EXPORT INSTABILITY AND ITS IMPACT ON ECONOMIC GROWTH OF THE SUDAN

By

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Dedicated to my Father (Elshiek Hamid)

May Allah's Mercy Be Upon Him

DECLARATION

Except where otherwise indicated, this sub-thesis is my own work.

A. Hamid

July 30, 1983.

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ABSTRACT

This study investigates the likely impacts of export instability on the economic growth of the Sudan. However, before considering that, it was necessary to examine the factors which can lead to instability and the theoretical arguments linking instability with growth.

Our analysis suggested that instability in Sudan, has been high by international standards. In investigating the causes of this instability the contribution of major commodities and countries to the overall instability was calculated. Commodity concentration did not seem to be an important cause, while geographic concentration showed a marginal effect on instability.

The analysis also showed that most of the variability in export earnings was attributable to quantity fluctuations which in turn was caused by fluctuations in yield. On studying the impact of this export instability on the internal economy, it was found that it had resulted in more than proportional fluctuations in critical economic variables, within the Sudan. There was evidence that this had adversely affected the rate of growth of both investment and GDP.

To deal with this instability both national and international policies are possible. At the national level fiscal devices such as export taxes and counter cyclical expenditure policy seem to have reasonable chances of reducing instability in Sudan. Internationally, both bilateralism and foreign borrowing can achieve similar results. However, it is emphasized that the costs and benefits of such policies should be examined carefully before they are introduced.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

The export sector in most of the less developed countries (LDCs) is of great importance to their development plans. The export proceeds provide most of the foreign exchange, needed to pay for imports, thus widening the selection of goods and services available to the community. These imports include skills, strategic goods and services, etc., that are unavailable domestically, but are essential in providing the basis for stable and relatively high rates of economic growth. The expansion of the export sector will hence lead indirectly to an increased supply of goods which should be channeled into investments in order to achieve an economic expansion as rapidly as possible.

To achieve growth in the export sector, the neo-classical prescription will call the LDCs to "specialize in the production and exports of those commodities in whose production "they" enjoy a comparative cost advantage" (Jacob Viner 1937, p. 348, cited in Soutar 1977 p. 279).

This neoclassical prescription is based on the assumptions that:

(1) Substitution between products (i.e. the movement along the production frontier) can be made quickly and costlessly to take advantage of changes in prices as they arise.

(2) The prices and trading opportunities are known with certainty.[1]

Neither of the assumptions is completely satisfied in the real world. With regard to the first assumption, when, an investment for production of a certain product is established, then it is not easy for it to be substituted, specially in the short run.

The second assumption also does not hold because the investment decision of today will be based on some probabilistic estimates of future prices. The presence of uncertainty with regard to prices modifies the neo classical prescription to be applied in terms of expected values of export proceeds. However if there are variations from these expected values, and these variations are not costly, then the neo-classical prescriptions, remain valid as only expected values need to be considered by policy makers. Unfortunately, there seem to be persuasive arguments to suggest that such variations (which are often termed export instability) are substantial in the LDCs and that these variations are extremely costly" (Soutar, 1977, p. 280).

The presence of uncertainty means that countries will not specialise as much as expected by neo classical theory (Brainard and Cooper, 1968, p. 261).

It is not surprising therefore that a lot of attention has been focussed on the causes of export instability, their costs, and ways of overcoming them.

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[1] Soutar point: investment decisions which are not risk-neutral must deviate from the case where prices are known with certainty and equal to the mean of the a priori distribution. It is not simply a matter of price variability about a certain mean causing change.

1.2 Outline of the Thesis

The aim of this thesis is to look at the export instability in Sudan. The remainder of this chapter will be a theoretical discussion of both causes and costs (impacts) of export instability. Chapter two will be a review of the empirical results of the studies on the subject to see whether the theory has been confirmed by empirical findings.

Chapter three will investigate the instability of Sudan exports, to find whether it is high and if so, what were the main causes of it.

Chapter four will focus on the effects of instability on the economy, and it's rate of growth. Finally, Chapter five will contain a brief summary, conclusions and policy observations.

The definition and aspects of export instability follow.

1.3 Definition of Instability

Export instability has been defined as the short term or yearly fluctuations of export proceeds around the growth trend of exports. Such instability as mentioned by some economists (Sundrum, 1967, p. 4) has the following three aspects.

1. Amplitude of fluctuations about the trend, i.e. the sheer magnitude of the divergences of actual from trend values, whether in the positive or negative direction.
2. Periodicity or frequency of fluctuations, i.e. the number of times a time-series changes direction, either in it's original form or after a trend factor has been removed.

3. Irregularity of fluctuations, i.e. the failure of these fluctuations to have a constant amplitude or frequency.

The instability described above, has been more severe in LDCs than DCs (see Chapter Two) and in general three factors have been said to cause it.

1.4 Causes of Export Instability

These causal factors are:

1. The high concentration of LDCs trade in primary products
2. The commodity concentration; and
3. The geographic concentration of purchasers.

These will be discussed briefly.

1.4.1 High Concentration of Trade in Primary Products

LDCs in general draw a great portion of their export proceeds from primary products, or partially refined materials or minerals. According to the International Monetary Fund (IMF) and the International Bank of Reconstruction and Development (IBRD) (1969), 85% of all exports from LDCs consisted of crude agricultural and mineral products. It is widely believed that the prices of these primary products fluctuate more violently than do the prices of manufactures. The explanation lies in the short run inelasticities of supply and demand, combined with the frequent shifts of both supply and demand schedules of these products.

1.4.1.1 Supply Instability

Agricultural commodities in general experience high short run supply fluctuations as a result of fluctuations in output that arise from

natural hazards of farming, e.g. pests, diseases, drought, floods, etc.

Supply can also fluctuate as an indirect result of variability in prices of inputs e.g. prices of fertilizers, insecticides, herbicides, etc., will affect their amount used for production of a crop, and hence the supply of that crop. Technology is an important factor in shifting the supply curve. For example, a yield increasing innovation such as a higher yielding variety or an introduction of weed and pest control programme, will reduce the average and marginal costs causing the supply curve to move to the right.

Supply fluctuations of agricultural products may also arise because farmers regularly forecast prices incorrectly. One of the classic examples of this is the Cobweb effect which results in years of abundant supplies and low prices being followed by years of short supply and high prices.

1.4.1.2 Demand Instability

Demand on the other hand can fluctuate as a result of variations in consumers' income (and thus their expenditure), and in the prices of other commodities, which are close substitutes or close complements to the commodity in question. Demand will fluctuate or move positively with variability in income and in prices of substitutes, and negatively with complements' prices.

Technology can also lead to shifts in demand, e.g., the demand for oil, gas and coal are derived demands for energy. So a change in technology for coal gasification, would clearly lead to a change in the demand for coal (Newbery and Stiglitz, 1981, p. 50). Technology has also lead to the

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1 This is partly due to the Cobweb effect which assumes producers are myopic and not rational. Prices are consequently more variable. This is not a general conclusion, however, especially in the presence of inventories (Turnovsky, 1979).

development of artificial substitutes for natural products (e.g. artificial fibres that compete with cotton, silk and wool) which have a significant depressing effect on the demand for natural products.

Other significant factors that generate demand fluctuation for primary products were summarized by Campbell (1973, p. 42) as: (a) changes in the tempo of business activity (b) hot and cold wars and rumours of war (c) political instability and social anxiety and strikes (d) variations in the proportion of commodity held in store, because of shifts in businessmen's expectations (e) imposition or relaxation of tariffs and quotas and (f) speculation in commodity markets.

1.4.1.3 Low Price Elasticity of Supply

In case of agricultural products, supply elasticity is very low or even zero, in the short run. This is because there is a time lag between market demand and a significant increase or decrease in several major crops, such as coffee, tea, cocoa and natural rubber. Even with annual crops many months are needed before a change in supply can take place. For most metals and minerals the supply elasticity is generally higher than for agricultural products, but still unlikely to be substantial (see MacBean, 1966, p. 24).

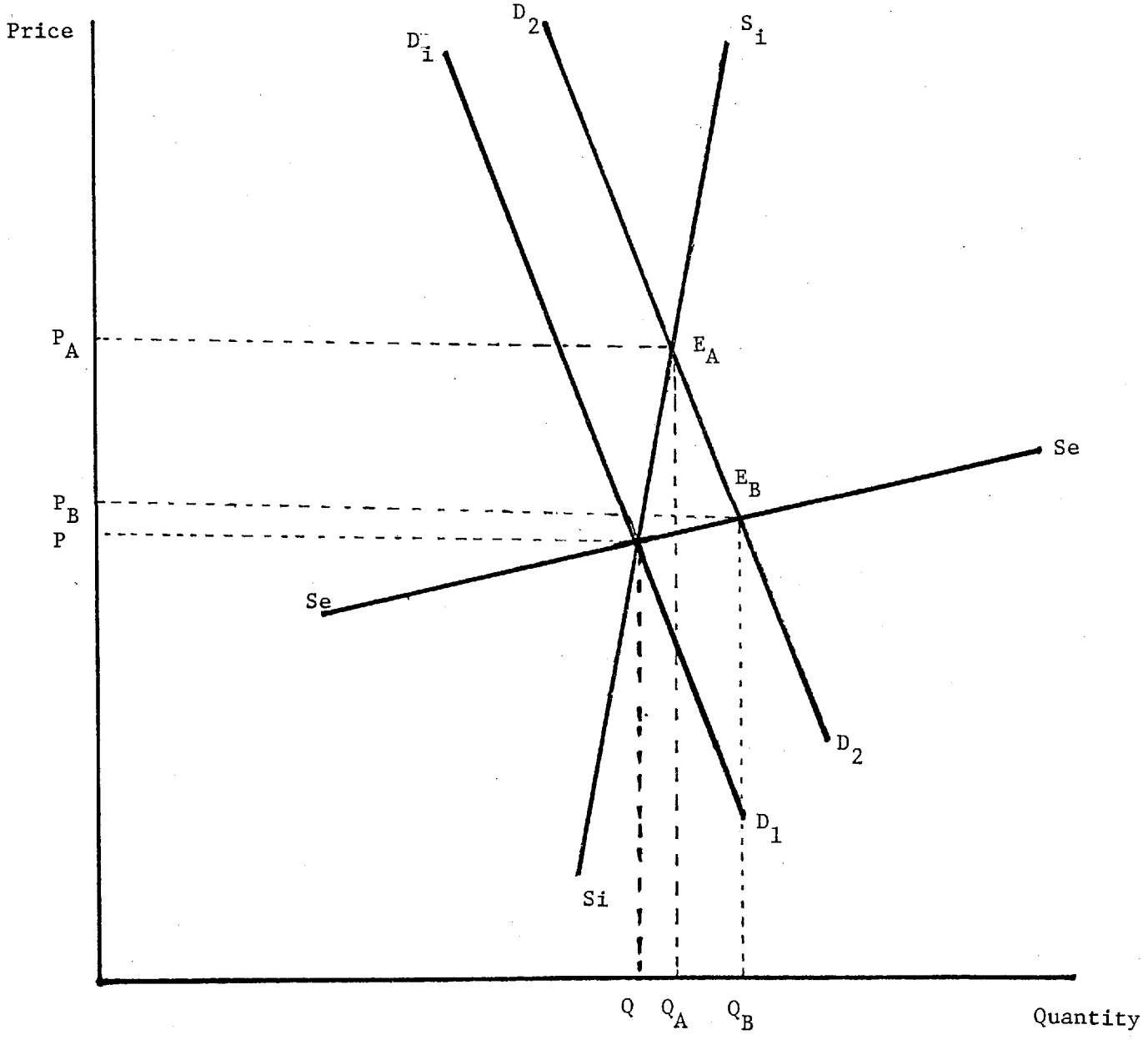
The low supply elasticity, at least in the short run, means that any change in demand for a product will induce disproportionately large fluctuations in prices, that lead to further changes in proceeds. The simple diagram of Figure 1.1 illustrates this case.[1]

In this diagram demand shifts from D_1 to D_2. In the case of the inelastic supply curve (Si price rises from P to P_A, whereas if supply was

[1] In a small span economy case the results will be somewhat different.

