predicted false reschedulings for only 9% of the sample. On the other hand, Feder-Just equation was able to identify a greater number of significant variables, such as the imports reserves ratio, per capita income, capital inflow debt service ratio and real export growth rates all of which, as can be seen from Table [6.1], had the expected sign.

The results obtained by applying both functions are reported in Table [6.2]. According to the discriminant function, the number of countries entering the "danger zone" (or predicted reschedulings) has increased from 6 in 1970 to 8 in 1976 and to 10 in 1977 (if Brazil's non-public debt is included). The comparable figures revealed by the logit analysis are 5, 6 and 8 respectively; assuming a probability of 0.5 as the critical value.⁽¹⁾ In 1977, both functions agree on 6 countries that would possibly enter the danger zone namely Chile, Mexico, Pakistan, Peru, Sudan and Zaire. Both functions predicted that the Sudan would reschedule its external debt in 1976 and 1977. The Sudan

(1) However, in most cases these studies have used debt and debt servicing data which were projections made by the World Bank and based on debt outstanding at the beginning of 1976. Therefore, it has been argued that the debt service for 1977 might have been underestimated. But when the debt service payments of 1977 were adjusted upwards (i.e. increased) by 25%, the general picture which emerged was more or less the same. For more details, see, G.W. Smith, *ibid.*

Table [6.2]: Predictions of Reschedulings and Major Defaults for Some Major Debtors During 1970, 1976 and 1977.

No.	Country	Frank-Cline Discriminant Fuction			Feder-Just Logit Analysis		
		1970	1976	1977	1970	1976	1977
(1)	Argentina	No	No	No	n.a	0	0
(2)	Bangladesh	n.a	No	Yes	n.a	0	0
(3)	Bolivia	No	Yes	Yes	0	.40	.15
(4a)	Brazil (public debt only)	Yes	No	No	0	0	0
(4b)	Brazil (all debt)		Yes	Yes		.11	.17
(5)	Chile	Yes	Yes	Yes	0	1	.88
(6)	Colombia	No	No	No	0	0	0
(7)	Ghana	No	No	No	.60	0	0
(8)	India	Yes	No	No	1	e	e
(9)	Indonesia	No	No	No	1	e	e
(10)	Kenya	No	No	No	0	0	0
(11)	Korea	Yes	No	No	0	0	0
(12)	Malaysia	No	No	No	0	0	0
(13)	Mexico	No	Yes	Yes	0	.65	.93
(14)	Pakistan	Yes	Yes	Yes	1	1	>.99
(15)	Peru	No	Yes	Yes	.82	.20	.61
(16)	Philippines	Yes	No	No	0	0	0
(17)	Moroco	No	No	No	0	n.a	0
(18)	Singapore	No	No	No	0	0	0
(19)	Sudan	No	Yes	Yes	0	1	1
(20)	Taiwan	No	No	No	0	0	0
(21)	Tanzania	No	No	No	0	0	0
(22)	Thailand	No	No	No	0	0	0
(23)	Uruguay	No	Yes	Yes	n.a	.57	0
(24)	Zaire	No	Yes	Yes	0	1	1
(25)	Zambia	No	No	No	0	.06	>.99

Source: the same as that of Table [6.1].

n.a = not available.

e = insufficient data.

actually rescheduled in 1979 (Chapter Two, Section 2.3(ii)), probably because the country managed to postpone rescheduling by borrowing from some of the Arab countries and /or private sources in order to service the debts. The main conclusion that can be drawn from the application of these econometric functions is that although the number of debtor countries facing debt problems may be increasing, their ability to avoid default in the predicted years was underestimated.

The major objection to the results obtained by Frank-Cline and Feder-Just functions stems from the fact that both functions have included only "public debt" while the clear trend in recent years has shown a greater reliance on private financing. But, as pointed out by Smith⁽¹⁾, the definition of private debt is very ambiguous in the statistics because only loans to private borrowers that do not bear a guarantee of the borrower's government are considered as private loans. Clearly, this definition conceals the identity of lenders. Therefore, the provision of finance by private lenders (banks or otherwise) to public institutions or private entities with government guarantees is included in the data of public debt. The full inclusion of services of private debt, on which data may be very scarce, will therefore add some other countries to the danger zone.

As for the method of analysis in general, it may be pointed out that econometric analysis of this kind is limited in the sense that it does not incorporate a consistent and complete model of the determinants of rescheduling. The Frank-Cline and Feder-Just

(1) See, G.W. Smith, *ibid.*

equations simply use indices or leading indicators which have been chosen for their ability to predict. Like any short term analysis, the criticism directed towards such econometric functions is that the economic and political structures which generate defaults and reschedulings might change and hence the predictive power of the functions will be jeopardized. As pointed out by Smith⁽¹⁾, these structural shifts have not and cannot be incorporated into these simple analyses. Therefore, any bias to be introduced by recent structural changes might lead these functions to under or overestimate the number and likelihood of actual reschedulings. This is because, for instance, the high income LDCs (such as Philippines, Korea and Peru) are now becoming more reliant on private sources for funds and more reluctant to risk their creditworthiness through defaults or reschedulings than they were a decade ago.⁽²⁾

6.5 Indebtedness, Dual Gap Analysis and the Debt Servicing Capacity

More recently, Feder⁽³⁾ has linked the growth-cum-debt model and the dual gap analysis with the Feder-Just econometric DSC formula in order to determine the time at which debt reaches its highest level. By retaining the basic features of the dual gap analysis (Chapter Five, section 5.1(a)(i)) and the growth-cum-debt model, the time of maximal debt (say t^*) has been derived as a

(1) See, G.W. Smith, *ibid.*

(2) See, G.W. Smith, *ibid.*; and also R. O'Brien, "Assessing the Credit....", *op.cit.*

(3) See, G.Feder, "Economic Growth, Foreign Loans and Debt Servicing Capacity of Developing Countries", *Journal of Development Studies*, April 1980.

function of the desired rate of economic growth (g); the marginal saving rate (s), the incremental capital-output ratio (ICOR or c) and the initial saving ratio (S_0) such that⁽¹⁾

$$t^* = \frac{1}{g} \ln \left(\frac{s - S_0}{s - cg} \right) \quad (6.11)$$

Equation (6.11) shows that the time required to reach the highest stage of indebtedness does not depend on the rate of interest on foreign borrowing or the initial debt level, although both factors will affect the level of debt at t^* . It also implies that if $S_0 < cg$, then $t^* > 0$ i.e. debt is declining throughout the time period considered. Furthermore, if the average and the marginal saving rates are equal (i.e. $s=S_0$), debt will decline indefinitely if $s < cg$ because this situation implies that the average supply of domestic savings exceeds investment requirements at the initial period as well as at any point in time after that. Equation (6.11) will provide a positive and finite solution for the time of maximum indebtedness only if $S_0 < cg < k$ (where k is the marginal propensity to consume as $s=1-k$).

Feder's analysis was mainly concerned with the problems of medium term planning (mostly five-year plans) and it cannot be accurately used to predict the problems of indebtedness and the accumulation of debt over a longer period of time. Therefore, the projections of this growth model were linked to the index of the probability of default that has been estimated by Feder and Just (see Table [6.1]).

(1) For a full exposition of the model, see, G. Feder, *ibid.*

Furthermore, Feder has criticised the conventional growth-cum-debt model for ignoring an important aspect of the debt servicing problem namely that debt service payments are usually made in convertible currencies. The growth-cum-debt model considers the ability to service accumulated foreign debts (through the process of growth) to require that debt must not grow at a faster rate than income. On the other hand, the ability to service foreign borrowing depends largely on the ability of the economy to generate foreign exchange earnings (through exports or import substitutes) that should be sufficient (when added to new foreign loans) to meet both the import bill and the debt service obligations. Therefore, Feder has included the rate of growth of exports in his analysis as a policy variable; and he used this exponential form

$$X(t) = X_0 e^{at} \quad (6.12)$$

where X_0 is exports at the initial period, a is the rate of growth of exports and t is time.

Using data which relates to two groups of developing countries (high and middle income LDCs), the model was simulated with various combinations of the indicators of DSC. When a probability of more than .25 has been identified, the situation was considered to be potentially associated with a debt servicing problem and hence changes in policy variables (such as the marginal rate of savings, the target rate of growth and the growth rate of exports) were further simulated in order to assess the effectiveness of each policy measure separately although in practice some of (or all) these policies may be used together.

However, the acceleration of export growth was found to be an effective policy in all the situations considered and an annual increase of 2% or 3% in the rate of growth of exports (throughout the period considered) tends to reduce the maximal probability of default to a reasonable low level of 6% or less. In several cases, it has been found that the debt service ratio ⁽¹⁾ reaches its highest point only when the probability of default has already started declining which suggests that the use of this ratio (which is a common rule of thumb)⁽²⁾ as the only indicator of DSC may not be acceptable as this ratio may be lagging behind the probability of default. Feder also showed that the debt servicing problems (reflected by high values of the probability of default) may arise long before indebtedness reaches its maximum level at t^* because a situation of low DSC may develop very rapidly despite the non-risky nature of the initial situation from which debts started to accumulate. This implies that the short term assessment of DSC should not be used as an indication of a long run performance since all the parameters (such as GNP growth, rate of growth of exports and the ICOR) were assumed to remain constant in the simulation.

-
- (1) The debt service ratio in Feder's analysis is defined as $((i+a)B)/X$ where i is the rate of interest on foreign loans, a is amortization payment assumed to be a fixed proportion of total outstanding debt, B is total outstanding debt and X is exports.
- (2) For an illustration, see e.g., H.J. Bittermann, **The Refunding of International Debt**, Duke University Press, Durham, North Carolina, 1973.

6.6 The Statistical Evidence for the Sudan

In dealing with the case of the Sudan, some examples which relate to the conventional growth-cum-debt model will be provided by computing the critical rate of interest (r) through formula (6.10) and then different combinations of the variables will be calculated in order to show the corresponding variations in the critical rate of interest.

Furthermore, using Feder's equation (6.11) which determines the time of maximum debt (t^*) to the borrower, an illustration of some possible time profiles by which external public debt in the Sudan would reach its maximum level can be provided.⁽¹⁾ Since equations (6.10) and (6.11) share the same parameters, it might be interesting to compare the different values of t^* at different levels of r .

Moreover, using a formula which has been derived by Rahman⁽²⁾, the required annual amount of debt servicing (interest and amortization) will be computed if the total outstanding external public debt accumulating by the end of 1979 is to be paid off by the Sudan, assuming no increase in the size of debt after 1979.

-
- (1) Due to data constraints, Feder's test of the probability of default or rescheduling cannot be performed because it requires detailed information. Moreover, the rescheduling for the Sudan was not only predicted by Frank-Cline and Feder-Just analysis (see Table [6.2]) but also the Sudan, as mentioned earlier, had already rescheduled in 1979. Hence the test will be irrelevant.
- (2) See, M.A. Rahman, "The Pakistan Perspective Plan and the Objective of Elimination of Dependence on Foreign Assistance", *Pakistan Development Review*, Vol. VII, Autumn 1967.

Finally, in recognition of the recent increasing arguments that inflation in industrial countries has contributed towards alleviating the burden of debt to developing countries, a test for the impact of inflation on the Sudanese debt burden will also be conducted using the "benefit index" developed by the UNCTAD.⁽¹⁾ However, before starting the analysis, it may be useful to begin with a brief introduction about the indebtedness of the Sudan.

(i) **The Indebtedness of the Sudan**

The size of the Sudanese external public debt needs not to be discussed in more detail since it has already been discussed in Chapter Two. From **Table [6.3]**, it is clear that the Sudan has received a large amount of foreign resources which accumulated by the end of 1979 into an outstanding debt of L.S 616.7 million (including the IMF obligations). This accumulation has posed problems and culminated in the rescheduling of 1979. The debt service payments and the debt service ratio indicate the strains on the country's net foreign exchange receipts and therefore on the balance of payments. According to the analysis in Chapter Two (section 2.3(i) and (ii)), debt servicing payments were growing at an annual average rate of 16% throughout the period 1958-1979 while the outstanding external public debt (excluding the IMF obligations for the reasons mentioned before) was growing at a rate of 19%. However, it should be mentioned that the total external public debt of the Sudan (and that of most LDCs) is

(1) See, UNCTAD, "Some Aspects of the Impact of Inflation on the Debt Burden of Developing Countries", **World Development**, Vol. 7, No. 2, February 1979, pp. 135-43.