FIGURE 1.1

THE EFFECTS OF A SHIFT IN DEMAND-INELASTIC VERSUS ELASTIC SUPPLY



elastic (Se), price would have risen to P_B only. Obviously producer revenue increases far more in the inelastic case.

1.4.1.4 Low Price Elasticity of Demand

Primary products are observed to have low price elasticities of demand (Table 1.1). This means that any given shift in the supply curve will cause larger fluctuations in both price and producer revenue, than with more elastic demand curves. This is illustrated in Figure 1.2 where it is clear that the shift from S_1 to S_2 causes far greater fluctuations in both price and revenue in the case of Di than for De.

TABLE 1.1

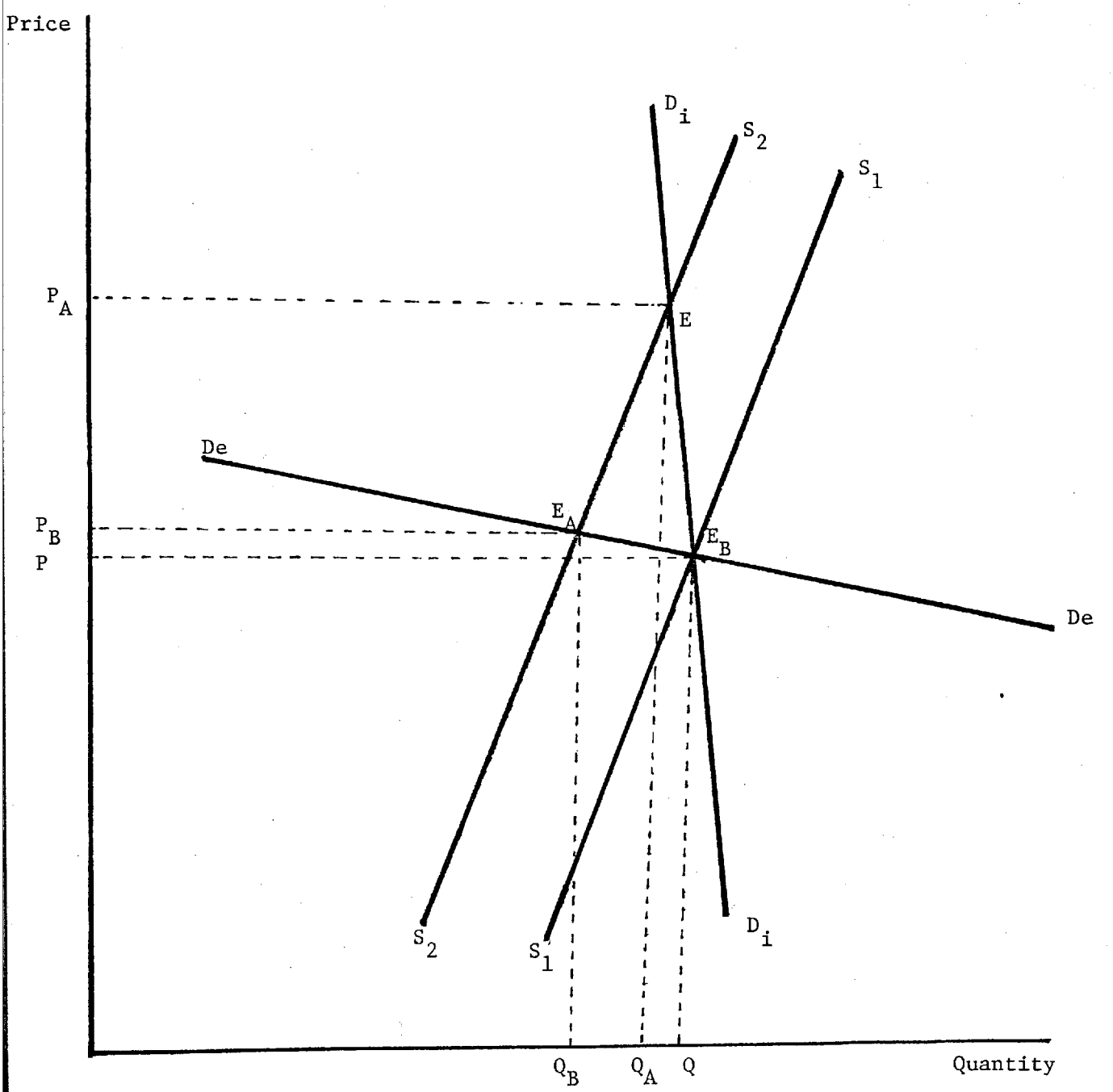
WORLD IMPORT DEMAND-PRICE ELASTICITY

Commodity	Elasticity
Cocoa	-0.40
Coffee	-0.25
Cotton	-0.35
Hemp	-0.30
Jute	-0.50
Manila	-0.30
Rubber	-0.40
Sisal	-0.30
Sugar	-0.70
Tea	-0.30
Copper	-0.45
Tin	-0.10

SOURCE: Murray, J.D. & Atkinson, L.J. (1978, p.15).

FIGURE 1.2

THE EFFECTS OF A SHIFT IN SUPPLY-INELASTIC VERSUS ELASTIC DEMAND



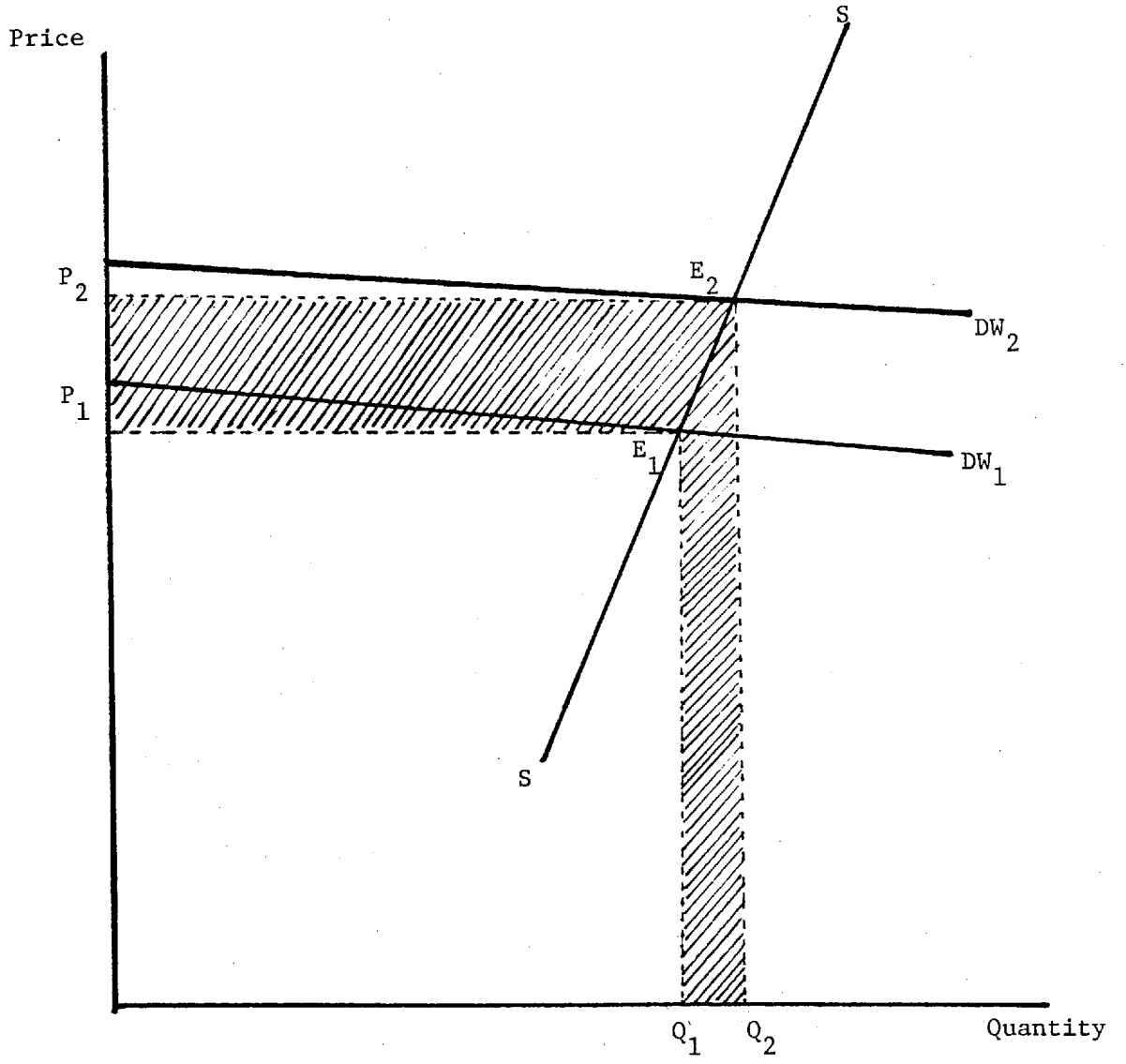
The uncontrolled shifts in supply and demand along with the low elasticities of both supply and demand led MacBean (1966, p. 25) to conclude that: "Low price elasticities combined with uncontrolled variability in demand and supply provide an entirely credible explanation for sharp instability in both prices and proceeds of primary products".

Two qualifications must be made. Firstly instability in prices and proceeds of primary products in general does not necessarily mean instability in the export revenue of the country exporting these products. This is because the movements in one primary product may be offset by opposite movements in other primary products. This may result in relatively stable export revenues. So if we propose that concentration in primary products leads to export instability, this implicitly means "a relatively high correlation between movements of the proceeds of primary products" (Soutar, 1977, p. 281).

Secondly, though the demand for primary products in the world market is inelastic, the demand facing the export of a single country tends to be elastic when it supplies only small parts of the total market for any of the commodities it exports, (i.e. small country). Most LDCs export only a small percentage of the world trade of most of the commodities. Exceptions are cocoa in Ghana, coffee in Brazil, jute in Bangladesh, and gum arabic and sesame in Sudan. This means LDCs in general are not in a position to affect world prices, and a change in a world demand of any of their exports can bring drastic changes in proceeds. In Figure 1.3, we have an elastic world demand curve for a commodity represented by DW_1, which cuts the home supply SS at E_1. When the world demand shifts to DW_2, the proceeds will increase by the shaded area.

FIGURE 1.3

CHANGES IN A COMMODITY PROCEEDS OF SMALL COUNTRY RESULTING FROM A SHIFT IN THE WORLD DEMAND



1.4.2 Commodity Concentration

Commodity or product concentration was the second traditional cause said to give rise to export instability in LDCs. Commodity concentration means the export of a narrow range of products.

In LDCs there are many examples of the so called one crop economies e.g. Ghana "cocoa", Mauritius "sugar", Sudan "cotton", Bangladesh "jute", etc. A survey by the IMF & IBRD in 1965 for 83 LDCs revealed that one half of the sample had 50% of their export earnings in one commodity. Further more, three quarters of the sample was found to have derived 60% of their export earnings from three or fewer commodities (see Table 1.2). Such a dependency on few commodities for export earnings was believed to cause higher export instability in LDCs.

It is sometimes argued that, if these countries were to diversify their exports, then the export earnings would exhibit a greater degree of stability over time. This is because changes in the proceeds of one crop would be balanced by opposite changes in another crop, tending to smooth out the fluctuations in the total export proceeds. The theoretical explanation for this case depends on a theorem on sample moments. This theorem states that if a random sample of size η is drawn from a density function with finite variance σ^2, then the variance of the mean sample is σ^2/η. In terms of export instability, if the export earnings of individual products are independent, and could be considered random variables, with finite variance σ^2, then the variance of the mean export earnings would be σ^2/η. (Knudsen & Parnes, 1975, p. 23). Under this condition, as long as η increases (i.e. the country diversifies its export bundle), then the variance of mean export earnings will decrease.

TABLE 1.2

COMMODITY CONCENTRATION IN THE EXPORT TRADE OF SELECTED DEVELOPING COUNTRIES 1965

Country	Primary Export Commodity	Three Commodities as Percentage Share of Total Export Earnings
Saudia Arabia	Petroleum (100%)	100
Mauritius	Sugar (96%)	98
Zambia	Copper (92%)	94
Ceylon (Sri Lanka)	Tea (63%)	93
Uganda	Coffee (48%)	88
Sudan	Cotton (46%)	87
Ghana	Cocoa beans (66%)	85
Colombia	Coffee (64%)	85
Bolivia	Tin (72%)	80
Indonesia	Rubber (30%)	75
Guatemala	Coffee (49%)	70
Tunisia	Phosphate (34%)	66
Brazil	Coffee (44%)	57
Kenya	Coffee (30%)	51
Mexico	Cotton (19%)	33
Korea Rep. of	Fish (9%)	17

SOURCE: International Monetary Fund & International Bank for Reconstruction and Development (1969, p. 153).

This result is not applicable if the export proceeds of the new crop are positively correlated with those of the traditional exports.

Knudsen and Parnes (1975, p. 42), explained this case as follows: if for simplicity, we take the case of two commodities for export with the earnings X and Y respectively, then the variance of the sum of the two earnings will be

$$V(X+Y) = V(X)+V(Y)+2COV(XY) \qquad 1.1$$

$$= V(X)+V(Y)+2\rho_{xy}\, V(X).V(Y). \qquad 1.2$$

where V: stands for variance

COV: covariance

ρ_{xy}: coefficient of correlation between X and Y

ρ will have the value $-1 \leq \rho \leq 1$. If ρ is -ve, then $V(X+Y) < V(X)+V(Y)$. i.e. the variance of total export earnings is less than the sum of the variances in earnings of individual products, which is the point of diversification. On the other hand when ρ takes a positive value, then $V(X+Y) > V(X)+V(Y)$, i.e. the total variance becomes greater than the sum. In this situation, at least a case can be made for diversification. We will substitute the products that have lower correlation than the original product combination. An essential assumption will be the variances of the new commodity combination do not outweigh the reduction resulting from the covariance term.

Thus, stability in export proceeds will not necessarily be achieved simply by exporting more goods. A country must diversify into exports "which have uncorrelated or (preferably) inversly correlated movements in world prices" (Brainard and Cooper, 1968, p. 267). This

means for a rational decision on how to diversify, "it is necessary to examine the variances and covariances of price movements between various goods" (Knudsen and Parnes, 1975, p. 42).

1.4.3 Geographic Concentration

The third factor that is said to cause instability is geographic concentration of export markets. When an economy trades with a country or small number of countries, it will be susceptible to the booms and depressions in the economies of the importing country(ies).

MacBean (1966, p. 24) argued that most LDCs traditionally sell to a limited range of markets, often for historical reasons. He thought that regional diversification of markets would make LDCs less dependent on the internal fluctuations in the traditional markets.

This argument implicitly assumes statistical independence among the annual export proceeds that results from sales to different countries. If the assumption is violated and regional proceeds are positively correlated, then the possible gains from increased geographic diversification may be reduced. (See our discussion in Commodity Concentration)and Kingston (1976, p. 312).

In contrast to MacBean's argument, there is another view in the literature which suggests geographic concentration reduces export instability. Massel (1964, p.56-67) expressed that:

" On the other hand it is quite plausible that countries whose exports are highly concentrated geographically, tend to have more effective methods of smoothing out the fluctuations in export receipts, perhaps because bilateral commodity arrangements may be prevalent in such areas ... In many cases it is likely that some form of commodity agreement between the exporting and importing countries tends to reduce fluctuations in export receipts. Perhaps the dominant trading partner in these cases either pegs the price of the stable exports, or else imports a guaranteed amount in either case insulating the exporter from the full impact of market forces".

Although Massel's argument seems to be plausible, the conditions of bilateral arrangements need not be fulfilled properly. In some cases they are only expressions of intentions. Moreover some of these agreements could be destabilizing factors depending upon negotiations, degree of fulfilment and provisions for renewing or cancelling the agreements (Coppock, 1966, p. 203).

1.4.4 Summary

The export of primary products, commodity concentration and geographic concentration have traditionally been said to destabilize the export earnings of LDCs. However, the last two causes are debatable as we saw earlier. All three factors have been tested empirically as causes of export instability, and diverse results were obtained (See Chapter Two). However, no one factor has been isolated as being of fundamental importance in determining instability in export earnings. In addition to the causes of export instability, the detrimental effects which instability has on growth has also received great attention in the literature. This will be the area to which we will now turn.

1.5 The Effects of Export Instability on Growth

Export instability has generally been argued to create costs that are detrimental to growth. These costs can be divided into three groups:

1. There are costs resulting directly from actual movements of export earnings
2. There are indirect costs resulting from reactions by other sectors in the economy, i.e. the adjustment costs of firms and individuals
3. There are costs resulting from defensive attempts by individuals, firms, or the government to avoid and/or reduce these costs.

(Brainard & Cooper, p. 258).

In the first group of costs are variations in the level and distribution of money income to which fluctuations in export earnings will lead. Fluctuations in incomes are regarded by most individuals as an undesirable phenomenon, especially when the future magnitude and direction of such fluctuations are unknown and largely outside their control. The precise impact of export earnings instability depends on the structure of export production and of the labour market. If the export commodities are produced in mines or plantations, the fluctuations in export earnings fall partly on business, including foreign business, and partly on wages and employment. When an export commodity is produced by small farmers, then their income will certainly yield them less economic satisfaction than would stable income of the same average level. This is because if they do not put away some cash as reserve when their income rises, then they cannot support their livelihood when their income falls. At a low level of income, unforseen declines in income can even mean starvation. If these farmers borrow during poor export earnings, then other hardships - very high interest rates charged by

money lenders in LDCs - will be placed on them (Brainard & Cooper, 1968, p. 259, MacBean, 1966, p. 28).

Income distribution will be affected as well by export instability. A sudden increase in export proceeds of an important crop, will enrich a group of farmers. This group of farmers may increase their demand for home produced goods. These goods are usually agricultural products, and housing, which normally have low supply elasticities in the short run. The increased demand with inelastic supply will produce sharp increases in domestic price levels. The increase in income realized by these farmers, in addition to the consequent rise in price level will make another group, relatively and absolutely worse off. These effects will be exaggerated in countries where race or tribal connections often determine occupations, and social tensions are already high (MacBean, 1966, p. 28).

A similar cost associated with export fluctuations is the direct disturbance they create in the public sector.[1] In LDCs fiscal authorities rely rather heavily on taxation of foreign trade. Fluctuations in export earnings and hence in imports are also reflected in the form of fluctuating revenues for the government. During trough periods in export earnings, either the government services must be curtailed, or other sources of finances should be raised. If the government increases other taxes to maintain its revenues, this may lead to social and political unrest. In seeking borrowings from abroad, then the government has to bear the interest costs. Further the foreign loans may not be available on reasonable terms. A third alternative will be deficit financing. This route can stabilize expenditure but may make any balance of payments crisis worse.

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[1] This is despite some compensatory finance becoming available under international arrangements like LOME Convention, STABEX system and the IMF Compensatory Financing Facilities.

Under the second group of costs come the reactions of each of the parties directly affected by a change in export earnings. Whether the party is an individual, a firm or the government, they are likely to transmit fluctuations to other parts of the monetized economy. Variations in export producers' incomes will tend to affect their expenditures, on consumption and capital goods, that will affect other sectors' receipts. The combination of the multiplier and accelerator effects are therefore likely, unless offset by government policy, to produce fluctuations in national income (MacBean, 1966, p. 26).

LDCs in general do not have substantial reserves. Further often there are limitations on foreign borrowing by these countries, so a short fall of export earnings may require a restriction on both public and private imports. The restrictions on imports will delay the acquisition of capital goods or industrial materials needed for investments. Delays in getting the imported parts and equipment force the import-using sectors to operate at less than full capacity, thus creating cyclical unemployment for work force. The result will be the inefficiencies in investment processes, the increase in the cost of investment and delays in investment returns, that in the long run reduce the rate of return and therefore impede new investments (Brainard & Cooper, 1968, p. 259; Yotopoulos and Nugent, 1976, p. 330).

Economic planning for LDCs is essential for their success in economic development. Export instability by creating the business miscalculations, and the difficulty of estimating the expected returns, can throw investment planning out of gear. Rational development planning, whether public or private must be able to count on the availability,

of foreign reserves at specific future time, and not when foreign reserves happen to be at hand. Instability in export earnings, and hence external exchange and government revenue, may tend to disturb the continuity regarded as essential in efficient development planning (Lam, 1975, p. 19). This is because the rigid economic structure in many LDCs, will not allow them to substitute alternative projects based on smaller import content for current investment, when imports shrink suddenly.