Table [6.3]: Sudanese Actual Receipts of Total Foreign Capital Inflows, Debt Servicing Payments, Outstanding Debt and the Debt Service Ratio (1958-1979):

(L.S million)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	Gross foreign Capital inflows	interest payments	principal payments	total debt servicing payments [(2)+(3)]	Exports	Debt service ratio [(4)/(5)] %	Total outstanding debt excluding IMF obligations	including IMF obligations
1958	14.7	n.a	n.a	8.3	51.1	16.2	10.4	n.a
1959	7.6	"	"	0.6	60.9	1.0	12.7	"
1960	13.5	"	"	5.4	63.4	8.5	15.2	"
1961	15.5	"	"	3.2	62.2	5.1	19.7	"
1962	15.7	"	"	4.1	79.0	5.2	22.5	"
1963	14.3	"	"	5.4	78.7	6.9	30.3	"
1964	17.0	"	"	5.5	68.9	8.0	38.1	"
1965	23.0	"	"	14.7	67.9	21.6	52.7	"
1966	26.0	"	"	15.3	70.7	21.6	61.0	73.5
1967	26.0	"	"	16.7	74.6	22.4	70.1	87.2
1968	12.3	"	"	6.8	85.6	7.9	75.1	95.1
1969	17.8	3.9	6.7	10.6	86.2	12.3	91.3	109.3
1970	12.8	5.4	11.1	16.5	103.9	15.9	98.9	110.5
1971	10.8	4.1	18.3	22.4	114.4	19.6	89.9	100.6
1972	36.4	5.3	22.2	27.5	124.4	22.1	103.6	119.2
1973	28.9	5.7	18.6	24.3	152.2	16.0	107.9	119.1
1974	137.6	9.2	27.2	36.4	122.0	29.8	225.5	254.3
1975	73.0	19.3	32.1	51.4	152.5	33.7	318.9	371.7
1976	53.4	23.1	29.4	52.5	193.0	27.2	339.8	394.9
1977	26.5	16.5	21.7	38.2	230.2	16.6	356.4	403.6
1978	68.0	19.9	26.9	46.8	202.2	23.1	359.1	432.9
1979	230.0	34.2	21.5	55.7	232.7	23.9	489.7	617.7

Source: Bank of Sudan, Ministry of National Planning and Department of Statistics.

n.a = not available.

considerably larger than has usually been reported because the released figures never include private or short term commercial debts and military commitments. Also, there is a general tendency among LDCs to report lagged figures rather than current ones.

Besides the size of indebtedness, the structure of debt and the extent of the burden should also be considered especially when solutions are to be sought for the problems posed by accumulated external public debt. For instance, in the case of the Sudan, the large share of short term loans in total borrowing has brought the country to the danger zone of default according to the arguments developed in Chapter Two (section 2.3(iii)) and section 6.4.

(ii) The Critical Rate of Interest and The Time of Maximal Debt

According to equation (6.10) and (6.11), the values of r and t^* can be determined given g, S_0, s and c . In order to determine these parameters and hence r and t^* , two approaches have been used. The first approach concentrates on the estimates and projections of the Six Year Plan (1977/78 - 1982/83)⁽¹⁾ and retains the plan's base year of 1976/77. The second approach, on the other hand, involves calculations of the values of the required parameters from historical data and considers 1958 to be the base year because this was the year when aid first started according to what has been reported in the Sudanese statistics.

(iii) Parameter Values

Regarding the first approach, the Six Year Plan assumed a target rate of growth of 7.5%, an average saving ratio for

(1) The Six Year Plan, *op.cit.*

1976/77 of 8.5%, a marginal saving rate of 21% and a capital-output ratio equal to 3.

As for the second approach, the parameter values were determined by utilizing the information reported in Table [5.3] and [5.6] in Chapter Five. The estimated historical rate of growth during the whole period appears to be 5.4%.⁽¹⁾ Furthermore, the average saving ratio for the initial year of 1958 was calculated as 7.6%. Also, when the marginal saving rate over the period 1958-1979 was estimated, it turns to be approximately 8.6%. The marginal saving rate is estimated by fitting a simple Keynesian function and regressing the level of gross domestic savings (S_t) on GDP.⁽²⁾ This result is obtained (with t-statistics in brackets)

$$S_t = 11.19 + .0864 Y_t \quad R^2 = .9764 \\ (6.88) \quad (28.10) \quad DW = 1.8046$$

Regarding the capital-output ratio, its calculation from historical data is fraught with measurement difficulties such as the degree of capacity utilization in the economy, the supply of the co-operating factors of production, the extent of structural changes and so on. However, accepting the data on its face value, the ICOR (or $I/\Delta Y$ where I is investment and Y is GDP) for the whole period tends to be approximately 3.1 which is almost

(1) The historical average annual rate of growth is calculated in real terms, and as it is clear from Table [5.6], which shows the price indices for the Sudan, the calculations can only be done until 1975 due to data limitations.

(2) For the relevance and convenience of applying this function to developing countries, see e.g., H. Houthakker, "On Some Determinants of Saving in the Developed and Underdeveloped Countries", in E.A.G. Robinson (ed.), **Problems of Economic Development**, Macmillan, London, 1965.

identical to the plan's figure. In general, this ratio can reasonably be assumed to remain constant over a short period of time unless the economy is on the verge of recovering from a long recession or if there is a tendency for changing the structure of investment towards capital-intensive industries.⁽¹⁾

To sum up, for the first approach, the obtained values for g , S_0 , s and c are 7.5%, 8.5%, 21% and 3 respectively while the corresponding values for the second approach are 5.4%, 7.6%, 8.6% and 3.1 respectively.

(iv) **The Results**

The results obtained by using the two approaches are reported in Table [6.4] from which it can be observed that in order to achieve the target rate of growth envisaged by the Six Year Plan, loanable funds from abroad can be sought at an interest rate up to 6.7%. Whereas if the historical rate of growth and economic structure are to continue (i.e. if the structural parameters are to remain constant), then the Sudan would have to bargain for concessional loans on very soft terms or virtually pure grants since the historical critical rate of interest tends to be 0.6%. In addition, this historical critical rate of interest would indicate the nature of loans that the Sudan should have received in the past so that its debts could have grown proportionate to

(1) The ICOR (c) can also be calculated by using the growth equation $g=s/c$, from which $c=s/g$ where g is the rate of growth ($\Delta Y/Y$), s is the saving ratio and Y is output. However, since the calculated historical average annual rate of growth does not cover the whole period (1958-1979), this approach is omitted. For a discussion on this growth formula, see Chapter Five, section 5.1(a)(i).

its national income, assuming the parameters of r can remain stable over the period 1958-1979.

Table [6.4]: The Critical Rate of Interest and the Time of Maximum Debt

Method	g	S_0	s	c	r	t^*
Approach I (6-Year Plan)	7.5%	1976/77 8.5%	21%	3	6.7%	-
Approach II (historical estimates)	5.4%	1958 7.6%	8.6%	3.1	0.6%	-

Source: based on Table [5.3] and [5.6] in Chapter Five, and the Six Year Plan, *op.cit.*
 t^* is unobtainable because the condition $S_0 < cg < s$ is not satisfied.

Using the calculated 4% weighted annual average rate of interest on past foreign borrowing (see Table [3.2] in Chapter Three) as a measure or indicator of the rate of interest that might be offered regarding future borrowing, it seems that borrowing according to the Six Year Plan can be tolerable at a level beyond the historical average experienced by the Sudan. Whereas if the historical trend of economic growth is to continue, the rate of interest attached to new loans should drop substantially below its historical level. Alternatively, when the estimated 7.5% world's annual average rate of interest during the period 1958-1979 (see Chapter Three section 3.4) is used, it appears that the plan was too ambitious to assume loans would be

available at an interest rate below the world's annual average while the position of the continuity of the historical trend remains unchanged i.e. still concessional loans on very soft terms will be required.

Regarding the time of maximal debt, it cannot be determined under both approaches (whether the historical or the plan's estimates are used) because the condition for equation (6.11) to give a finite solution is not satisfied i.e. $So < cg < s$.

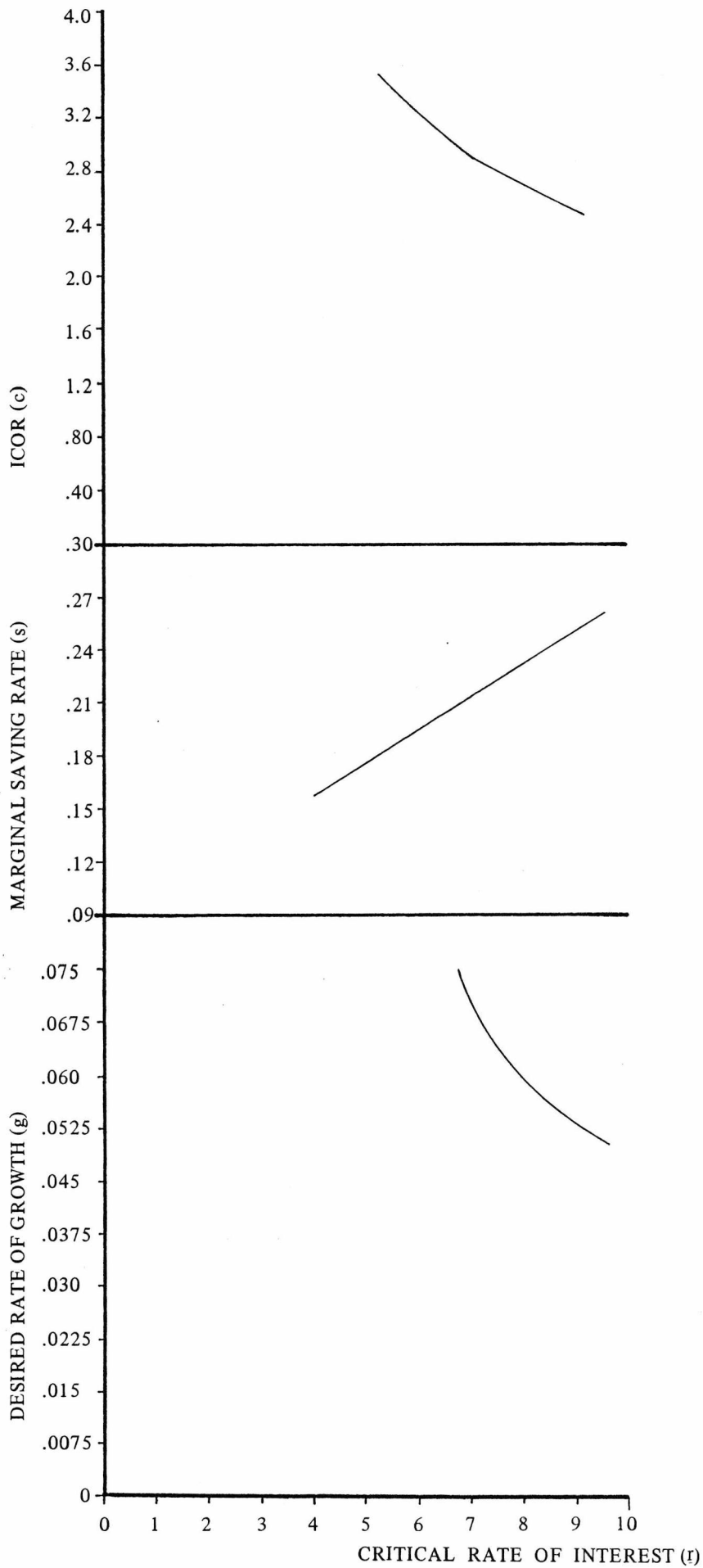
(v) Variations in the Critical Rate of Interest and the Time of Maximal Debt

The variations in r and t^* with respect to their determinants are examined by applying sensitivity analysis to the values of the parameters obtained through the first approach and by allowing each individual parameter to vary by 5 points above and below the plan's original level. The variations in r are shown by Figure (6.2) and Table [6.5] which also shows the corresponding variations in t^* .

It can be observed from Figure (6.2) that the critical rate of interest is positively related to the marginal saving rate and both move in the same direction. For instance, as s increases, r also increases suggesting that the increase in s will enhance the borrower's DSC and make borrowing on hard terms tolerable. Indeed, in Feder's analysis⁽¹⁾ it has been maintained that changes in the marginal saving rates seem to be an effective policy when the economy is characterized by a low initial saving rate and that a 4% increase in s reduces the maximum probability of default by

(1) See, G. Feder, "Economic Growth, Foreign...",
op.cit., p.362.

Figure (6.2): THE RELATION BETWEEN THE CRITICAL RATE OF INTEREST AND THE DESIRED RATE OF GROWTH, THE MARGINAL SAVING RATE, AND THE ICOR.



34 and 14 points for high and middle-income LDCs respectively. Also, the effectiveness of this policy measure may decline steadily while the maximum probability of default is still high. However, a high critical rate of interest could be sustainable if

Table [6.5]: Variations in the Critical Rate of Interest and the Time of Maximal Debt

g	So 1976/77	s	c	r	t*
.075	.085	.26	3	9.4	21
.075	.085	.21	3	6.7	
.075	.085	.16	3	4.0	
.075	.085	.21	3.5	5.3	
.075	.085	.21	2.5	9.1	23
.080	.085	.21	3	6.5	
.070	.085	.21	3	7.0	
.065	.085	.21	3	7.4	30
.060	.085	.21	3	7.9	24
.055	.085	.21	3	8.6	18
.050	.085	.21	3	9.6	15

Source: own estimates based on data from the same source of Table [6 .4]. The missing values of t^* are unobtainable because the condition $So < cg < s$ is not satisfied.

the marginal saving rate as well as the rate of growth of income are rising. On the other hand, the reduction of the desired rate of growth could be accompanied by a reduction in indebtedness and the probability of debt problems, but the rate of growth cannot be reduced indefinitely and any reduction beyond some critical point might impair rather than improve the DSC. This is because the net effect of the trade off between reduced indebtedness and lower growth rates of output (or income) is not obvious.