In an uncertain climate, created by export instability, investment may not be allocated to more productive or higher returns activities. This is because the violent fluctuation of export receipts may well be a major cause of the speculative attitude and the "get-rich-quick" mentality so wide spread among the businessmen in LDCs (MacBean, 1966, p. 108, cited from Nurkse, 1958). The private entrepreneurs will concentrate their business in the fields characterized by rapid turnover of capital. The productive activities requiring substantial fixed investment - which are the drive towards development - will be discouraged.

By creating uncertainty, export instability may tend to discourage the individual farmers from specializing in cash crops which yield the highest average returns. This is because the individual farmer producing for the market runs three risks: (1) the risk of a bad crop (2) the risk of fall in the price of his crop (3) the risk of a rise in the price of the food he needs to buy to support his family. The subsistence producer runs only the first of these risks (MacBean, 1966, p. 124). So in some countries "mainly Asian" where cash crops are grown on land which can be used for food crops, the uncertainty caused by export

instability can deter specialization and encourages subsistence farming.

The third type of costs, manifest themselves as follows. If the government or other agencies attempt to smooth out fluctuations by establishing buffer stock schemes, then costs will result in the form of storage and/or other transaction expenses. If a country aims at maintaining regular imports, the export instability is likely to force that country to hold a higher ratio of external reserves to import, than would normally have been the case. Holding reserves as such is another cost on these countries (Stein, 1978, p. 287).

In a marked contrast to this gloomy picture of the consequences of export instability, another view is that it can contribute to higher rates of economic growth. This argument is based on the permanent income hypothesis. The permanent income hypotheses states that: A high variance in the transitory income (caused say by an export upswing) produces a need for large savings, thereby lowering the propensity to consume, and "if savings are the primary source of investment and capital formation in the LDCs, then a lower propensity to consume, should precipitate higher levels of investments" (Knudsen and Parnes, 1975, p. 84).

It is true that savings are necessary for investment, but it does not necessarily follow that a reduction in consumption will induce capital formation. This is because the contraction in the market caused by a reduction in consumption would in many LDCs effectively discourage investment (Stein, 1978, p. 289).

Even if this is not so, most of the saving arising from instability would be kept in highly liquid securities, and would probably not be available for long term investments. Further, if the people behave according to the permanent income hypothesis, savings would be erratic because"almost the entire amount of any increase in income will be saved (but) equally any decline in current cash income will be met by liquidation and indebtedness"(MacBean, 1966, p. 29).

1.6 Conclusions

The literature generally argued that countries exporting primary products whose exports were concentrated into a few commodities or who relied heavily on a few markets were more likely to suffer from export instability than others.

As was shown that this export instability could be reflected in fluctuations in key macro-economic variables within an economy especially if a country is unwilling or unable to follow a counter cyclical policy. The effects of this in economic growth were debated. The majority opinion was that instability retards growth because of disruptions to investment. However, there was a minority view that growth might be higher because of instability. The empirical support for these arguments provides the major focus of the next chapter.

CHAPTER TWO

EMPIRICAL EVIDENCE

2.1 Introduction

In Chapter One some of the causes of export instability were discussed. Some of the theoretical arguments relating export instability to the rate of economic growth were then considered. Most of these concentrated on the harmful effect of export instability on economic growth though there were some theories which claimed a beneficial effect would exist. In this Chapter, the empirical evidence available in the literature will be examined in an effort to resolve this problem.

2.2 Empirical Evidence

One of the pioneering empirical studies was by Coppock (1962). He picked a sample of 83 countries, and developed a log variance index (often called Coppock Index) for measuring instability. He sought to explain the inter country differences in the index over the years (1946-1958) by a combination of single and multiple variable correlations. He employed 37 different explanatory variables[1], and found that instability in export proceeds is most closely associated with instability of export quantum, prices, imports and terms of trade. With regard to regional concentration and instability he found a negative correlation, while commodity concentration showed a positive but very low correlation

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1 The variables investigated by Coppock fall into one of the following categories: the size, growth, and importance of foreign trade; the direction of exports; the composition of exports; the size of the national economy; the economic level of the country; and prices and monetary factors.

with instability. The study also showed that manufactures (as a group) in world trade are more unstable than primary products. Moreover the study showed that the mean instability index for LDCs was greater than that of DCs.

Michaely (1962), worked with a sample of 36 countries, for the period 1948-58. He found a significant and positive relationship between commodity concentration and fluctuations in export prices, and that geographic concentration is positively correlated with commodity concentration. It is worth mentioning that, unlike other studies which seek an explanation for fluctuations in export proceeds, Michaely's study measured the fluctuations in export prices. The two variables need not always move together.

Massel (1964) studied the causes in a sample of 36 countries for the period 1948-59. He used three variables, commodity and geographic concentration and the ratio of primary product exports to total exports. He started by a simple regression of instability on commodity concentration and the coefficient was not significant. When a geographic concentration index was added to the equation, it resulted in a negative non-significant coefficient, but commodity concentration index became significant. The ratio of primary product exports to total exports tended to be significant (though weak), when estimated with geographic concentration.

With the evidence of Coppock and his own results,Massel (p. 61) concluded that "The relationship between instability of export earnings and concentration of exports is a tenuous one".

MacBean (1966) examined both causes and effects of instability. He used Coppock's and Michaely's data and worked with a sample of 37 countries (20 LDCs and 17 DCs) for the period 1948-58. His results showed that yearly fluctuations of LDCs export income is only insignificantly larger than for DCs. In calculating correlations between instability and the traditional causes that Massel used earlier, MacBean obtained low and non-statistically significant results. He concluded that "such theoretically proposed general factors as specialisation in primary products or commodity concentration per se, may have some slight systematic tendency to produce export instability, but their explanatory value in particular cases is very small" (MacBean, 1966, p. 36).

In investigating the effects of instability on growth, MacBean used cross-section data from 11 countries for the period 1950-60. Correlation between export instability and the ratio of investment to income was not significant. Indeed, the results indicated that if anything, a positive association appeared to exist. Correlating export fluctuation and the growth rate of national income, again revealed no significant relationship. MacBean concluded that although individual countries, may have had low growth rates because of export instability, for developing countries in general "the evidence indicates that export fluctuation has not been an important obstacle to their economic development" (MacBean, 1966, p. 127).

Maizel (1968) criticized MacBean's analysis and findings by pointing out weaknesses in the data, e.g. a lack of comparable and correctly articulated series which could seriously affect the regression results. Furthermore,he claimed that at times MacBean's conclusions seem to directly oppose his results. Maizel re-examined MacBean's data on a

country-by-country basis rather than a cross sectional inter country basis, and his results supported the view that export instability and rate of growth of GDP were negatively related.

Since MacBean, many other studies have been undertaken all using cross sectional data from a number of countries, covering mainly the 1950's and 1960's. As far as the facts are concerned there had been no disagreement that LDCs are subject to more instability than DCs, [Erb and Schiavo-Campo (1969), Leith (1970), Kenen and Voivodas (1972), Glezakos (1973), Lawson (1974), Knudsen and Parnes (1975) and Soutar (1977)]. However the exports of LDCs were more stable in the 60's than in the 50's [Erb and Campo (1969), Leith (1970), Naya (1973), Lawson (1974) and Murray(1978)].

As far as the causes are concerned, there is disagreement. Massel (1970), Knudsen and Parnes (1975) and Soutar (1977) found a positive relationship between instability and concentration of exports in a few commodities, whereas Naya (1973) found no relationship. Similarly Knudsen and Parnes (1975) and Soutar (1977) found a correlation between the geographical concentration of markets and instability, while Massel (1970), Kingston (1976) and Lam (1980) found no correlation.

The results with economic growth are even more confusing. Glezakos (1973) and Lim (1976) found that instability was negatively related to economic growth, Knenen and Voivodas (1972) found no relationship, while Knudsen and Parnes (1975) and Yotopoulos and Nugent (1976) found evidence that instability would even have fostered growth.

Part of the confusion about both the causes and effects of instability could lie in the different indexes of instability which were employed. Murray(1978) in fact calculated 5 of the commonly used indexes and found that conclusions about causes and effects depended critically on the index that was employed. This possibility is considered further in the next section. Other reasons could be the different time periods considered, and differences in commodity concentration and geographical direction of the countries that are included. These factors are also considered.

2.3 Differences in Instability Indexes

Instability as we defined in the previous chapter is taken to imply fluctuations around the trend. Trend identification in most of the studies was done by moving averages and by the least squares. The differences in the trend fitted can lead to different results. This is because, the indexes that use least squares estimate the trend for the whole period of the study. While those using moving averages, estimate a different trend each time they calculate the average.

These differences can result in a lower index when moving averages are used. Stein (1977, p. 280) mentioned, "The length of the chosen interval influences the degree of smoothing, and where it is small, the moving average tend to absorb some of the short term fluctuations, possibly causing an underestimation of instability".

In addition to the differences between moving average techniques as a group, and those of least squares as another group, differences exist within a group according to the type of the trend chosen. For example, log trends whether fixed over the whole period of study, or moving assume annual growth rates where as linear trends assume annual growth

increments.

The differences between the formulations of the indexes and their assumptions had led to different results in the studies, they were applied for. Massel (1964) had used two different indexes:

1. Standard error of estimate divided by the mean of the observations; and
2. The average annual percentage rate of change in the value of exports - trend corrected - (See Appendix 2.A for these indexes).

Although, Massel found a correlation coefficient of .72 between the two indexes, there was a large difference in country rankings between them. For example, Columbia was having the second highest instability with the first index. When the second measure was used its ranking dropped to 25. This tends to suggest that the indexes are not so closely related.

Lawson (1974) had again used two different indexes:

1. Standard deviation of the observed deviation from the exponential time trend.
2. The normalized standard error of deviations from an estimated linear time trend.

He applied the two indexes to two sets of data representing 1950-59 and 1960-69. Discrepancies between the results of the two indexes obtained led Lawson to conclude that "it does make a difference which instability

index we use".[1]

The different results arising from using different indexes suggest that the trends differ between countries. So one index which corrects for specific trend, may not give reliable results. Using different trends for different countries will not allow for inter-country comparisons. It follows that only those countries which have some similarities in their export trends should be studied together. None of the above studies had provided such a claim before (See Murray 1978).

2.4 The Time Periods for Which the Results were Calculated

Different studies had used different periods, and different time spans "intervals". Some of the studies had contained in their samples the post war and the Korean war years. Inclusion of these periods can affect the results because they were abnormal years of booms and depressions.

2.5 Differences in Commodity Composition and Geographic Direction of Exports

Different countries produce and export different varieties of commodities. Different commodities behave differently in international markets with respect to concentration and instability. Massel (1970, p. 27) found that "countries that derive a large percentage of their export earnings from food tend to experience less export instability

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1 While discussing the differences between indexes, Stein (1977, p. 287) mentioned that Leith in his paper of "Export Concentration and Stability: The Case of Ghana", used four different sets of data and calculated the correlation coefficients between Coppockindex and one based on the mean percentage deviations from a linear trend. The figures obtained were .75, .59, .5, .75. These correlations, especially the middle ones, are not very high. Leith's article was published in the Economic Bulletin of Ghana, Vol. No. 1 which is difficult to obtain.

than countries that are more heavily dependent on raw materials or manufactures".

The commodity concentration also differs a great deal between countries. The principal export commodity was found to count for 100% in Saudi Arabia and 96% in Mauritius, where its share was 19% and 9% in case of Mexico and Korea respectively (Table 1.2, p. 13).

The same applies for geographic concentration. Kingston,(1976) showed that the Hirshman index of geographic concentration for Mexico was 73.1 for the period 1954-67, while it was 26.8 in case of Pakistan for the same period. The above two points reveal the diversity with the samples studied.

Looking at the other part of the problem, i.e. the effects of export instability on the internal economies and growth, more reasons exist that lead to such divergent results.

There are great differences in economic structures and the degree of dependence of different economies on the foreign trade sector, particularly for the supplies of capital equipment. Export downswings can lead to bottlenecks in the availability of capital goods (where most are imported in some countries and hence affect their investment programmes while the effect will be less where the country produce a great portion of the capital goods.

Lim (1974) also argued that the multiplier effects of export fluctuations will depend on such factors as the degree of foreign ownership of the export sector. It will also depend on the measures a

country takes to counteract the effects of instability.

Given the diverse and heterogenous group of countries that are covered in a cross-sectional study it will follow that: "The impact of a given fluctuation in export earnings on the long term growth rate of GNP, is likely to vary substantially between different developing countries" (Maizels; 1968, p. 580).

From the above discussion it would seem that a more satisfactory approach for reaching firm conclusions with respect to both causes and impacts of export instability would be the study of each country separately (Lim, 1974).

The one country approach to the problem was adopted earlier by different authors:-

1. MacBean (1966) investigated the effect of export instability on five countries, each at a time. These were Uganda, Tanganyika (Tanzania), Puerto Rico, Chile and Pakistan. His findings showed that, export instability was not harmful to the economies of the first three countries. The effects were moderately adverse in Chile and substantial in Pakistan.
2. Lim (1972, 1974) studied the problem in West Malaysia. His findings in the two studies showed that export instability had led to economic instability. However, the unreliability of data and some conceptual problems prevented him from testing the relation between export instability and rate of growth of GDP.
3. Lam (1975) studied the impact of instability on government and monetary sectors in both Malaysia and Thailand. His findings

suggested that export instability did not present as many serious problems as are commonly assumed, although the two countries are heavily dependent on trade, and their trade is heavily concentrated.

2.6 Conclusions

This chapter had reviewed many of the empirical results of studies on export instability. Their findings tend to be divergent with regard to both causes and effects of instability.

Among all the studies only Knudsen and Parnes (1975) and Soutar (1977) could find a positive association between export instability and geographic concentration.

A positive association between commodity concentration and export instability was confirmed only by Massel (1970) Knudsen and Parnes (1975) and Soutar (1977).

The variability in primary products receipts which was believed to be a cause of export instability had not been confirmed by any of the studies.

Greater diversity of results was revealed with respect to the effects which instability has on growth. Coppock (1962), MacBean (1966) and Kenen and Voivodas (1972) obtained no consistent relationship between export instability and domestic instability or economic growth both aggregate and per capita.

Glezakos (1973) and Lim (1976) confirmed the detrimental effects of instability on growth.

In a marked contrast, however, Knudsen and Parnes (1975) and Yotopoulos and Nugent (1976) conclude that instability may well have beneficial effects on economic growth.

These inconclusive results had resulted from different factors. Diversity of indexes used to measure instability, the heterogenous samples of country studied, the different time periods covered, and the dissimilarity between the economic structures of the countries had lead to such results.

To us a more convenient way to study the problem will be the one country approach, to which we will turn in the next chapter.

CHAPTER THREE

CAUSES OF EXPORT INSTABILITY IN THE SUDAN

3.1 Introduction

In the previous chapter, we argued that the one country approach can be a better and meaningful one in the study of both causes and impacts of export instability. In this chapter the problem of export instability will be studied in the context of the Sudan. The geography, economy and export trade pattern of the country will be reviewed in sections 3.1, 3.2 and 3.3. In section 3.4 various indicators of export instability are considered for the Sudan. These show that Sudan's exports have been subject to relatively high fluctuations by international standards. In the final section an attempt is made to determine whether the observed instability is related to either commodity specialization in Sudan or to the geographic concentration of export markets.

3.2 Background

The Sudan is the largest geographical unit in Africa, covering an area of 2.5 million square kilometers. It stretches from the Egyptian borders at latitude $22N^{o}$ to as far as $4N^{o}$. The country is bounded by Egypt in the north, the Red Sea and Ethiopia in the east, Kenya, Uganda and Zaire in the south, and Central African Repbulic, Chad and Libya in the west.

The country consists mainly of a gently sloping plateau with some elevated regions such as Jebel Marra in the west, Nuba Mountains in the centre, the Imatong Hills on the southern border and mountain ranges at the Red Sea.

The River Nile and its tributaries, White Nile, Blue Nile, Atbara and the Sobat, are the most important physical features of the country. Almost the whole of Sudan is located within the Nile Basin.

The country displays a wide range of climatic factors from equatorial type in the south to a vast desert area in the north. This has determined the fauna and flora of the country, which has influenced the structure of the economy and the course of its development. Unfortunately, the vast unproductive desert parts lie close to the Red Sea coast, whereas the more productive regions are separated from the Sea by distances which range between 800 and 2400 kilometers. Their remoteness was a major obstacle towards the development of the economy until the beginning of the present century, when a net work of railway and steamer lines was developed. Still, inadequacy of transport is one of the important bottle necks in the economy.

The officially estimated population in 1979 was 17.3 million. The average density of population is low and there is no population pressure on the available resources at present. Open unemployment is very insignificant, and in fact Sudan suffers from seasonal shortages of labour, particularly during the cotton picking season.

3.3 The Current Economic Setting

The Sudan economy is heavily dependent on agricultural production. Agriculture, including livestock, forestry and fishing, contributes about 40 per cent on average to GDP. Around 80 per cent of the economically active population depend for their subsistance on agriculture and related activities. Agriculture is the source of domestic food consumption, it

provides inputs for a large portion of industrial activity, and surpluses of food and industrial crops for exports that account for over 90 per cent of the country's foreign exchange earnings.

The most important cash crop is cotton. Long staple cotton is grown in the large irrigated scheme of the Gezira, which produces three-quarters of the total cotton production. It is also grown in eastern Sudan under flood irrigation. Medium and short staple cotton are grown usually in rain fed areas using traditional methods. Part of this cotton especially the American type, is consumed by the local textile industry, and the rest is exported.

Groundnuts recently have become the second most important earner of foreign exchange, due mainly to the expansion of production in irrigated schemes. Traditional farmers however, also grow them under rainfed conditions.

Sesame and gum arabic, tapped from Acacia senegal, are the third and fourth contributor to foreign exchange earnings. Some Durra[1] Sorghum vulgare is also exported but most of this crop is consumed domestically as it is the staple food. Sudan also has a very large livestock population. However most animals are owned by traditional producers and livestock exports account for a relatively small percentage of total exports.

In addition to being agricultural, another feature of the Sudanese economy is the dominant role played by the public sector in all economic activities. The government is the major source of investment in the economy. Its share in fixed gross capital formation between 1955/56-

[1] Durra is the local name for Grain Sorghum.

74/76 ranged from 51 per cent to 64 per cent. In the six year plan period 1977/78-1982/83 the share of the government in total proposed investment was 59 per cent.

In addition to investment in transport and other public utilities, the government also plays a dominant role in extention of irrigated agriculture through the construction of dams, canals, and the provision of assistance to mechanised pumping schemes. The government owns and operates all public corporations whose contribution to the total government revenue in form of fees and charges exceeds 7 per cent (Suliman, 1981). In addition, the government acts as a partner in the production of about half of the cotton produced in the country, and its receipts from participation in agricultural schemes account for 5 per cent of its total revenues. The government has a monopoly control over the imports of sugar (profits from sugar monopoly accounts for over 16 per cent of its total revenue), and over the marketing o of 75 per cent of cotton overseas, as well as being the major employer of labour in the economy (see Nimeri, 1970).

3.4 Pattern of Exports

Exports assume a vital role in the Sudan. This is particularly the case in connection with the need to generate foreign exchange earnings, and the financing of capital good imports. The pattern of exports outlined earlier is presented in Table 3.1. The dominance of cotton is obvious. The category "others" consists largely of cotton seed, minerals and extractive products (chrome ore, iron and manganese). Exports from manufacturers are in an embryonic stage of development at this stage.

TABLE 3.1

THE PATTERN OF SUDANESE EXPORTS (1956-1980) L.S" 000,000"

Year	Export Proceeds	Cotton	Ground nuts	Gum Arabic	Sesame	Cakes & Meals	Dura	Livestocks	Hides & Skins	Others
1956	65.33	41.69	3.79	5.34	2.05	0.97	0.36	1.52	0.86	8.75
1957	48.85	22.93	4.70	4.67	2.99	0.93	1.20	2.04	0.87	8.52
1958	39.76	22.27	3.43	5.21	2.20	1.06	0.29	1.61	0.70	2.99
1959	63.47	40.14	3.58	5.09	2.75	1.68	1.67	1.09	0.90	6.57
1960	60.65	33.15	4.39	6.97	4.59	1.39	2.80	1.47	0.89	5.00
1961	59.08	31.16	5.37	6.14	4.18	1.93	1.86	1.48	0.88	6.08
1962	74.58	43.53	6.68	4.57	5.64	2.60	1.48	0.82	0.97	8.29
1963	77.12	45.56	6.40	5.69	4.83	3.50	1.56	1.04	1.28	7.26
1964	67.10	32.34	9.18	6.79	6.45	4.13	1.54	0.87	0.98	4.82
1965	67.14	31.20	8.60	7.53	4.75	3.96	2.44	1.99	1.25	5.43
1966	69.78	34.81	7.26	7.18	5.65	4.56	1.87	1.79	1.60	5.06
1967	74.06	40.85	6.51	8.34	6.53	4.14	0.02	2.05	1.45	4.18
1968	80.83	48.51	4.60	7.85	6.22	4.49	1.07	2.10	1.51	4.49
1969	85.62	49.47	5.99	8.67	8.02	4.18	0.04	2.32	1.80	5.12
1970	103.91	63.67	5.51	9.10	6.50	5.56	0.00	2.32	1.70	9.55
1971	114.37	69.91	9.33	8.03	8.00	4.46	1.09	2.01	1.94	9.63
1972	124.35	72.84	9.71	9.08	9.17	4.39	1.66	2.19	3.31	12.00
1973	152.17	84.26	12.99	7.40	10.71	7.90	2.92	3.23	6.07	16.68
1974	122.01	43.26	18.16	14.27	16.51	2.24	4.40	4.49	3.78	14.90
1975	152.47	70.19	34.38	7.55	11.94	5.18	2.23	1.03	3.19	16.78
1976	193.01	97.80	38.99	11.23	17.29	5.09	3.17	0.59	3.72	15.13
1977	230.18	131.56	28.80	13.51	18.26	7.83	4.77	4.33	4.36	16.76
1978	202.34	104.93	20.73	14.79	19.18	6.71	2.66	8.00	3.90	21.44
1979	232.67	151.27	9.97	18.65	6.28	7.27	13.52	6.90	3.65	15.15
1980	271.34	115.44	5.92	18.33	24.87	13.23	43.02	16.54	6.64	30.34
% of Total Exports:	100%	53.7	9.71	7.84	7.61	3.86	3.45	2.61	2.06	9.10

SOURCE: UN - Year Book of International Trade Statistics - various issues for the years 1956-1968.
Bank of Sudan - Annual Report - various issues for years 69-80.