It can also be observed from Figure (6.2) that r and c are inversely related and when the latter increases the former decreases. This is probably because of the inefficiency that accompanies high ICORs which would jeopardize the DSC and render the economy unable to borrow at hard terms.

Furthermore, it seems that r is more sensitive to changes in s and c rather than to changes in g as can be shown, through equation (6.10), that the effect of an increase of one point in the marginal saving rate on the critical rate of interest is approximately equal to that of a one point reduction in the ICOR or seven points reduction in the desired rate of growth, assuming of course the values of the other determinants remain unchanged.

Recalling that the time of maximal debt does not depend on the rate of interest on foreign borrowing or the initial level of debt (although both will affect the level of debt at t^*), it is clear from Table [6.4] that higher levels of r are associated with lower values of t^* . This implies that the higher the level of the critical rate of interest, the more quicker debt reaches its maximum level.

6.7 Debt Retirement

This section estimates the amount of debt services (interest and amortization) required to repay the current existing Sudanese outstanding debt, which accumulated to L.S 617.7 million (including the IMF obligations) by the end of 1979, through a constant stream of debt servicing payments and over a certain period of time (say 50 years).

Assuming debt outstanding (D) by the end of the year T (or 1979) will be repayable over n years by surrendering a constant annual flow of debt services (P) with a compound annual rate of interest (r^*), one can obtain.

$$D_{T+t+1} = D_{T+t} - (P - r^* D_{T+t}) \quad (6.13)$$

where $t = 0, 1, 2, \dots, n$

The solution to this difference equation is⁽¹⁾

$$D_{T+t} = D_T(1+r^*)^t - \frac{P}{r^*} \left[(1+r^*)^t - 1 \right] \quad (6.14)$$

Letting $D_{T+t} = 0$ and solving for P we have

$$P = \frac{D_T \cdot r^* (1+r^*)^n}{(1+r^*)^n - 1} \quad (6.15)$$

In order to compute P through equation (6.15), the 4% weighted annual average rate of interest on contracted Sudanese loans (Chapter Three, Table [3.2]) will be used as well as the L.S 617.7 million of debt outstanding by the end of 1979 including the IMF obligations (Table [6.3], column (8)), assuming a time profile which extends over 50 years and no increase in the level of debt after 1979. It should be noted that this weighted annual average interest rate should not necessarily reflect the true picture of the interest rate but nonetheless it would give an idea about the size of interest payments that the Sudan should at least expect to pay for its debts.⁽²⁾ In addition, since the

(1) See, M.A. Rahman, "The Pakistan Perspective Plan...", *op.cit.*

(2) Obviously, the overall picture of the interest rate will also be affected by reschedulings especially when a penalty is imposed by donors in the form of an increased rate of interest.

interest rate regarding transactions with the IMF is always not reported in the statistics, this 4% might be lower than it should be in which case the required debt servicing payments would be also underestimated. At any rate, the estimates of P would serve as an indicator of the minimum debt servicing requirements that the Sudan should consider if its current debts are to be paid off.

An illustration of the annual amount of debt servicing required to pay off the Sudanese debt outstanding by the end of 1979 over a period which extends to 50 years is given in **Table [6.6]**. As can be seen from the table, these illustrative figures are reported in multiples of five years (i.e. 5, 10, 15...., 50).

Table [6.6]: The Required Debt Servicing Payments to Pay Off the Current Sudanese Debt Outstanding by the end of 1979.

Total outstanding debt by the end of 1979=L.S 617.7 million (including IMF obligations); payable at an interest rate of 4% over 50 years.

No. of years over which debt will be repaid	Required debt servicing payments (L.S million)	Debt service ratio* according to export proceeds in 1979 (%)
5	138.8	59.6
10	76.2	32.7
15	55.6	23.9
20	45.5	19.6
25	39.5	17.0
30	35.7	15.3
35	33.1	14.2
40	31.2	13.4
45	29.8	12.8
50	28.8	12.4

Source: own estimates based on **Table [6.3]**.

* Export proceeds in 1979 were L.S 232.7 million according to **Table [6.3]**.

Assuming the Sudan can reach an agreement with its creditors by which the total current outstanding debt can be repaid over 50 years, this would mean that an annual instalment of L.S 28.8 million should be surrendered to donors, as can be seen from Table [6 .6]. In general, the longer the time profile over which this debt will be repaid, the more the interest would accumulate but with a lower pressure on export proceeds, as the debt service ratio drops to 12.4% if the total outstanding debt is to be repaid over 50 years .

Indeed, the prospects of export proceeds and hence those of debt servicing will be jeopardized due to the current stagnation of the world economy where the prospects of recovery are uncertain. Unless the recovery is initiated in industrial countries and thus the demand for exports of LDCs is stimulated, debt repayments would have to be largely financed by further borrowing.

6.8 (a) **The Impact of Inflation on the Debt Burden**

The role of inflation in reducing the debt burden of developing countries can be seen by focussing on "real" debt service payments rather than on the nominal values. While nominal debt service payments may be increasing, in real terms, however, this increase could be marginal. Inflation can be measured in several different ways since different goods and services will be of different value to borrowers and lenders. Furthermore, the impact of inflation on the debt burden of LDCs cannot be assessed in isolation from the impact of the economic upheavals which

affect the level of economic activity, the demand for exports and the terms of trade. Therefore, the usual practice of deflating the stream of debt servicing payments by either the export or import price index of the debtor will not, in general, provide a meaningful measure of the loss to the creditor. In this case, the creditor's own import price index might be more relevant.⁽¹⁾

On the other hand, the deflation of the debt service by these price indices does not necessarily provide a measure for a debt burden relief to the debtor country because the burden of debt can be better assessed by considering the current account as a whole where the relative movements of export and import prices become very important. According to this approach, therefore, the reduction in the debt burden due to unanticipated inflation might be offset by an increase in financing requirements as a result of an unfavourable terms of trade and export volume movements which could be associated with inflation. Since the costs to the creditors do not necessarily have to be equal to the debtor's benefits, any potential benefits accruing to debtors from a depreciation of their outstanding debt must, therefore, be valued against the "costs" incurred as a result of a decreasing demand for their exports and the concomitant increase in the prices of their imports.

(b) The Index of the Impact of Inflation on the Debt Burden

Changes in the value of debts due to inflation have been perceived by the UNCTAD paper in a similar way to that of paper

(1) See, UNCTAD, "Some Aspects of the Impact...", *op.cit.*, p. 135.

assets i.e. in terms of the debtor's purchasing power and whether its ability to obtain goods and services has increased.⁽¹⁾ Accordingly, the impact of inflation on the debtor's purchasing power has been determined by considering the induced changes in income and costs due to inflation as well as the debt service payments. For example, if export prices are rising, fewer goods and services need to be sold to meet the due debt commitments. However, if the prices of imports are also rising, the debtor may need to sell more goods and services in order to cover production costs. Thus, the impact of inflation on the debt burden of a capital importing country can be assessed by determining whether an increased portion of a unit of imports would be financed from the debtor's own resources in the event of a given change in the pattern of prices. That is to say, for a positive impact, this inequality must hold:

$$\frac{P'_x X - DS}{P'_m \cdot M} - \frac{P_x X - DS}{P_m \cdot M} > 0 \quad (6.16)$$

where P_x is the price index for exports of goods and non-factor services; P_m is the price index for imports of goods and non-factor services; DS is interest and amortization due on outstanding debt; X is a volume of exports, M is a volume of imports and ' refers to values after an inflationary episode.

Rearranging the terms of (6.16), one can obtain

$$P'_x X - DS - (P_x X - DS) \frac{P'_m}{P_m} > 0 \quad (6.17)$$

$$(P'_x X - P_x X) + (P_x X - DS) - (P_x X - DS) \frac{P'_m}{P_m} > 0 \quad (6.18)$$

(1) See, UNCTAD, *ibid.*, p. 136.

$$(P'_x - P_x)X - (P_x X - DS) \frac{P'_m - P_m}{P_m} > 0 \quad (6.19)$$

Dividing through by $P_x X$ and rearranging, we get

$$\left(\frac{P'_x - P_x}{P_x} \right) \left/ \left(\frac{P'_m - P_m}{P_m} \right) - \left(1 - \frac{DS}{P_x X} \right) \right. > 0 \quad (6.20)$$

Thus, the benefit that inflation generates to a debtor country depends on the rate of growth of export prices relative to import prices as well as the traditional debt service ratio (or the ratio of debt service to exports). It should be pointed out that this approach considers only the direct price effects of inflation while there may be also significant secondary effects involving the response of world demand for exports due to the price changes and import substitution, which would produce a different relationship between growth and the demand for imports. These effects are very complex and depend in general on the state of world demand, on the one hand, and the degree of diversification in the debtor country on the other.⁽¹⁾ As the magnitude of inflation varies between countries, it is likely that the impact of world inflation on a manufactures exporting country would be different from a primary products exporter.

To demonstrate the experience of individual countries in a non-generalized form, 71 developing countries (including the

(1) Using a more comprehensive approach which incorporates the interaction between export volume and prices and identifies clearly the assumptions underlying the analysis, the same formula as (6.20) has been derived in the UNCTAD study showing that the debtor country is no worse off after an inflationary episode if the ratio of the growth rate of export prices relative to that of import prices is not less than one minus the debt service ratio. See, UNCTAD, *ibid.*, Annex, pp. 137-143.

Sudan) were examined by the study of the UNCTAD using formula (6.20) in order to assess the relative magnitude and direction of the impact of inflation in 1973, 1974 and 1975, as these years showed high rates of inflation (see **Figure (6.3)**). Despite the fact that 1973 was a year of commodity price inflation in which most developing countries showed a very good export performance, yet not less than 18 countries were found by the UNCTAD to be adversely affected by the price boom. In 1974, with the world economy sliding into a recession while inflation was shooting up, the situation became worse and 33 countries have been negatively affected. In 1975, with worldwide inflation still high and production being severely curtailed, the number of countries which have been adversely affected increased to about 75% of the total sample. Furthermore, little correlation was found to exist between the situation in 1973 and 1974 for individual countries but the majority of them showed a marked deterioration from 1974 to 1975.

Regarding the Sudan, the study of the UNCTAD has found a positive impact of inflation on the debt burden for the years 1973 and 1974; and a negative one for 1975.⁽¹⁾ As can be seen from **Table [6.7]**, our estimates agree with those of the UNCTAD for the year 1973 and 1975 but they differ for the year 1974 as we found a negative impact.⁽²⁾

Generally, **Table [6.7]** reveals a few cases where inflation has positively affected the debt burden of the Sudan throughout

(1) See, UNCTAD, *ibid.*, Table 1, pp. 138-139.

(2) It could have been interesting to examine also the situation in 1979 because it was a year of marked inflation but there is no available data.