Table 3.2 shows that the directional pattern of Sudan's exports has undergone significant changes during the last three decades. Britain was the dominant customer until the late fifties, but its share dropped significantly during the sixties. This drop was compensated by new customers in the European Economic Community (EEC), mainly West Germany, which increased its export share from 8% to 28% and some Eastern European Countries, whose share increased from 0.5% to 14% by the late sixties.

Part of the changes in the 1970's can be attributed to the change in government in 1969. It called for nationalisation of the economy and liberation of foreign trade from the hands of capitalist countries. Banks, a variety of firms and companies as well as the cotton trade were nationalized in 1970.

This policy was followed by a fall in the purchases of Sudan's exports by western countries. EEC's share dropped from 33% in 1969 to 24% in 1971, and that of UK from 8% to 4% for the same period. The USSR, however, became the largest customer for that period, and its share in Sudan's export rose from 4.5% in 1969 to 16.1% in 1971. For political reasons however, USSR's imports from Sudan dropped to almost nil in 1973. In that year the People's Republic of China took the largest share of Sudan's cotton followed by Japan, Italy and India. The increase in cotton purchases by far eastern countries, can partly be due to the huge expansion of textile industries in these countries.

Saudi Arabia which was a very small buyer during the sixties, became a major customer during the last decade. The increase in Saudi's income, along with the proximity of Sudan to Saudi Arabia, had resulted

TABLE 3.2

THE DIRECTIONAL PATTERN OF SUDAN EXPORTS (1956-1980) ŁS "000"

COUNTRY / Year	Belgium	China	Egypt	France	Germany	India	Italy	Japan	Netherlands	Poland	Saudi Arabia	USSR	UK	USA	Yugoslavia	Others	Total
1956	1142	869	7423	3170	4699	8824	5973	1832	1363	564	971	0	22008	1446	301	6204	66789
1957	776	606	8195	3671	2529	5463	4656	775	1390	90	1350	1003	11791	1272	25	7831	51423
1958	862	724	3284	2602	4088	4901	2684	1182	1063	554	1420	13	11920	1336	116	6680	43429
1959	1626	1027	2021	4322	6114	7173	6183	1992	2745	536	1634	1504	17420	1659	188	10626	66771
1960	1028	3275	3022	3055	3983	6539	4313	1789	1583	291	1430	2007	16473	2003	565	12070	63426
1961	1329	1389	2884	2692	6398	6099	5783	2588	2027	697	1767	3417	11900	1750	38	11421	62179
1962	2389	3066	3853	2346	8119	12203	6685	2877	2855	879	1457	3590	14154	2180	133	12173	78959
1963	1902	4366	3070	2757	8578	6511	8179	5407	2863	742	1560	5342	10457	2845	1505	13120	79202
1964	1453	1711	1322	3561	7838	6484	7997	4980	3975	2047	1740	1765	2845	2121	1077	18036	68952
1965	1981	5365	2141	2945	7187	4210	7144	2708	4473	1591	2915	4378	6560	2110	1350	10898	67956
1966	1500	3942	2528	3492	6595	7610	9329	4382	4926	1460	2521	2742	4977	2260	301	12164	70729
1967	1608	2656	2944	4016	8817	6817	8796	5718	4588	936	2198	3225	6086	4573	117	11514	74609
1968	2206	4838	2413	2068	12256	7946	9726	6653	4280	1786	2697	4818	4950	2769	839	10905	81150
1969	1963	6430	3919	1351	10157	10134	10782	8110	3370	1544	2579	3389	5931	3011	989	12538	86197
1970	1940	6180	5644	2350	10582	10270	10744	9322	3619	1619	2185	16292	6177	3771	1361	11858	103914
1971	2080	10785	5700	3090	8779	11997	9775	8322	4155	2111	3048	18351	4885	1814	1006	18476	114374
1972	4036	12459	7046	4527	11569	22903	11594	10087	4315	1818	3547	470	4687	3691	2422	19180	124351
1973	2449	22746	5767	9247	13874	8878	16866	16887	7313	1742	4370	3	5453	2921	945	32711	152172
1974	2747	11797	3734	12652	8147	4551	15502	4307	4895	1047	6630	1621	4188	6883	891	32418	122010
1975	1173	13046	10642	19258	9386	2257	20059	6520	6890	1396	3856	3656	5520	3340	7025	38444	152468
1976	1580	8423	6546	12818	12702	8207	37954	14468	9440	2321	3732	6268	5501	7571	10493	44982	193006
1977	2518	19599	2398	12993	16840	20503	28377	17960	5829	5037	10337	4948	7376	5066	13536	53864	230181
1978	2211	21032	12445	14998	8813	7940	27159	16578	4988	4782	12431	6859	4992	4642	12207	40264	202341
1979	2190	40748	5179	8465	9578	785	30672	16278	3259	2959	22003	16484	6315	5683	14545	47524	232667
1980	5282	24911	6188	8293	14114	1010	33843	22371	5401	4259	57609	4920	6992	6596	14680	54874	271343

SOURCES: UN - Year Book of International Trade Statistics - various issues for the years 1956-1968.
Bank of Sudan, Annual Report - Various issu-s for year 69-1980.

LS = Sudanese Pound.

in a rise of food (mainly vegetable oil, livestock and durra) and other exports to that country. Further, "Saudi Arabia has become more interested in investing in the Sudan to develop the potential of this country as an important neighbouring supplier of commodities necessary to the economic development of the Saudi Arabian Peninsula (Lees, 1977, p.115).

3.5 Export Instability

In Chapter One, we saw that specialialization in primary products, geographic and commodity concentration, are said to be conducive to export instability. All these conditions are met in the case of Sudan. The Sudan derives 95% of its export earnings from primary agricultural products. Commodity concentration manifests itself in cotton exports, which accounts for above 50% of export earnings. Moreover, 80% of export earnings are drawn from four commodities (cotton, groundnuts, sesame and gum arabic).

Although, significant changes took place in the directional pattern of Sudan exports, this was not planned. The changes were mainly a result of political factors. The changes in export markets in fact might have contributed to instability by creating shifts in demand for the export commodities.

The figures of Table 3.1 show that Sudan's exports have fluctuated over the last three decades. Between 1952-56, exports rose from S£41.2 millions to S£65.3 million i.e. an increase of 59%. They dropped by 25% in 1957, and rose again by 26% in 1962. The period 1964-66 was almost a stagnant one. This cycle repeated itself in later years. From 1970-73, exports were rising, they dropped in 1974 and recovered in 1975. Afterwards, with the exception of the year 1978, the trend was upward.

The argument of Chapter One was that fluctuations in exports could inhibit the growth of an economy. To determine whether this in fact happened in the Sudan requires the answer to the following questions.

1. Are the observed fluctuations in exports large by international standards?
2. Is there any evidence that the export instability was transmitted to the rest of the economy?
3. If so, is there any evidence that it had a detrimental effect on economic growth?

The remainder of this chapter considers the first question. It also tries to determine the causes of the observed instability.

3.6 Export Instability of Sudan in International Perspective

In Table 3.3 the results obtained in previous studies on the subject are reviewed. For each study the time period for which the instability index was calculated, the method by which it was measured, the mean value of instability indexes obtained, and the instability index of Sudan are reported.

The mean values for the studies of Erb and Campo (1969) Leith (1970) and Glezakos (1973) refer only to the LDCs in their samples. In the other two studies, the mean value was obtained for the whole sample of DCs and LDCs. Coppock and Glezakos, in addition to measuring proceeds instability, calculated indexes of both price and quantity instability as well. All the studies showed the instability indexes for Sudan exports to be well above the mean value. This is true for different time periods, with the use of different indexes for measurement, and for the three variables - proceeds, quantitites and prices.

TABLE 3.3

INSTABILITY INDEXES OF SUDAN EXPORTS IN INTERNATIONAL PERSPECTIVE

Study	Time Period	Method of Measurement	Mean	Inst.Index for Sudan	Rank*	Sample Size
Coppock (1962)	(1946-58)	Coppock Log Variance Index	26.8	40.4	78	83
" " Iq	"	"	17.1	29.8	63	83
" " Ip	"	"	15.4	25.2	59	83
Erb and Campo (1969)	(1954-66)	Coppock Log Variante	13.4	21.8	n.p.	45 LDCs
Leith (1970)	(1957-67)	Coppock Index	14.01	18.36	n.p.	70 LDCs
" "	"	Linear Trend Index	6.9	9.34	n.p.	70 LDCs
Glezakos (1973)	(1953-66)	Arithmetic Mean Corrected for Trend	9.96	15.15	n.p.	50 LDCs
Iq		"	8.67	19.10	n.p.	50 LDCs
Ip		"	7.09	9.49	n.p.	50 LDCs
Knudsen & Parens (1975)	(1954-67)	Coppock Index	10.35	21.15	n.p.	53
		Exponential Trend	9.87	14.7	46	53
		Moving Average	3.82	7.66	50	53

Iq = quantity instability index

Ip = price instability index

* = Ranks from lowest instability (equals 1) to highest.

n.p.= Ranks were not provided in the respective studies.

The findings of all these studies are acceptable because they all measured the degree of instability around the trend, i.e. they had eliminated the growth trend in their calculations. The statistical data used in their analysis are relatively accurate, because the data on the foreign trade sector are easy to collect and are widely accepted to be the most reliable of all the data collected in LDCs (Lim, 1974, p. 80).

These findings will allow us to conclude that the degree of instability which Sudan experienced in its export sector is high by international standards. Now let us see what are the causes of such highly unstable export earnings. This will be the focus of the discussion in the following section.

3.7 Causes of Export Instability in the Sudan

Traditionally export instability was said to arise from commodity and geographic concentrations, and the specialization in primary products. In this section we will look at the effects of both commodity and geographic concentrations on the overall instability. To do this we have to measure the fluctuations of each commodity (country) by means of a suitable instability index.

3.7.1 Instability Index

Instability was defined in Chapter One as the short term fluctuation around the trend. In constructing an instability index, it is necessary to eliminate the trend, i.e. to separate the year to year fluctuations (which are our concern in this study) from the long term growth trend over the period as a whole.

Two problems arise in the computation of an instability index:

1. The most appropriate and representative trend form (linear exponential, that approximates as closely as possible the real trend of the data for the study, should be selected because the type of trend fitted to the data influences the measure of instability obtained.
2. This selected trend should correctly and smoothly apply to the entire period of the study (Stein, 1979, p. 184).

The linear trend has shown a better fit from the preliminary graphing of the data used in the study. Therefore, an instability index that measures instability around a linear trend will be the approximate one. A widely used instability index,[1] i.e. the normalized standard error, was chosen to measure the instability of export proceeds, quantities, prices and some other economic variables in this study.

This instability index is as follows:

$$I = \frac{100.SE}{\bar{X}} \qquad 3.1$$

$$= \frac{100.}{\bar{X}} \sqrt{\frac{1}{n-2} \sum_{t=1}^{n} (X_t - \hat{X}_t)^2} \qquad 3.2$$

where I = Instability Index t = time in years

$\bar{X}$ = Mean value of observations SE = standard error

X_t = Actual values of exports

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1 The index was used by Massel (1964), Neuberger (1964), Statter (1964) and Lam (1975, 1980).

$\hat{X}_t$ = Trend values of exports obtained by fitting a linear least square line of the form $\hat{X}_t = a + b_t$, over time.

and n = number of observations.

This index, as it can be seen, measures the export variations due to instability by subtracting the variation due to growth (measured by the regression line) from total variations of the actual export earnings. As a way of making indexes comparable over all commodities (or countries), these variations are divided by the mean observation i.e. they are standardized.

The above index will be used to measure the degree of export fluctuations in the Sudan for the period 1956-80. 1956 is the year in which Sudan got her independence and became an independent financial unit. Moreover, we need to eliminate the early fifties, because of the boom in the world market associated with the Korean war.

However, the period was broken into two subperiods because of data limitations. Data have been taken from two sources, viz, 1 The United Nations International Trade Statistics for the first period 1956-68 and, 2, the Bank of Sudan annual report statistics for the second period 1969-80. Some differences exist between the two sources in the overlapping years that does not encourage us to pool the whole series together. We could not carry on with the UN Statistics because some commodities had been aggregated together, in the post 1970 records of the UN. Moreover, data on production and area cultivated (that is used in decomposition of quantity variation into yield and acreage components) was available for the second period only. This compells us to treat it as a separate period.

The instability index for the first period is 12.42 and for the second is 9.83 (see Table 3.4). This result suggests that there has been a reduction in export instability over time in the Sudan. It is a similar result to those obtained by Erb and Schiavo-Campo (1969), Leith (1970), Kenen and Voivodas (1972), Naya (1973) and Lawson (1974), where all found a decline in the export instability in LDCs over time.

In Table 3.4 there are three columns for each period. Column one, measures the instability index of each commodity, and the second represents its share in the overall exports. The third represents the instability share. This indicates the share of total instability attributable to a specific commodity.

The contribution of each commodity to the instability of total exports depends on:

1. The degree of instability of the commodity; and
2. The share of that commodity in the total export earnings.

The commodity may be very unstable, but if it is a relatively minor export item, then its contribution to the instability of total exports will be relatively small, and vice versa. So the instability share in Table 3.4 is in fact a weighted instability index, calculated by multiplying the figures in columns 1 and 2, then dividing this product by the sum of all products. Mathematically, the share of the ith commodity (Si), to the instability of the total exports is given by:

$$S_i = (I_i M_i)/(\sum_{i=1}^{n} I_i M_i) \qquad (3.3)$$

where I_i = The instability index of the ith commodity

n = Number of commodities, and

M_i = The sum of the earnings from ith commodity over the period under analysis.

Such a procedure, which has been used extensively,[1] appears to assign precisely each export item's own responsibility for total export instability (Stein, 1979).[2]

3.7.2 Commodity Concentration

A number of conclusions can be drawn from Table 3.4. Firstly, fluctuations in the export earnings of each commodity and for the two periods, are above that of total export earnings. This suggests that the random movements in various commodity receipts were offsetting, leading to some stabilizing impact in total earnings.

The second major conclusion is that commodity concentration does not seem to have been the major cause of instability. Well over 75% of export earnings were produced by the four major export crops (namely cotton, groundnuts, Gum Arabic and sesame), but the instability share of these crops taken as a group was only 64% in the second period for example. Of these crops, only groundnuts showed an instability share above the export share. On the other hand, the minor crops durra and livestock contributed more to instability than their export shares.

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1 See Coppock (1962), Lam (1975), Stein (1979) and Lim (1981).

2 For details on the advantages of the use of this type of instability index, see Stein (1979). The Log trend based index would be more stable because it deals with proportions and proportional changes.

TABLE 3.4

INSTABILITY INDEXES AND THE WEIGHTED CONTRIBUTION TO INSTABILITY OF SUDAN MAJOR EXPORT COMMODITIES (1956-80)

Period	(1956-68)			(1969-80)		
	1	2	3	1	2	3
Commodity	Instability Index of Exports	% of Export Share	Instability Share	Instability Index of Exports	% of Export Share	Instability Share
Cotton	22.20	55	54	23.24	53	36
Ground Nuts	27.15	9	11	68.89	10	20
Sesame	14.64	7	5	23.21	8	5
Gum Arabic	13.83	10	6	13.96	7	3
Cakes and Meals	19.12	4	3	35.8	4	4
Durra	61.45	2	6	144.8	4	16
Livestocks	29.95	2	3	74.14	3	7
Hides and Skins	13.97	2	1	31.71	2	2
Others	27.82	9	11	22.97	9	7
Total:	12.42	100	100	9.83	100	100

SOURCE: Table 3.1.

TABLE 3.5

INSTABILITY INDEXES OF PROCEEDS, QUANTITY AND UNIT VALUE OF SUDAN MAJOR EXPORT COMMODITIES 1956-1980

Period	Instability Indexes 1956-68			Instability Indexes 1969-80		
Commodity	Proceed	Quantity	Unit Value	Proceed	Quantity	Unit Value
Cotton	22.20	23.69	12.10	23.24	27.58	13.98
Ground Nuts	27.15	27.65	9.12	68.89	63.94	16.82
Sesame	14.64	20.98	15.81	23.21	25.76	24.96
Gum Arabic	13.83	9.65	7.38	13.96	32.55	34.55
Cakes and Meals	19.12	15.44	10.14	35.80	25.79	23.87
Durra	61.45	71.83	17.68	144.80	90.33	41.29
Livestocks	29.95	32.17	19.10	74.14	45.55	29.05
Hides & Skins	13.97	17.45	13.07	31.71	25.66	32.87
Others	27.82	-	-	22.97	-	-
Total:	12.42	-	-	9.83	-	-

SOURCE: Appendix 3.A and 3.B.

3.7.3 Price Versus Quantity Instability

From a policy viewpoint, it would be useful to determine whether observed fluctuations in export earnings were caused more by price or quantity fluctuations. Figures for each crop are provided in Table 3.5.

These figures show that quantity instability has generally been larger than price instability, with the recent exceptions of gum arabic and hides and skins. These figures imply that the proceed variations have been due more to quantity than price instability. However, a more rigorous method must be employed in order to confirm this conclusion.

Gross export income (GI) of a commodity is a product of price (P) and quantity (Q). When P and Q are correlated the variance in (GI) can be allocated between P and Q in the following fashion.

$$\begin{aligned} \text{Var}[PQ] = {} & E^2[P]\,\text{Var}[Q] + E^2[Q]\,\text{Var}[P] + 2E[Q]\,E[P]\,\text{Cov}[PQ] \\ & - \text{Cov}^2[P,Q] + E[(P-E[PZ])^2(Q-E(Qz)^2] \\ & + 2E[P]\,E[(Z-E(Q))^2\,(P-E[PZ])] \\ & + 2E[Z]\,E[(P-E(P))^2\,(Q-E[Q])] \end{aligned} \qquad 3.4$$

Burt and Finely (1968, p. 737), suggested that by ommiting higher order interactions, this variance is approximated as follows:

$$GI = P.Q. \qquad 3.5$$

$$\text{Var}(GI) \sim A + B + C \qquad 3.6$$

where $A = E^2$ (Q) var (P)

$B = E^2$ (P) var (Q)

$C = 2E$ (Q). E(P) Cov (P_1 Q)

and var = variance

cov = covariance

E = mean

E^2 = mean square

The value A is taken as the direct effect of variability in price. B is the effect attributable to quantity and C is the first order interaction (based on the covariance between P and Q), that cannot be decomposed into separate effects. Burt and Finely claimed that the term of linear interaction, C, will dominate the higher order-terms and should approximate the full interaction between price and quantity. Higher order-terms in the exact var (GI) can be omitted. To make the interpretation easy, they suggest that, the three terms A, B, and C in Equation 3.6 above, should be expressed relative to (A+B). The positive direct price and quantity effects, i.e. $(\frac{A}{A+B})$ and $(\frac{B}{A+B})$ respectively, sum to one. The third term of interaction $(\frac{C}{A+B})$ will take either sign.

Houck (1973) applied this method to detrended data for Australian wool, wheat and beef for the period (1946-1970). He obtained satisfactory results for both wool and wheat. His results for beef showed that the interaction term was relatively higher than the direct effects. Being a negative term and at the same time large, Houck could not apportion the interaction term between price and quantity.

Goldberger (1970) criticised Burt and Finely's procedure and pointed out that, for some values, the method may not be accurate and will involve a high percentage of error. In their reply to Goldberger's criticism, Burt and Finely (1970) pointed out that the higher order interactions can easily be ignored in detrended data, because their value will be very small.

Piggott (1978) mentioned three other criticisms of Burt and Finely's paper. These criticisms are:

1. Piggott questioned whether there is any necessity for the approximation formula (i.e. equation 3.6) because the interaction effect can be computed as the difference between the true value of the variance of GI and the sum of the first two RHS terms (in equation 3.4).
2. He asked how the first RHS term can be called a direct effect of price, though it contains the square of the mean quantity? The same applies for the second RHS term.
3. Thirdly, he mentioned the difficulty in interpreting the results when the interaction term is relatively large, as it was the case for beef in Houck's study.

As an alternative procedure, Piggott suggested the study of the historical pattern of supply and demand variability, underlying a particular pattern of revenue instability, to place the analysis on an analytical framework. This requires the estimation of supply and demand functions. These estimations could not be made for Sudan with the data at hand. For example, the series on prices are those by which commodities were sold abroad, and these would not be the prevailing farm gate prices at sowing time.