Figure (6.3) : INFLATION RATES IN THE WORLD AND INDUSTRIAL COUNTRIES.
(% CHANGE IN CONSUMER PRICES)

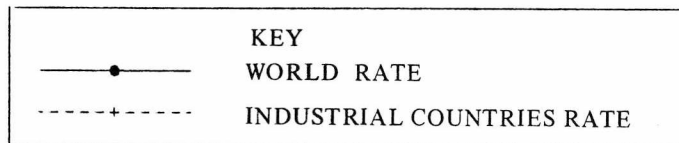
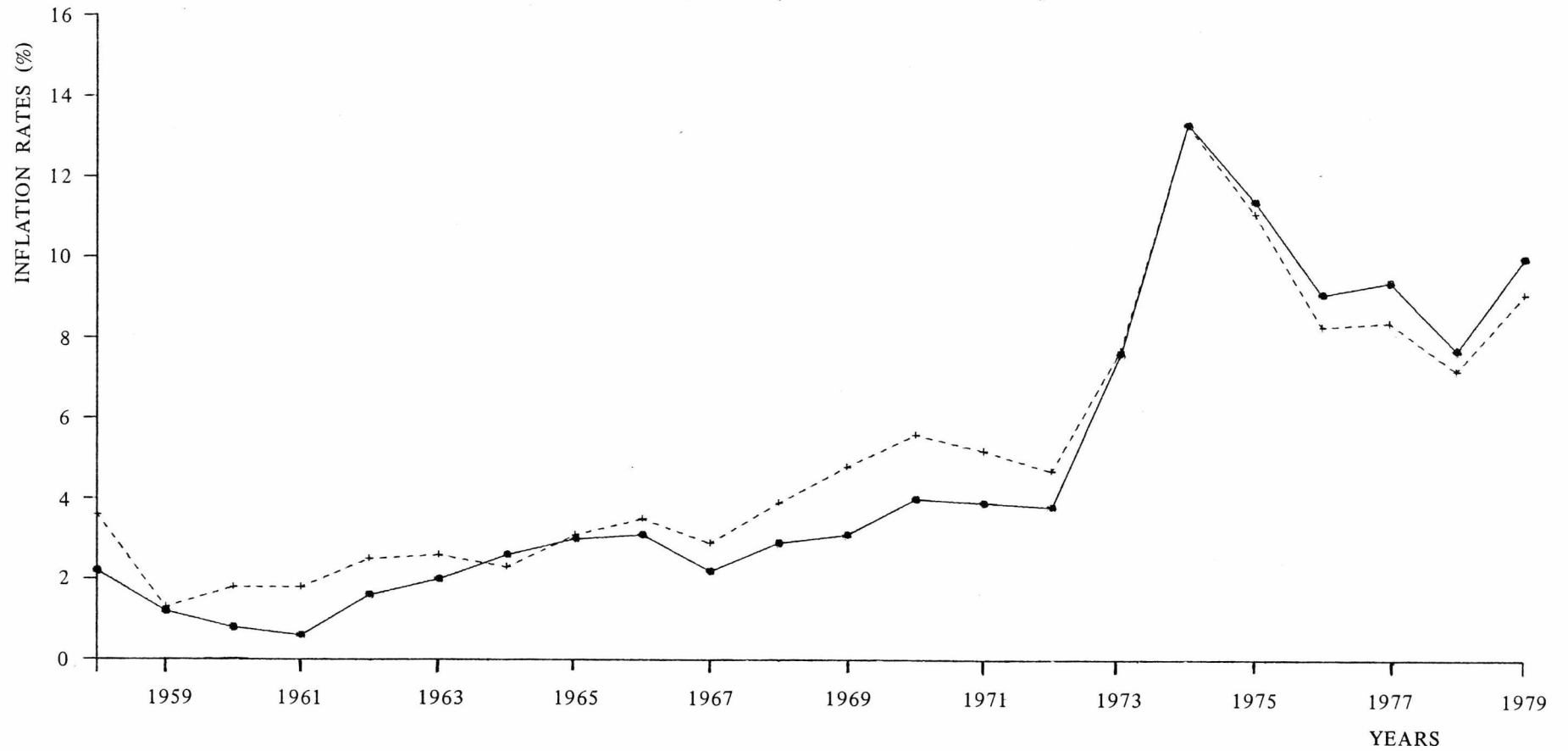


Table [6.7]: The Impact of Inflation on the Debt Burden of the Sudan (1958 - 1979)

Year	Terms of Trade ratio	Debt service ratio	Benefit index
1958	0	0.16	-0.84
1959	1.4	0.01	0.39
1960	1.8	0.08	0.93
1961	0.6	0.05	-0.37
1962	0	0.05	-0.95
1963	-0.8	0.07	-1.68
1964	-0.7	0.08	-1.62
1965	-0.9	0.22	-1.72
1966	-0.9	0.22	-1.64
1967	-0.1	0.22	-0.87
1968	-0.2	0.08	-0.77
1969	1.1	0.12	0.24
1970	0.2	0.16	-0.64
1971	0.6	0.20	-0.16
1972	1.1	0.22	0.33
1973	1.0	0.16	0.19
1974	0.5	0.30	-0.19
1975	-0.7	0.34	-1.37
1976	0.4	0.27	-0.38
1977	-0.3	0.17	-1.11
1978	1.6	0.23	0.85
1979	n.a		
average value (1958 - 1979)			-0.54
average value (1958 - 1974)			-0.55

Source: own estimates based on data from the IMF **International Financial Statistics**, the Bank of Sudan and the Department of Statistics.

n.a = not available.

It should also be mentioned that the estimates from the year 1975 onwards are based on indices published recently by the Department of Statistics. This is because information on export and import price indices for the Sudan are incomplete as has been mentioned at the bottom of Table [5.6] in Chapter Five.

the period 1958-1979 to the extent that the resulting overall average impact during the whole period is also negative and remains to be so even when the estimates from 1975 onwards have been excluded (i.e. the period 1975-1978) because the price indices after 1974 were compiled from a different source; as indicated at the bottom of Table [6.7].

Therefore, the conclusion generated by the study of the UNCTAD remains valid; namely the proposition that inflation benefits the debtor countries is not self evident. In fact the reverse appears to be true for most of the major debtor developing countries including the Sudan.

6.9 The World Outlook

The alleviation of the burden of third world debt and the solutions to the problems resulting from the accumulation of debt cannot be considered in isolation from the international economic order. In general, policy-oriented proposals and solutions to the problem of debt are always discussed in connection with debt management where the role of the structure of debt and the size of the burden becomes paramount. The manageability of debt is a very complex and difficult issue for both borrowers and lenders because the international assistance takes different forms which vary from a short-term adjustment to a longer-term development finance, in addition to the already mentioned statistical problems of under-reporting lagged debt figures. Therefore, it will be very difficult to make proper judgements about the management of debt in the event of a continuing rapid growth of indebtedness under the current uncertain international economic conditions and their

depressive impact on export revenues and debt servicing prospects of debtor countries. With the recession spreading throughout the world since 1973, the low rates of economic growth maintained by the industrial countries may be acceptable for their own internal welfare. For instance, the impact of the recession on some of the major countries of OECD - Europe can be seen from **Table [6.8]** where the rate of growth of output in these countries had dropped by more than half during the period 1973-1981 in comparison to its average level of 1965-1973. From the view point of LDCs, these low growth rates of advanced countries may not be satisfactory because of their negative effect on export proceeds of LDCs especially when most of the developing countries had suffered for some time from the deceleration of the growth rate of world demand for their output and from protectionist measures in some of the advanced countries. Therefore, borrowers would have to continue borrowing in order to repay their outstanding debts and to finance new balance of payments deficits. As borrowing itself has become very difficult on bilateral and multilateral basis because of the current world economic stagnation, the borrowers overloaded with debt started seeking commercial sources. Commercial borrowing, therefore, played a major role in these refinancing operations especially when most of the borrowers are willing to pay high commissions on the new loans⁽¹⁾ i.e. the whole issue becomes the servicing of debt regardless of the borrower's capacity to repay. This is why it has been argued that the problem of debt in LDCs

(1) For a good discussion, see e.g., "International Loans - Turkish Delight", **The Economist**, London, 22 July 1978, p. 102.

(including the Sudan) is increasingly becoming unmanageable due to the already mentioned statistical difficulties related to the reporting of debt figures; the political and institutional

Table [6.8]: Economic Growth and Manufacturing Output in Western Europe (1965-1973 and 1973-1981)

Country	% Average annual growth rates of output		% Average annual growth rates of manufacturing output	
	1965-1973	1973-1981	1965-1973	1973-1981
German Federal Republic	4.2	2.0	4.8	1.2
France	5.4	2.5	7.6	1.6
Italy	5.4	2.4	7.6	2.9
U.K.	3.1	0.5	3.0	-2.3
Belgium	4.9	2.0	7.1	1.2
Netherlands	5.1	1.8	6.3	1.0
Spain	6.5	2.1	10.0	1.8
Overall average	4.7	2.0	5.8	1.2

Source: OECD.

constraints which prevent any agreement on adequate international policy solutions and the steadily deteriorating economic situation of the world economy.⁽¹⁾

6.10 Some Concluding Remarks

The problem of indebtedness in the Sudan and many other developing countries which depend on loan finance from abroad is becoming very alarming in recent years since most of these countries started to experience repayment difficulties and

(1) See e.g., M.S. Wionczek, "Editor's Introduction", **World Development**, Vol. 7, No. 2, February 1979, pp. 91-94; Special Issue on International Indebtedness and World Economic Stagnation.

defaults. Similarly, the debts that accumulated through time are becoming increasingly unmanageable which made it difficult to work out a convenient international solution to the problem.

Ideally, the developing countries which experienced severe repayment problems would prefer to receive new concessional loans or rather pure grants in order to keep their development process going and hence solve their debt problems. Furthermore, the burden of debt can be further alleviated if the donors are persuaded to accept the repayments of their loans in terms of the debtor's domestic currency (or simply by buying the debtor's exports). In practice, however, these solutions seem to be unfeasible due to the current world economic stagnation which does not only depress the prospects of LDCs exports but also makes loan finance hardly obtainable on bilateral and multilateral basis. This is how the share of commercial borrowing in the total debt of LDCs has increased during the recession of the 1970s . This proves that Horowitz's proposal for alleviating the burden of debt to LDCs is far from being realistic.⁽¹⁾ He suggested that if the developed countries agree to guarantee loans from private sources to LDCs and also to create a fund to subsidise the associated commercial rate of interest, this will result in: LDCs getting loans free of interest, encouraging private sources to lend without fearing default and not seriously affect the donor's balance of payments since they pay only the interest charges. Another proposal which contributed towards offering solutions to the problem of servicing

(1) See, D.D. Horowitz, **The Abolition of Poverty**, Praeger, New York, 1969.

external debt was that of Khatkhate who suggested that the repayments of debt by LDCs should be made in "local" currency to regional development banks instead of being made to the original donor countries in convertible currencies.⁽¹⁾ Then these regional banks should relend the local currencies to other developing countries to help them purchase the exports of the debtor countries. Thus the developing countries which purchase these exports would increase their liabilities to the developed creditor countries by the same amount as the debt of the countries which export these goods would be reduced. In that sense, the due debt servicing to developed countries from one debtor developing country will be relent or transferred to another developing country and hence the retirement of debt will be postponed to an indefinite date .⁽²⁾

In recognition of the seriousness of the problem posed by recent LDCs debt, an international meeting took place in Mexico in October 1977 in order to discuss and provide some solutions to these problems.⁽³⁾ First, the meeting distinguished between the problems caused by external factors and those caused by internal ones. In the first case, the meeting endorsed an unconditional relief for the problem of excessive indebtedness (in terms of its

(1) See, D.R. Khatkhate, "Debt-servicing as an Aid to Promotion of Trade of Developing Countries", **Oxford Economic Papers**, July 1966.

(2) For a discussion of the problems surrounding this proposal, see e.g., A.P. Thirlwall, *Growth and Development...*, **op.cit.**, pp. 305-306.

(3) See, M.S. Wionczek, "Possible Solutions to the External Public Debt Problem of the Developing Countries: Final Report", **World Development**, Vol. 7, February 1979, pp. 211-224; Special Issue.

structure and the debt burden) and a conditional relief in the second case. Also, the same approach should be applied when new foreign resources are to be transferred to LDCs for short-term adjustments (i.e. stabilization); and the factors (whether internal or external) which are responsible for the deficit in the balance of payments must be identified. Then the same solution (of conditional and unconditional relief) should be applied accordingly. As for the longer-term development finance, it was suggested that the share of "official" flows in total net flows should be increased by donors and also the terms of borrowing should be softened.

Also among the major proposals was the idea of "aid through trade". That is to say, the transfer of real resources (from developed to underdeveloped countries) for development purposes should be financed by increasing the "current account" financing of real resource transfers (i.e. export trade expansion accompanied by an improvement in the terms of trade) rather than by increasing the transfers through borrowing. This scheme is beneficial to LDCs because export trade does not entail reverse transfers in the future. The feasibility of this proposal is doubtful due to internationally growing protectionist tendencies the danger of which to national economies, living standards and to relations between LDCs and advanced countries was emphasized by GATT.

Finally, the World Bank has announced recently an "action programme" of US \$2000 million to the third World.⁽¹⁾ It will

(1) **The Times**, Thursday, 24 February 1983.

spread over a period of two years in anticipation of a world recovery which should have started by then i.e. the injection of some funds into the economies of LDCs is expected to stimulate the initiation of recovery in advanced countries. The programme is intended to rescue the countries which were caught up in debt crisis and hence were forced to cut back on important domestic projects. Therefore, its main objectives are to support high priority projects which are based on economic policy changes, to expand lending necessary to maintain ongoing infrastructural projects and export oriented activities and to accelerate the disbursement of existing loans and credits which have been already approved.

APPENDIX (6.1)

The Derivation of the Critical Rate of Interest

In order to derive the critical rate of interest, the investment and saving functions would have to be specified first.⁽¹⁾ According to the growth-cum-debt model, the investment function is defined as

$$I_n = cg Y_0 (1+g)^n \quad (6.21)$$

where I is gross investment, Y_0 is income at the initial period, n is time, and c and g are as defined in equation (6.10). Similarly, the saving function is defined as

$$S_n = Y_0 [S_0 + s ((1+g)^n - 1)] \quad (6.22)$$

where S is gross domestic savings, S_0 is the initial saving ratio (S_0/Y_0) and s is the marginal saving rate assumed to be a constant proportion of income.

Assuming no debt at the beginning of the period and that the interest payments in any year are calculated on outstanding debt at the end of the previous year, total foreign debt (D) can be derived as

$$D_0 = cg Y_0 (1+g)^0 - Y_0 [S_0 - s((1+g)^0 - 1)] \quad (6.23)$$

$$D_n = [cg Y_0 (1+g)^0 - Y_0 [S_0 - s((1+g)^0 - 1)]](1+r)^n + \dots + [cg Y_0 (1+g)^n - Y_0 [S_0 - s((1+g)^n - 1)]](1+r)^0 \quad (6.24)$$

where r is the interest rate on foreign borrowing

(1) This derivation is extracted from D. Avramovic, et.al., *Economic Growth...*, op.cit., Mathematical Appendix, pp. 188-192.

From (6.24):

$$D_n = Y_0 \left[(cg-s)(1+r)^n \frac{1 - \left[\frac{(1+g)}{(1-r)} \right]^{n+1}}{1 - \left[\frac{(1+g)}{(1-r)} \right]} - (S_0 - s)(1+r)^n \frac{1 - \left[\frac{1}{(1+r)} \right]^{n+1}}{1 - \left[\frac{1}{(1+r)} \right]} \right] \quad (6.25)$$

$$D_n = Y_0 \left[\frac{(cg-s)(1+r)^{n+1} - (1+g)^{n+1}}{r - g} - (S_0-s) \frac{(1+r)^{n+1} - 1}{r} \right] \quad (6.26)$$

and when $g=r$, this form applies:

$$D_n = Y_0 \left[n (cg-s)(1+g)^n - (S_0-s) \frac{(1+g)^{n+1} - 1}{g} \right] \quad (6.27)$$

In addition to the basic assumptions of the model which have been discussed in section 6.3, it is further assumed that the increase in debt in a given year is equal to the interest payments on outstanding debt at the end of the previous year minus savings (that should pay for debt servicing) after meeting domestic investment requirements or plus the excess of domestic investment requirements over domestic savings. Therefore, D_n can be rewritten as

$$D_n = rD_{n-1} - (s Y_n - cg Y_n) \quad (6.28)$$

The condition for debt to increase at the same rate as income is

$$D_n = g D_{n-1} \quad (6.29)$$

Thus, the condition for the equiproportionate growth of income and debt is

$$g D_{n-1} = r D_{n-1} - (s Y_n - cg Y_n) \quad (6.30)$$

Since $Y_n = Y_0(1+g)^n$, the solution for (6.30) can be obtained as

$$D_{n-1} = \frac{Y_0 (1+g)^n (cg-s)}{g-r} \quad (6.31)$$

$$D_n = \frac{Y_0 (1+g)^{n+1}(cg-s)}{g-r} \quad (6.32)$$

Substituting (6.32) in the left hand side of (6.26) and rearranging, we get

$$Y_0 \left[\frac{(cg-s)(1+r)^{n+1}}{r-g} - \frac{(S_0-s)(1+r)^{n+1} - 1}{r} \right] = 0 \quad (6.33)$$

Since for higher values of n , $(1+r)^{n+1}$ would sufficiently approximate the term $(1+r)^{n+1} - 1$ and hence -1 can be ignored. Thus (6.33) becomes

$$Y_0 \left[\frac{(cg-s)(1+r)^{n+1}}{r-g} - \frac{(S_0 - s)(1+r)^{n+1}}{r} \right] = 0 \quad (6.34)$$

Dividing through by $Y_0 (1+r)^{n+1}$ and solving for r , the critical rate of interest would be obtained as

$$r = \frac{g(S_0 - s)}{S_0 - cg}$$

CHAPTER SEVEN

**A COMPARISON OF TRADE AND AID IN THE PROCESS
OF DEVELOPMENT IN THE SUDAN**

7.1 Introduction

Economists differ on the relative contribution of foreign assistance and domestic exports to the development process of LDCs. Johnson⁽¹⁾ claims that a given amount of foreign "aid" will be worth more than the value of an equal amount of domestic exports but others such as Cohen⁽²⁾ either maintain the opposite view or simply regard the development potential of both sources to be equal (see Chenery and Strout⁽³⁾, or McKinnon⁽⁴⁾). Johnson argues that a dollar from extra foreign capital will be worth more than a dollar from extra exports because of the assumption that the exporting country must use some of its own resources to earn the extra dollar from exports. On the other hand, Keesing⁽⁵⁾ and Haberler⁽⁶⁾ maintain that the expansion of exports may confer benefits which are not associated with aid. These benefits can be in the form of scale effects associated with production for larger

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- (1) See, H.G. Johnson, **Economic Policies Towards Less Developed Countries**, George Allen and Unwin, London, 1967.
 - (2) See, B.I. Cohen, "Relative Effects of Foreign Capital and Larger Exports on Economic Development", **Review of Economics and Statistics**, No. 2, May 1986, pp. 281-284.
 - (3) See, H.B. Chenery and A.M. Strout, "Foreign Assistance...", *op.cit.*
 - (4) See, R. McKinnon, "Foreign Exchange...", *op.cit.*
 - (5) See, D. Keesing, "Outward-Looking Policies and Economic Development", **Economic Journal**, Vol. 77, June 1976, pp. 303-320.
 - (6) See, G. Haberler, **International Trade and Economic Development**, National Bank of Egypt, Cairo, 1959.

markets, learning effects due to foreign contacts, and linkage effects that will be created by the export-orientated industries. Haberler further argues that the expansion of exports will not only allow a capital importing country to pay off its past foreign debts but it can also induce new foreign capital inflows, assuming aid is positively related to the performance of the export sector. Furthermore, Maizels⁽¹⁾ argues that exports contribute to domestic savings not only through their effect on output but also because the export sector is likely to have a higher propensity to save than the other sectors of the economy. Finally, advocates of the dual-gap approach suggest that an extra dollar from exports has the same effect on the development process as an extra dollar from foreign capital if the growth of the developing country is constrained by its inability to import the required capital-goods (which cannot be produced domestically) due to a shortage of foreign exchange.

The statistical evidence for developing countries generally supports the hypotheses that the growth of exports plays a major role in the development process both by stimulating demand and by encouraging saving and capital accumulation, and because exports increase the supply potential of the economy by raising the capacity to import.⁽²⁾ In this connection, Chenery and Strout remark that there was almost no country in their sample which has

(1) A. Maizels, **Exports and Economic Growth of Developing Countries**, Cambridge University Press, London, 1968.

(2) See e.g., R. Emery, "The Relation of Exports and Economic Growth", **Kyklos**, No. 2, 1967; and R.F. Syron and B.M. Walsh, "The Relation of Exports and Economic Growth: A Note", **Kyklos**, No. 3, 1968.

sustained for a long period a growth rate substantially higher than the rate of growth of its exports.⁽¹⁾ Also, the Pearson Commission has found that the growth rates of individual developing countries correlate better with export performance than with any other economic indicator.⁽²⁾

The relative worth of trade and aid can be compared by assessing the "direct effects" (i.e. by comparing a unit of foreign exchange from exports with a unit of foreign exchange from aid) as well as the "indirect effects" or the "secondary repercussions" (i.e. by comparing the productivity of foreign capital with that of domestic exports and also the contribution of both sources towards generating more savings). Let us consider first the direct effects.

7.2 The Direct Effects of Trade and Aid

(i) The Traditional Approach

The practice of comparing the worth of exports with that of an equal amount of foreign assistance through their direct effects has been developed in order to examine the economic rationale of the slogan "trade, not aid", a slogan which has become increasingly important to the developing countries. In his seminal analysis, Johnson considered aid in the literal sense (i.e. as a free resource transfer) and, by ignoring what he called the secondary repercussions, he argued that a unit of foreign exchange from "pure aid" will always be worth more than a unit of foreign

(1) See, H.B. Chenery and A.M. Strout, "Foreign Assistance...", *op.cit.*

(2) See the Pearson Report, *Partners in Development*, *op.cit.*

exchange from exports.⁽¹⁾ He assumed that exports provide "indirect" resources for investment only in so far as export proceeds allow the purchase of imported final goods and services at lower costs than domestic costs of production, where this ratio may be defined as the excess cost of import substitution. On the other hand, aid not only provides resources "directly" but also indirectly by saving the excess cost of import substitution (as defined above). Therefore, the relative worth of exports and aid may be compared by using this formula

$$\frac{cX}{(1+c)A} \quad (7.1)$$

where X is the value of exports, A is the value of pure aid and c is the excess cost of import substitution. For the purposes of this comparison, A is set equal to X; and it is clear that $c < (1+c)$ where $c > 0$ and therefore pure aid is preferable.

Thirlwall⁽²⁾ developed this approach by incorporating the excess cost of aid-tying and formula (7.1) then becomes

$$\frac{cX}{(1+c)A} \cdot r \quad (7.2)$$

where r is the excess cost of tying defined as the "ratio" of the price of tied goods to the price of the same goods in the world market. Here exports will be worth more than aid if $cr > (1+c)$.

Trade and the grant element of an equal amount of foreign

(1) See, H.G. Johnson, *Economic Policies...*, *op.cit.*, p. 57.

(2) A.P. Thirlwall, "When is Trade More Valuable than Aid?", *Journal of Development Studies*, Vol. 12, No. 5, 1976, pp. 35-41.

assistance can also be compared. When aid is untied, the formula is

$$\frac{cX}{(1+c)Fg} \quad (7.3)$$

or if aid is tied

$$\frac{cX}{(1+c)Fg} \cdot r \quad (7.4)$$

where F is the face value of the loan and g is the grant element as a proportion of nominal aid; i.e. $A=Fg$. Therefore, exports will be worth more than aid if $c > g(1+c)$ or when aid is tied if $cr > g(1+c)$.

Given the assumption that foreign borrowing on any terms saves the excess cost of import substitution, it has also been argued that the most relevant comparison to be made is that between the worth of exports and an equal amount of foreign assistance itself.⁽¹⁾ Furthermore, foreign borrowing is still assumed to provide resources directly equal to Fg and indirectly equal to Fc. The comparison formulae can now be expressed as:

$$\frac{cX}{(g+c)F} \quad (7.5)$$

and when aid is tied

$$\frac{cX}{(g+c)F} \cdot r \quad (7.6)$$

It is clear that in the absence of aid-tying the worth of exports can never exceed the worth of an equal amount of foreign assistance unless $g < 0$, because $c < (g+c)$. However, when aid is tied, exports might be worth more than an equivalent amount of foreign assistance if the excess costs of import substitution and aid-tying are high and the grant element of foreign assistance is very low, i.e. if the condition $cr > (g+c)$ is satisfied.

(1) A.P. Thirlwall, *ibid.*, p. 38.

(ii) **The Estimates for the Sudan**

The implications of equation (7.6) can be investigated in the case of the Sudan by combining the estimates of the grant element obtained in Chapter Three with those for the excess costs of tying derived in Chapter Four. From **Table [3.3]** in Chapter Three, the overall value of the grant element during the period 1958-1979 averaged 23%, 31% and 39% at a discount rate based on annual average current interest rates, 8% and 10% respectively. On the other hand, the overall average excess cost of aid-tying according to **Table [4.2]** in Chapter Four is 125%. It should be noted that the excess cost of aid-tying in our analysis (ϵ) is defined as the proportional mark up of the price of tied goods over their free market price which is different from Thirlwall's r ; $r = \epsilon + 1$.⁽¹⁾ Given the values of g and r , one can solve for the value of c which will equate the worth of exports with that of an equal amount of foreign assistance i.e. when this equality holds

$$cr = g + c \qquad (7.7)$$

From equation (7.7), a unit of foreign exchange from exports will be worth as much as a unit of foreign exchange from a foreign capital inflow - in the case of the Sudan - if the excess cost of import substitution is approximately 18%, 25% or 31% when the grant element of 23%, 31% and 39% is used respectively.

Regarding the actual measurement of c , it is very difficult to estimate the average excess cost of import substitute activities. The best indicator that perhaps can approximate the

(1) See the empirical demonstration given by A.P. Thirlwall, *ibid.*, p. 38.

excess cost of import substitution is the average tariff rate on imports that compete with domestic goods. In the case of developing countries, this would mean the use of the average tariff rate on imported manufactured goods. The tariff rate on manufactured goods in the Sudan was estimated by Abdul Wahab and Azhar.⁽¹⁾ The authors found that the general average rate of import duty in the country during the period 1961-1974 was approximately 40%.⁽²⁾ Taking this figure as an indicator of the value of the excess cost of import substitution in the Sudan, it is clear from equation (7.6) that exports will be worth more than an equivalent amount of aid at the three different values of the grant element. However, it can be argued that the excess cost of import substitution in the Sudan may be higher than the level reflected by the average tariff rate because of the increasing cost of import substitute activities. The foreign exchange cost of these activities may be very high when financed by foreign borrowing due to the high excess cost of tying (Chapter Four), or

(1) See, A.R. Abdul Wahab and B.A. Azhar, "Domestic Budgeting Constraints and Prospects", in A.M. El Hassan (ed.), **Growth, Employment and Equity**, ILO and Economic and Social Research Council, Khartoum, 1977.

(2) It should be mentioned that the Sudan adopted in 1968 the Brussels Nomenclature according to which the tariff scheme was divided into 99 chapters containing about 1100 items. In general, most of the duties are levied on an ad valorem basis with the exception of some traditional items (such as tea, coffee beans and cigarettes) which are subjected to specific rates of duty. The scheme involves as many as 26 duty rates ranging between 5% to 600%. However, a frequency distribution test showed that the most frequent rates of duty range between 10% to 150% and they apply to about 90% of the total items and sub-items in the tariff structure. See, Abdul Wahab and Azhar, *ibid.*

when financed by export proceeds, because of the successive devaluations of the Sudanese pound (Chapter Five, section 5.2(v)). The local cost component may also be very high due to the inflationary impact of the devaluations.

(iii) **An Alternative Derivation of the Relative Worth of Trade and Aid**

The comparison of the relative worth of trade and aid through the conventional approach relies on the assumption concerning the excess cost of import substitution because exports confer benefits only when there is an excess cost of import substitution, then obtaining resources from abroad would save that cost. More generally, the analysis also regards tying as a factor which increases the worth of exports or directly reduces the worth of aid in terms of purchasing power as far as imports are concerned. Yet, given the effect of tied aid on the recipient's real income and welfare (Chapter Four), it seems more appropriate to analyse the effect of aid-tying on the value or the net worth of the assistance. In other words, the shadow grant element approach which has been developed in Chapter Four (equation (4.3) or (4.4)) should be used. Concentrating on equation (7.6) which represents the most relevant comparison to be made according to Thirlwall, the modified formula can be written as

$$\frac{c \cdot X}{(g^* + c)F^*} \quad (7.8)$$

where F^* is the real value of the loan (F/r), $g^* = (F/r) - PV$, and PV is as defined in equation (3.2) in Chapter Three. Now, it is clear from formula (7.8) that exports will be worth more than an

equal amount of aid if $c > (g^* + c)$ or simply if $g^* < 0$. When $g^* > 0$, aid will be worth more and when $g^* = 0$, aid and trade will have an equal worth.

(iv) **The Experience of the Sudan**

To illustrate the implications of equation (7.8) with an empirical example from the experience of the Sudan, the estimates of the shadow grant element contained in Chapter Four (Table [4.5]) can be used. Since all the estimates of g^* tend to be negative, then according to (7.8) exports should be worth more. As such, the role of the excess cost of import substitution in the analysis has been neutralized in which case the conventional approach becomes doubtful in making the correct comparison between the worth of trade and aid since the excess cost of import substitution is the only assumption upon which this comparison depends.⁽¹⁾ This would probably strengthen the case for investigating the secondary repercussions or the indirect effects which have been ignored by this analysis.

7.3 **The Secondary Repercussions**

The question of the secondary repercussions or the indirect effects of aid and trade, as mentioned earlier, involves primarily a comparison of the productivity of both sources as well as a comparison of their ability to generate additional saving. Let us now take these issues in turn.

(1) The same result has been reached by Yassin elsewhere but the approach used here gives more sound economic implications. See Ibrahim H. Yassin, "When is Trade More Valuable Than Aid?: Revisited", **World Development**, Vol. 10, No. 2, February 1982, pp. 161-166.

(i) **The Productivity of Aid and Trade: The Experience of the Sudan**

Although it is difficult to obtain a point estimate for the productivity of each source, some "indicators" can be used as to whether or not these resources have been used in the most productive manner in the Sudan. In the case of foreign assistance, these indicators can be extracted from the results obtained in the preceding chapters. The evidence contained in Chapter Three shows that the contracted Sudanese foreign loans during the period 1958-1979 have been primarily directed towards promoting infrastructure and social overhead leaving the directly productive activities lagging behind. Since infrastructural projects are generally believed to have a relatively high capital-output ratio, as discussed in Chapter Five, this would result in a low productivity of foreign resources. Regarding the directly productive activities, they have been characterized by capacity underutilization which could be largely due to the unsatisfactory quality of the plants and the inappropriate technology that often accompanies foreign loans. This is clearer in the case of the tied projects which have been examined in Chapter Four (section 4.8) where some of the projects were handed to the Sudan government before even being completed and have suffered from continuous technical defaults. Sometimes the installed machines were not compatible with the contract's specifications and in one case the erection of a complete factory was done on a physically unstable foundation.

On the other hand, the productivity of exports in the Sudan

during the period under consideration is likely to be higher than that of foreign assistance because exports are free to finance directly productive activities unlike foreign resources which have been largely tied to nonproductive uses or by source in which case unsuitable machines and inappropriate technology were purchased at prices considerably higher than the world market price.

(ii) The Contribution of Aid Towards Domestic Savings

The condition for domestic saving to increase due to foreign borrowing is conveyed by equation (6.9) in Chapter Six. Saving will increase when income increases and income will increase as long as the rate of interest on foreign borrowing is less than the productivity of capital or the returns on investments that have been financed by foreign borrowing. There are difficulties in applying a detailed micro analysis in order to determine the returns on individual aid-financed projects but in Chapter Five it was argued that foreign capital inflows were associated with a reduction in the domestic saving rate at the macrolevel during the period 1958-1979 since a large proportion of the assistance was consumed, leaving a small fraction to contribute to domestic capital formation. What remains then is to estimate the propensity to save out of exports.

(iii) Exports and Saving: The Maizels' Hypothesis

The behaviour of saving is generally explained by fitting a simple function which relates current savings (S_t) to current income (Y_t) such as⁽¹⁾

(1) See, A. Maizels, Exports and Economic Growth..., *op.cit.*, p. 95.

$$S_t = a + bY_t + \mu_t \quad (7.9)$$

where b is the propensity to save and μ is the error term. In this case, saving will increase, *ceteris paribus*, with income and give a stable saving function. However, when savings vary substantially from one period to another at a given level of income, current income alone will not explain savings behaviour.⁽¹⁾ In order to account for the shift of the saving-income relation, other variables should be included in the saving function and this is why Maizels⁽²⁾ has introduced exports as an additional explanatory variable. In theory, exports may influence domestic income and saving because of the efficient resource allocation that will be induced by increased trade opportunities (according to the classical theory of trade) or through the multiplier effect (as the modern theory suggests). According to these theories, exports will affect savings indirectly by bringing about changes in income. Maizels, however, seems to be more concerned with what can be called the "direct effects" of exports on saving that ultimately cause the saving function to shift. He argues that the direct effects can occur because the propensity to save in the export sector is higher than the rest of the economy; taxation on foreign trade is a major source of government saving and the growth of exports may induce a rise in the propensity to

(1) See e.g., D.W. Johnson and J.S.Y. Chiu, "Saving - Income Relations in Underdeveloped and Developed Countries", *Economic Journal*, June 1968.

(2) See, A. Maizels, *Exports and Economic Growth...*, *op.cit.*, p. 93.

save in the other sectors of the economy.⁽¹⁾

The estimating equations which incorporate exports can be specified in several ways⁽²⁾ and Maizels used equation (7.9) as well as this form⁽³⁾

$$S_t = a_0 + a_1(Y_t - X_t) + a_2X_t + \mu_t \quad (7.10)$$

where S is gross domestic savings, X is the value of exports, Y is GDP, Y-X is the non-export income, μ is the error term and t is time.

Maizels has fitted both equations ((7.9) and (7.10)) to a sample of 11 countries and his results largely confirmed his hypothesis as 8 countries showed a significant correlation between savings and exports.⁽⁴⁾ When Lee extended Maizels' analysis by increasing the sample to 28 countries for a longer period of time, his results further supported Maizels' findings and the coefficient on X was found to be substantially higher than on Y-X for many countries.⁽⁵⁾ Similar results for different samples and time periods were also obtained by Chenery and Eckstein;⁽⁶⁾ and by

(1) Maizels did not give explicit explanations as to why or how these direct effects can bring about an increase in the marginal propensity to save; in particular his major hypothesis that the propensity to save in the export sector is higher than elsewhere in the economy remains an empirical question. A good explanation was provided by Joong-Koon Lee, "Exports and the Propensity to Save in LDCs", **Economic Journal**, Vol. 81, June 1971.

(2) See e.g., T. Weisskopf, "The Impact of Foreign Capital...", **op.cit.**

(3) See, A. Maizels, *Exports and Economic Growth...*, **op.cit.**, p. 69.

(4) See, A. Maizels, **ibid.**, p. 95.

(5) See, J.K. Lee, "Exports and the Propensity...", **op.cit.**, p. 346.

(6) See, H. Chenery and P. Eckstein, "Development Alternatives...", **op.cit.**

Papanek. (1)

In the case of the Sudan, equation (7.9) has been already fitted in Chapter Six (section 6.6(iii)) and the estimated propensity to save out of current income was .086. When equation (7.10) was fitted to Sudanese data for the same period (1958-1979), the following result is obtained (with t - statistics in brackets)

$$S_t = 9.81 + .069(Y_t - X_t) + .118 X_t \quad R^2 = .9487$$

(2.95) (4.86) (2.69) DW = 1.8119

which also lends support to the Maizels hypothesis and stresses the significant contribution of exports to saving.

Therefore, regarding the secondary repercussions or the indirect effects, the evidence for the Sudan tends also to suggest that the contribution of exports towards generating additional savings has been positive and significant unlike that of foreign assistance.

7.4 The Contribution of Aid and Trade to Growth

After discussing both the direct and indirect effects of trade versus aid, a related issue to that of the secondary repercussions which needs to be discussed is the contribution of both sources towards promoting economic growth. While the theoretical impact of foreign capital inflows has been fully explored in Chapter Five, the estimated equation for the Sudan incorporated both the foreign capital inflows and exports. The results obtained show that the contribution of exports towards

(1) See, G. Papanek, "Aid, Foreign Private....", *op.cit.*

the rate of economic growth of the Sudan during the period under consideration was significantly positive unlike that of foreign assistance which was negligible. These results agree with the existing statistical evidence for many countries that has been derived by testing various export-led growth models, and support in general the hypothesis that the growth of exports plays a major role in the process of economic growth. Such studies have either examined the relation between exports and growth directly, or indirectly by considering the import-growth relation.⁽¹⁾

As for the export-growth studies, Emery found a strong correlation between the growth of output and that of exports by examining 50 countries and by using the average values of per capita income growth and export growth over the period 1953-63.⁽²⁾ When Syron and Walsh divided the sample of Emery into developed and less developed countries, they also found a strong correlation between exports and growth in both groups of countries.⁽³⁾ By taking 20 countries during the period 1961-66, Stein found a significant strong correlation between both exports and imports and growth.⁽⁴⁾ Also, in a sample of 8 south-east Asian countries

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- (1) In the case of export - growth studies, the estimating equation takes usually the form of $y=a+b(x)$ where y is the growth of output and x is the growth of exports. However, in cross-sectional analysis allowances should be made for differences between countries as far as the importance of exports in total output is concerned; otherwise the estimating equation will be mis-specified. The correct form to be used in cross-section studies therefore will be $y=a_1 + b_1 (wx)$ where w is the potential importance of exports in total output.
- (2) R. Emery, "The Relation of Exports...", *op.cit.*
- (3) R.F. Syron and B.M. Walsh, "A Note", *op.cit.*
- (4) See, L. Stein, "On the Third World's Narrowing Trade Gap", *Oxford Economic Papers*, March 1971.

over the period 1951-1969, Healey found a strong time series correlation between growth and exports within countries.⁽¹⁾

Similarly, in empirical analysis, a strong correlation was found between the growth of output and the growth of imports which is plausible if export earnings are the major determinant of the capacity to import. In addition to the already mentioned study by Stein⁽²⁾, the UNCTAD⁽³⁾ found also a strong rank correlation between the growth of output and the rate of growth of the capacity to import in the case of 20 countries during the period 1953-1963. This study stressed the supply or the capacity creating effects of exports rather than the demand stimulating effects. Finally, when Agosin⁽⁴⁾ examined the relation between imports and growth in 12 countries, he remarked that the slow expansion of world markets for primary products may create difficulties for the exports of developing countries and hence the economic growth of these countries may be consequently constrained because the capacity to import the essential raw materials and capital goods will be jeopardized.

7.5 Export - Led Growth and the Balance of Payments Constraint

Thirlwall⁽⁵⁾ has been critical of the export-led growth

(1) See, D. Healey, "Foreign Capital and Exports in Economic Development: The Experience of Eight Asian Countries", **Economic Record**, September 1973.

(2) L. Stein, "On the Third World's...", *op.cit.*

(3) See, UNCTAD, **Trade Prospects and Capital Needs of Developing Countries**, United Nations, New York, 1968.

(4) See, M. Agosin, "On the Third World's Narrowing Trade Gap: A Comment", **Oxford Economic Papers**, March 1973.

(5) See, A.P. Thirlwall, **Balance of Payments Theory and the United Kingdom Experience**, Macmillan, London, 1980.

models (in particular the virtuous circle models)⁽¹⁾ for their concentration on a faster growth of output and exports rather on relieving a country from a balance of payments constraint on demand. For instance, assuming the demand for exports is a function of the difference in the growth rates of domestic and foreign prices, the virtuous circle models envisage that a faster growth of exports will lead to a faster productivity growth which will contribute to a lower rate of growth of average costs per unit of output (provided that wages do not increase in proportion with productivity) in which case the increase in domestic price of exports will be at a lower rate which will lead to a factor rate of growth of exports. It is clear that these models do not account for the possibility that the rate of growth of income (as determined by these models) may induce a rate of growth of imports greater than that of exports which would impose a constraint on the export-led growth rate if the balance of payments equilibrium is to be maintained i.e. the import side in these models has been neglected. In order to allow for this induced growth in imports, these models should incorporate a balance of payments equilibrium condition. This equilibrium condition through time for a growing economy will require the rate of growth of the value of exports and imports to be equal and hence placing emphasis on the income elasticities of demand for exports and imports.

Assuming that the balance of payments equilibrium on current

(1) See e.g., A. Lamfalussy, **The United Kingdom and the Six**, Macmillan, London, 1963; and W. Beckerman, "Projecting Europe's Growth", **Economic Journal**, December 1962.

account is to be preserved and that the real terms of trade remain unchanged, Thirlwall has shown under various restrictive assumptions that the balance of payments constrained growth rate approximates in the long run to a simple growth rule namely: the rate of growth of income is equal to the rate of growth of exports divided by the income elasticity of demand for imports⁽¹⁾, which is simply the dynamic analogue of the Harrod trade-multiplier.⁽²⁾ Thirlwall found that the actual growth experience of several developed countries over the post-war period has approximated to this simple growth rule.

In order to apply this approach to a sample of developing countries, the simple Harrod trade-multiplier was used and then the analysis was further extended to account for the effect of foreign capital inflows.⁽³⁾ Starting from a current account disequilibrium, the extended model shows that the balance of payments constrained rate of growth is a weighted sum of the growth of exports (due to an exogenous growth of income abroad) and the growth of real capital imports; both divided by the income

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- (1) See, Thirlwall, *ibid.*, and also A.P. Thirlwall, "The Balance of Payments Constraint as an Explanation of International Growth Rate Differences", *Banca Nazionale del Lavoro Quarterly Review*, March, 1979.
 - (2) See, R. Harrod, *International Economics*, Cambridge University Press, London, 1933; and also N. Kaldor, "What is Wrong with Economic Theory?", *Quarterly Journal of Economics*, August 1975; and C. Kennedy and A.P. Thirlwall, "Import Penetration, Export Performance and Harrod's Trade Multiplier", *Oxford Economic Papers*, July 1979.
 - (3) See, A.P. Thirlwall and M.N. Hussain, "The Balance of Payments Constraint, Capital Flows and Growth Rate Differences Between Developing Countries", *Oxford Economic Papers*, Vol. 34, No. 3, November 1982.

elasticity of demand for imports. In this case, the model will underpredict or overpredict the growth rate depending on whether or not capital imports grow at a rate faster or lower than that of export earnings. The model also shows that the balance of payments constrained growth rate will be lowered if the rate of growth of capital imports is zero. This is because, with the initial current account disequilibrium, an equal rate of growth of the value of exports and imports will widen the disequilibrium in absolute terms, and if the gap is not bridged by a continuous flow of foreign capital, the growth of income must fall in order to reduce the growth rate of imports below that of exports to keep the absolute gap between them (which is equal to the initial value of capital imports) unchanged.⁽¹⁾ With no initial disequilibrium and capital inflows, the model reduces to the original Harrod trade-multiplier.

It can be noticed that the treatment of capital imports in the analysis of a constrained balance of payments growth rate is similar in a sense to its treatment in the dual gap analysis when the foreign exchange gap is a dominant constraint on growth (see Chapter Five). According to the dual gap model, in the presence of an export-import gap, not only capital imports will contribute as much as exports to ease the foreign exchange shortages⁽²⁾, but also the required amount of capital imports can be estimated in

(1) Thirlwall and Hussain, *ibid.*, p. 503.

(2) Thirlwall and Hussain also assumed that the rate of growth of capital inflows is equal to the rate of growth of export earnings otherwise the predictive power of the model will not be the same as that which starts from a current account equilibrium. Thirlwall and Hussain, *ibid.*, Footnote 2, p. 501.

order to close the foreign exchange gap and hence a target rate of growth can be achieved. Similarly, in the constrained balance of payments growth rate model, a specific rate of growth of real capital imports would be required to fill an initial gap between the rate of growth of the value of exports and imports and hence a constrained balance of payments growth rate (starting from an initial disequilibrium position) can be preserved. Since this thesis is not concerned with estimating foreign resource requirements in the aggregate whether to achieve a target rate of growth or to preserve a constrained balance of payments growth rate, this type of analysis will be irrelevant.

However, the empirical results obtained by applying the analysis of the Harrod trade-multiplier and the extended model to Sudanese data over the period 1958-1976, showed that the annual growth rates of income, exports and real capital imports averaged 5.4%, 5.3% and 7% respectively.⁽¹⁾ Therefore, with an estimated income elasticity of demand for imports in the region of 0.64, the simple Harrod trade-multiplier predicted a growth rate of 8.3% while the extended model predicted a rate of growth of 8.5%. Since the rate of growth of real capital imports was found to be greater than that of exports, the balance of payments constraint on growth should have been relaxed but because of the adverse affect of relative price changes, (which was estimated to be -3.1), the balance of payments constraint on growth seems to have been

(1) See Thirlwall and Hussain, *ibid.*, p. 505.

tightened.⁽¹⁾

7.6 Donors' Combined Contribution of Aid and Trade

Yeats⁽²⁾ has recently assessed the total foreign resource transfer by individual developed industrial countries in terms of both aid (with official development assistance, or the ODA, being the major form) and trade (i.e. buying exports of LDCs). He found that some of the countries which contributed significantly in terms of aid have ranked among the poorest performers in terms of trade, and vice versa. For instance, while Japan and the USA which both share a low percentage of ODA/GNP were found to import about 23% or more of total manufactures of developing countries, the import share of Norway, Sweden and Denmark (all of which obtained the OECD/ODA target of 0.7% of national income) was about 6%. In terms of the combined contribution of aid and trade, countries like the UK, Netherland and Belgium were found to be making the highest contributions. The total resource transfer by USSR and other socialist countries of Europe was far below the poorest performing DAC members.

In the case of the Sudan, Yeats' approach cannot be used throughout the period under consideration due to the lack of

(1) The effect of relative price movements was calculated as the terms of trade divided by the income elasticity of demand for imports; while the terms of trade was calculated as the ratio of the country's export price index over its import price index. Thirlwall and Hussain, *ibid.*, Table 3, p. 508.

(2) See, A.J. Yeats, "Development Assistance: Trade Versus Aid and the Relative Performance of Industrial Countries", *World Development*, Vol. 10, No. 10, October 1982, pp. 863-69.

adequate detailed information and a proper classification, on the basis of individual countries, of the direction of trade with foreign customers. Nevertheless, the combined contribution of aid and trade by some major donors (customers) can be demonstrated by using the shares of these countries in the value of total Sudanese exports as well as the total contracted official loans during the period 1958-1979. Using the classification by the Bank of Sudan of the Sudan's main customers, the average annual shares of these customers in the total value of Sudanese exports were calculated as in column (1) in **Table [7.1]**. The share of aid (column (2), **Table [7.1]**) has been calculated from the available data on contracted loans which was previously used in the calculations of the grant element in Chapter Three.⁽¹⁾ This means that the share of aid in total resource transfers is on commitment basis. By combining both calculated shares, the annual average total foreign resource transfer was obtained (column (3) in **Table [7.1]**).

Both **Table [7.1]** and **Figure (7.1)** show that individual countries (or groups of countries) which contributed a higher share of aid, maintained a lower share in trade, and vice versa. Moreover, while the EEC has achieved the highest contribution in trade, the category of "Others" which is mainly composed of the Arab countries has shown the best performance as far as the aid contribution is concerned.⁽²⁾ As for the combined contribution of

(1) In order to match the classification of the Bank of Sudan, the Sudan's aid donors (customers) were also classified accordingly.

(2) It has been also shown in Chapter Three (**Table [3.2]**) that the amount of loans contracted with the Arab countries during the period 1958-1979 was the largest in comparison to any other source.

Table [7.1]: Percentage Shares of the Sudan's Main Customers (Donors) in the Value of Total Exports and Total Contracted Official Loans During the Period 1958-1979

Countries	(1)	(2)	(3)
	% share in the value of total Sudanese exports	% share in the value of total contracted official foreign loans	% of total foreign resource transfer to the Sudan
(%) annual average over the period (1958 - 1979).			
EEC*	38.7	13.1	51.8
Other Western Europe	3.9	11.5	15.4
USA	3.2	1.0	4.2
Japan	6.7	1.0	7.8
Egypt	4.0	1.4	5.4
India	8.4	-	8.4
P.R. of China	7.0	4.6	11.6
USSR	4.9	1.7	6.6
Other Socialist Countries	7.7	11.6	19.3
Others**	15.5	20.8	36.3
Total	100.0	66.7**	

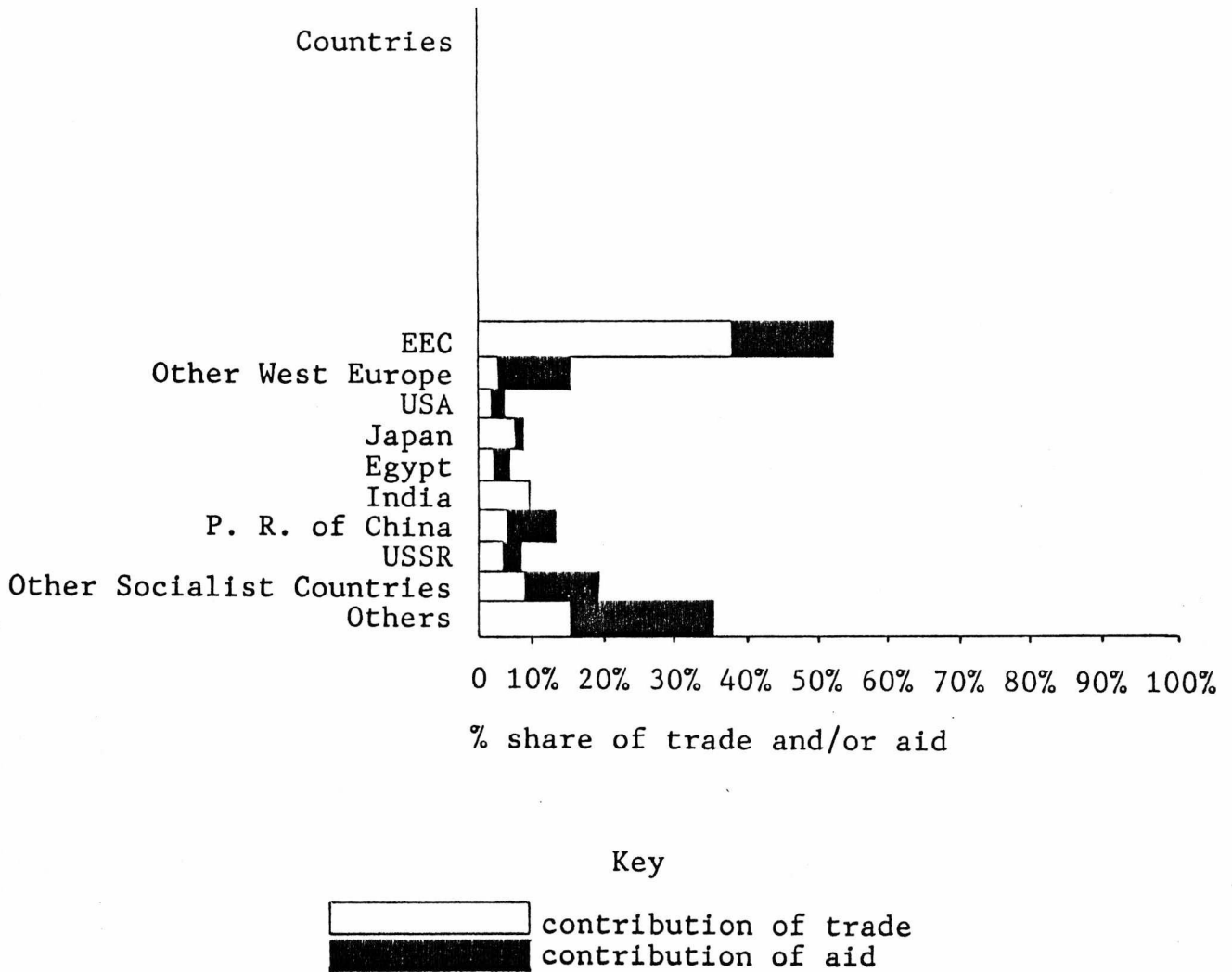
Source: own calculations based on data compiled from various issues of the **Annual Reports** of the Bank of Sudan and the records of the Sudanese Ministries of "National Planning"; and "Finance and National Economy".

* Britain is included as an EEC member throughout the whole period.

** The category of "Others" is mainly composed of the Arab countries, and in order to make columns (1) and (2) comparable under this category, foreign assistance originating from International Organizations (such as the IBRD and IDA) as well as from Private sources was excluded. When the percentage share of these two excluded sources in total contracted loans (which reaches 33.3%, **Table [3.2]** in Chapter Three) is added to the total of column (2); the overall 100% figure will be reached.

aid and trade, while the EEC still ranks the highest, the USA performance tends to be consistently poor showing the lowest contribution in terms of aid, trade and total resource transfers.

Figure (7.1): The Contribution of Trade and Aid to Total Resource Transfers by Some Sudanese Customers (Donors) 1958-1979.



Among the countries listed in Table [7.1], it can be noticed that the non-EEC members of Western Europe, Other Socialist countries and the Arab countries (which dominate the category of "Others") have shown a deficient trade performance in comparison to their aid contributions. However, it should be noted that since the Sudan is a primary products exporting country, it may have limited marketing opportunities. In addition, the domestic supply constraints may further limit the opportunities to increase trade.

7.7 The Future Prospects of Sudanese Trade

In order to increase trade opportunities in future, the Sudan needs to pursue an export-led growth strategy which focusses on both the expansion and diversification of exports. This will alleviate the constraints on growth, whether caused by foreign exchange shortages or a domestic resource gap, and contribute towards paying off foreign debts. This is because export-led growth will relax the constraints on the balance of payments by improving the balance of trade and by contributing to the debt servicing payments, in which case the foreign exchange gap will be eventually closed and perhaps the dependence on foreign assistance might cease. On the other hand, the growth of exports will lead to an increase in domestic savings (due to the consequential rise in income) which will contribute towards financing investment requirements in order to eliminate the foreign exchange gap. Hence, the need for foreign assistance might cease in the long run and a self-sustained growth can be realized.

The expansion of exports cannot be easily done or achieved in

the Sudan. The Sudan is mainly an agricultural country depending on the exports of cotton (65%), ground nuts (4.3%), sesame (2.7%), gum arabic (8%) and other goods (20%).⁽¹⁾ The dependence on cotton as the major exportable crop makes the returns from exports greatly influenced by changes in the world cotton markets. As the world's future consumption of cotton was found by Ecevit⁽²⁾ to be increasing (though at a diminishing rate), it may be still profitable for the Sudan to continue producing cotton with perhaps maximized returns if proper marketing policies are adopted. Nevertheless, in order to avoid the Sudan the risk of depending only on one crop, the development of other products will be required, given the agricultural potential of the country. For example, food production and processing can be expanded by establishing export-orientated agro-industries with the intention of increasing trade especially with countries (such as the Arab countries) where the trade performance tends to be deficient in comparison to the aid contributions of these countries to the Sudan (section 7.6). In brief, in order to increase the market share of the Sudanese exports abroad, a comprehensive programme which examines the competitiveness of the exportable products, the potential world prices, the price and income elasticities of demand for such products and the world's economic situation as a

(1) See, the Bank of Sudan, **Annual Report**, 1979.

(2) The world's consumption of cotton was regarded by Ecevit as a function of the prices of cotton and man-made fibres as well as previous consumption. See, L. Ecevit, "Recent Development in the World Cotton Market and the Future Outlook", **IMF Staff Papers**, July 1977.

whole will be required; otherwise an erroneous decision might be taken which might negate the whole strategy.⁽¹⁾

7.8 An Overall Evaluation

The discussion contained in this chapter shows that, in the comparison of trade versus aid options, no general consensus can be reached (whether in theory or in practice) on the superiority of one resource to the other when their impact on the development process of LDCs is to be assessed. Furthermore, the role of the secondary repercussions (or the indirect effects) in this comparison seems to be more important than that of the direct effects as the latter may not provide the correct comparison. Even when the secondary repercussions are considered, a comprehensive evaluation of the contribution of trade and aid to the development process cannot be reached because in many occasions a more detailed micro analysis which examines each individual project financed by these sources would be required.

Nevertheless, the empirical evidence for the Sudan during the period 1958-1979 suggests that the contribution of exports towards the economic development of the country was consistently in excess of capital imports. This is because export earnings were free to finance directly productive activities and also because of their positive contribution towards domestic savings and growth. The

(1) A typical example would be the expansion of the production of sugar in the Sudan due to the increase in the World's prices of sugar in 1974 after which the prices fell substantially making the Sudanese calculations of profits out of date. For more details, see e.g., I.H. Yassin, "Private Foreign Investment in the Sudan...", Mimeographed, *op.cit.*

analysis also shows that the countries which contributed significantly in terms of aid have ranked among the poorest performers in terms of trade, and vice versa. Moreover, while the EEC scores the highest share of trade with the Sudan, the USA ranks the lowest in terms of aid, trade and total resource transfers. However, in order to increase the share of Sudanese exports in foreign markets and perhaps to balance trade with customers (donors), the Sudan needs to utilize the borrowed money in promoting exports which can be demanded abroad.

CHAPTER EIGHT

CONCLUSIONS

This thesis has examined the impact of foreign capital inflows on the Sudanese economic development during the period 1958-1979. Although the official loans contracted by the Sudan during this period totalled L.S 1203 million, the amount actually received reached only L.S 880.8 million.⁽¹⁾

The analyses in Chapter Two and Three showed that the project approach which the Sudanese authorities followed in selecting investment projects especially when preparing for a development plan tended to be biased towards activities with a high import content which attracted the maximum possible foreign resources. In the absence of sufficient concessional borrowing, import requirements were usually financed by short term hard borrowing with maturity periods between 1 and 10 years and interest rates reaching 6% or more . The share of this type of loans therefore increased in total borrowing and constituted by the end of 1980 about 70.5% of total outstanding debt. It is not surprising, therefore, that the grant element of the loans contracted by the Sudan was low averaging 23%, 31% and 39% at the discount rates based on the annual average interest rate prevailing at the Eurodollar and U.K. money markets, 8% and 10% respectively. While lower average grant elements appeared to be associated with Arab loans, higher average grant elements were linked with borrowing

(1) The official exchange rate of the Sudanese pound till 1978 was L.S=2.87 \$ and because of several devaluations the Sudanese pound currently worth less than 0.7 \$.

from international organizations. In between were the average grant elements of the loans contracted with West and East European countries.

However, Chapter Four showed that the high excess cost of tying the credits by source and/or by end use which was estimated to be 125% higher than the international market had largely wiped out the benefit or the aid component of these credits and rendered their value negative (i.e. yielding positive returns to donors). The costs of the tied credits were made more expensive by including in the contracts price escalation clauses, commissions payable on top of the rate of interest attached to the credits and contingency items which normally do not relate to the contracts under consideration.

Chapter Five showed that a large proportion of the received foreign capital inflows was used for increasing consumption expenditure, leaving a small fraction for investment activities which were biased towards infrastructural projects and social overhead capital. These emphases on infrastructure were reflected by the pattern of resource allocation of the Sudanese development plans as well as the distribution of the contracted loans during the period under consideration among the different sectors of the economy with the transport sector sharing 40% of the total flows. In addition, directly productive activities were characterized by capacity underutilization and suffered from several domestic problems major among which were the fluctuation of power, the lack of adequate trained manpower, shortages of fuel and delays of transport. These factors have put the effectiveness of these

investments into jeopardy and further neutralized the potential beneficial effects of the assistance on the rate of domestic savings and growth to the extent that these effects appeared to be negligible. Therefore, it appears that the Sudan has been unable to use foreign aid to achieve self-sustaining growth.

The consequential repercussions on the balance of payments and the economy as a whole were apparent: the high import content of the Sudanese investment projects which in turn stimulated a high demand for imports and created a severe problem of foreign exchange shortages, had continuously forced the government to relax import controls and to liberalize trade. As a result, corrupt domestic black markets have flourished and intensified the inflationary pressures on the economy. In addition, the local costs associated with the investment projects exerted extra pressures on the government's expenditure to the extent that the inflationary pressures on the economy were enhanced. On the other hand, given the fluctuations in export proceeds and their low growth rate (which averaged 8% during the period 1958-1979) relative to the average rate of growth of the debt service and outstanding debt (16% and 19%, during the same period, respectively), the debt service ratio showed an increasing trend and by 1979 the Sudan failed to meet its overdue obligations and asked for rescheduling. With the world economy sliding into the 1970s recession, not only was the possibility of repaying debts from export proceeds narrowed but also the refinancing of debt through bilateral and multilateral assistance became difficult. Past debts therefore had to be repaid by borrowing from private

sources and this had also contributed to the increasing share of commercial borrowing in the total inflows not only for the Sudan but also for many developing countries. As such, the Sudan entered a vicious circle of debt.

In addition to the suspension of aid by socialist countries in the early 1970s due to the Sudan's political orientation, the Sudan also lost credibility among other aid donors and became uncreditworthy after the 1979 default. In order to obtain some foreign resources to service the debts or perhaps to redress the balance of payments, the Sudan had to accept the IMF facilities which are normally accompanied by austerity programmes. Among other restrictions, the Sudanese pound was devalued several times (between 1978-82) by more than 75% with the likely effects being an increase of the inflationary pressures on the economy and a tightening of the balance of payments constraints.

The overall experience of the Sudan seems to demonstrate a lack of agreement on policy goals between aid donors and recipients. In order to increase the effectiveness of the inflows from the recipient's point of view, aid must be liberalized from economic and political ties which would require from the aid donors to sacrifice what they might regard as a legitimate interest so that the recipient countries can also recognize some of their own interests and development prospects. In addition, donors may also be required to consider the possibility of transferring real resources through trade rather than borrowing (i.e. aid through trade) because trade does not entail a reverse resource transfer in future. Alternatively, donors should accept

at least in the short run the repayments of debts in debtors' local currency or by simply buying their exports on preferential basis so that the debt burden to these countries can be alleviated and the pressure on their foreign exchange can be relaxed. Generally, concessions and favourable terms of borrowing may be granted by donors according to the weight they attach to the recipient's bargaining or political power.

Given the potential external effects of the Sudanese past investment in infrastructure on the development process, the policy implications for the Sudan seem to be that the country needs to contemplate a long term investment in directly productive activities which would earn and/or save foreign exchange rather than to concentrate on short term stabilization or adjustment policies. This should necessarily involve a long term development strategy which recognizes the country's development potential and identifies the dominant constraint on growth (whether a domestic resource or a foreign exchange gap) upon which the need for foreign resources should be based. Then a coherent development policy which aims at promoting production for foreign and domestic markets in order to relax these constraints should be designed. Given the significant contribution of exports to the rate of domestic savings and growth in the Sudan, the promotion of exports will contribute towards alleviating the pressures on the balance of payments by improving the balance of trade and the debt servicing capacity in which case the foreign exchange gap will be eventually closed and perhaps the dependence on foreign assistance might cease. Similarly, the growth of exports will increase income

and consequently savings which will contribute towards financing investment requirements till the need for foreign resources is eventually eliminated and self-sustained growth is finally realized. In addition, Sudanese exports which are currently dominated by cotton should be diversified in order to avoid the country the risk of depending only on one crop. The product composition can be diversified by expanding, for example, food production and processing with the intention of increasing trade especially with countries such as the Arab countries where the trade performance appeared to be deficient in comparison to their aid contributions to the Sudan. Unlike the IMF's devaluation which was meant to improve the competitiveness of Sudanese exports⁽¹⁾, a comprehensive programme which examines the potential world prices and the demand for the exportable products in relation to the world's economic situation as a whole will be required if the share of Sudanese exports in foreign markets is to be increased. Production for the domestic market should also be expanded by establishing appropriately the necessary import substitute activities otherwise the growth in income that would be generated by expanding exports may induce an increase in imports which would disturb the balance of payments equilibrium.

Whether or not the Sudan will be able to draw the necessary concessional funds to finance a long term development strategy (or even to improve the existing productive capacity) through which

(1) See, for example, K. Nashashibi, "A Supply Framework for Foreign Exchange Reform in Developing Countries: The Experience of Sudan", **IMF Staff Papers**, Vol. 27, March 1980.

foreign borrowing will be self-terminating rather than self-generating , no definite answer can be given but it seems that the chances are very slim due to the current recession in most advanced countries on the one hand, and the stage of uncreditworthiness that the Sudan has reached on the other. Both factors, however, will weaken the chances of attracting the required foreign resources and put the efforts to break the vicious circle of debt into jeopardy.

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