TABLE 3.6

SEPARATION OF GROSS INCOME VARIATIONS FOR SUDAN EXPORTS INTO PRICE AND QUANTITY COMPONENTS (1956-1980) WITH THE LINEAR INTERACTION (COVARIANCE TERM) SHOWN SEPARATELY AND APPORTIONED EQUALLY

Item	1956-68			1969-80		
	Income Variation attributable to:			Income Variation attributable to:		
	Price A/(A+B)	Quantity B/(A+B)	Linear Interaction C/(A+B)	Price A/(A+B)	Quantity B/(A+B)	Linear Interaction C/(A+B)
	Percent			Percent		
Cotton	18	82	-44	19	81	-53
		n.p.			*n.p.*	
Groundnuts	9	91	-8	8	92	-36
	5	*95*			*n.p.*	
Sesame	36	64	4	46	54	-23
	37	*63*		*45*	*55*	
Gum Arabic	38	62	16	55	45	-67
	40	*60*		*65*	*35*	
Cakes & Meals	35	65	10	46	54	1
	36	*64*		*47*	*53*	
Durra	7	93	-34	31	69	75
		n.p.		*39*	*61*	
Livestocks	29	71	-23	30	70	78
	23	*77*		*39*	*61*	
Hides & Skins	31	69	-30	63	37	-44
	23	*77*		*73*	*27*	

NOTES:

1. The covariance term was shown separately and was equally apportioned between price and quantity (italic figures) as was suggested by Golderberger (1970).
2. The figures wirtten in italic is the results after apportion

$$A = \frac{(A+C/2)}{(A+B+C)} \quad , \quad B = \frac{(B+C/2)}{(A+B+C)}.$$

3. *n.p.* means apportion is not possible because the covariance term is negative and relatively high.

SOURCE: The figures were obtained from detrended data of Appendices 3.A and 3.B.

The supply function therefore could not be estimated.

In this study we will use the Burt and Finely's procedure that will give us understandable results for our purpose (i.e. how much of proceeds variability is attributable to price and quantity).

In Table 3.6 the values of A, B, and C were calculated, as indicated in equation 3.6 from trend corrected data. Further computations were made to separate the output variation into acreage and yield components. Because of data limitations the acreage-yield analysis could be done for the second period (1969-80) and for cotton, groundnuts, sesame and durra only. The results are presented in Table 3.7

Table 3.8 brings the results of Tables 3.6 and 3.7 together. Yield and acreage percentage figures were multiplied by those of the quantity to obtain the percentage contribution of acreage and yield to the total proceed variations (See Houck, 1973).

Major results show that most of the proceeds variations are due to quantity component, with the exception of price effects of gum arabic and hides and skins in the second period. Most of the quantity variation, arose from yield variation for the crops studied. Many reasons why this occurred can be suggested for each crop but this is beyond the scope of this study. It would however, be crucial for consideration of policy, e.g. if the next chapter reveals that export instability caused problems, then causes of instability of each crop presented in the table should be examined in far more detail before policy recommendations could be made. This is mentioned again in the final chapter.

TABLE 3.7

SEPARATION OF OUTPUT VARIATION FOR FOUR COMMODITIES INTO ACREAGE AND YIELD COMPONENTS (1969-1980)

Item	Output Variations attributable to:		
	Acreage	Yield/Feddan	Linear Interaction
Cotton	21	79	53
	31	*69*	
Groundnuts	25	75	-12
	22	*78*	
Sesame	31	69	11
	33	*67*	
Durra	27	73	1

NOTES:

The figures in italics are obtained from partition of covariance term equally between yield and acreage, see Table 3.6.

SOURCE: Obtained from detrended data of Appendix 3.C.

TABLE 3.8

SEPARATION OF PROCEEDS VARIATION FOR FOUR COMMODITIES INTO PRICE, ACREAGE, AND YIELD COMPONENTS (1969-1980)

Item	Proceeds Variations attributable to:		
	Price	Acreage	Yield/Feddan
		Per Cent	
Cotton	19	17	64
Groundnuts	8	23	69
Sesame	46	17	37
Durra	31	19	50

SOURCE: Tables 3.6 & 3.7.

3.7.4 Geographic Concentration

It was shown above that the instability of export proceeds was due mainly to instability in quantities sold. However instability was not directly attributable to the concentration of exports on few commodities. In this section the relation between instability and concentration on a few buyers is considered.

Table 3.9 gives figures on the instability indexes, export share, and instability share of Sudan's major customers. The instability index was calculated using the normalized standard error index (equation 3.2). The instability share, i.e. the weighted contribution of each customer to the overall instability was obtained by the use of equation 3.3. The indexes and contributions were computed for the two periods mentioned earlier.

From the table, the instability indexes of each country for the two periods, are higher than the indexes of the total exports. This, again means that the movement in Sudan's foreign markets were offsetting.

Let us take the five main customers in the first period (i.e. Germany, India, Italy, Egypt and the U.K.). Their export share was 51.69% and their instability share was slightly above this percentage at 52.07%.

For the second period, the five main customers (China, Germany, Italy, Japan and Saudi Arabia), had an export share of 43.81% and an instability share of 46.98%. The instability share is again above (though small) the export share.

TABLE 3.9

INSTABILITY INDEXES, AND THE WEIGHTED CONTRIBUTION TO INSTABILITY OF SUDAN MAJOR EXPORT MODELS

(1956-1980)

Period	1956-1968			1969-1980		
Country	Instability Index of Exports	Export Share %	Instability Share %	Instability Index of Exports	Export Share %	Instability Share %
Belgium	20.80	2.26	1.70	33.4	1.37	1.17
China	42.83	3.87	6.01	42.53	9.98	10.87
France	20.21	4.57	3.35	50.16	5.54	7.12
Germany	21.85	9.97	7.89	23.38	6.78	4.06
India	29.92	10.36	11.23	69.77	5.52	9.86
Italy	18.25	10.00	6.61	23.04	12.76	7.53
Japan	27.77	4.90	4.93	32.37	7.62	6.32
Netherlands	19.00	4.36	3.00	35.39	3.2	2.9
Poland	42.55	1.39	2.14	37.82	1.52	1.49
Saudi Arabia	15.54	2.70	1.52	106.59	6.67	18.20
USSR	43.68	3.86	6.11	93.68	4.34	10.41
Egypt	45.93	5.15	8.57	45.93	3.79	4.46
UK	30.25	16.21	17.77	15.75	3.43	1.38
USA	27.27	3.27	3.23	30.95	2.77	2.20
Yugoslavia	94.04	0.75	2.56	37.09	4.04	3.83
Others	22.53	16.38	13.39	15.48	20.65	8.20
TOTAL:	12.42	100	100	9.83	100	100

In view of the above results, it seems that the geographic concentration on some major customers (Egypt, India and the UK for the first period, and Saudi Arabia and China for the second period) had contributed marginally to export instability.

3.8 Conclusion

Investigations in this chapter suggest that the instability of Sudan's exports is high by international standards. However, it appears to have been falling over time.

In analysing the causes of such instability for the period (1956-1980), the nonavailability of a complete series of data compelled us to split the period of study into two subperiods. To find the contribution of different commodities and countries to the overall instability, a widely used method that assigns the share of total instability to specific commodity and/or country was employed.

The results showed that major export items, with the exception of groundnuts, had added less to the total instability than their export share. This in turn implies that commodity concentration was not a major cause of instability.

Some of the major customers had slightly greater instability shares than their export shares, meaning that geographic concentration may have contributed to total instability. However, this contribution was marginal.

When the export proceeds of each commodity were broken by price and quantity, three groups of commodities could be distinguished:

1. Group (A): Where above two thirds of proceeds variation was attributable to quantity. This group included cotton, groundnuts, durra and livestock for the two periods.
2. Group (B): Where the portion attributable to quantity was slightly greater than that of price. This group included sesame and cakes and meals for the two periods, and the gum and hides and skins in the first period.
3. Group (C): Where variation due to price was greater than the variation due to quantity. This group was represented by gum and hides and skins in the second period only.

The decomposition of quantity variation into yield and acreage showed that most of the variation was associated with yield variation for the crops studied.

Whether this instability had been transmitted from export sector to the rest of the economy, and how it affects the rate of economic growth, will be the focus of the next chapter.

CHAPTER FOUR

DOMESTIC CONSEQUENCES OF EXPORT INSTABILITY IN SUDAN

4.1 Introduction

In the previous chapter it was shown that export instability in Sudan has been high by international standards. In this chapter the effects of this instability on the domestic economy are considered.

A fairly large body of literature exists which relates instability in national income to export instability. This literature is reviewed briefly in section 4.2. The effects of export instability on national income, government sector and imports in Sudan, will be considered in Section 4.3. Section 4.4 will focus on the impacts of export instability on the rate of growth of both investment and GDP.

4.2 Export Instability and Economic Instability

The term economic instability is commonly used to mean the instability in national income. Exports fluctuations can cause fluctuations in the internal economy by affecting the income of the producers in the export sector directly. This will in turn affect their domestic consumption and investment expenditures. These variations in consumption and investment will cause similar fluctuations in the incomes of domestic goods producers, which in turn causes additional variations in the domestic consumption and investment. Through this form of multiplier, the fluctuations in the export earnings will produce changes in national income which are in

the same direction, and which in the absence of government intervention will be more than proportional to the initial changes in the export proceeds (MacBean, 1966, p. 26).

Export fluctuations can lead to similar fluctuations in the money supply of an economy. The increased foreign earnings during an export boom will increase foreign reserves and deposits, and can lead to secondary credit expansion and an increase in money supply. On the other hand, reserves may be reduced in an export down turn. This will reduce bank deposits and liquid assets and will provide the necessary and sufficient conditions for credit contraction (Lam, 1975, p. 16).

Export instability can also seriously affect government revenue in developing countries. Many LDCs rely heavily on tariffs and various forms of taxes on traded goods as sources of revenue. If imports are financed through export revenue, variations in exports will produce similar variations in imports, which will be reflected in changes in government revenue.

Government expenditure need not follow similar patterns if the government adopts countercyclical budgetary policies. However, to do this it would have to have an effective machinery to stabilize demand. This, MacBean (1966, p. 27) argues, is not present in most LDCs. Moreover, it is politically difficult for governments in LDCs to restrain expenditure during boom periods. These factors mean that most governments in LDCs are forced to follow procyclical expenditure policies (Yotopoulus and Nugent 1976, p. 329).

These factors imply that national income will fluctuate in sympathy with export fluctuations. This does not necessarily imply, however, that export instability will reduce the long term growth rate of national income. The argument, as outlined in Chapter One, is that investment is lower in conditions of instability than it would otherwise be. This is due partly to the possibility of making losses in poor years, and partly to the unpredictable imports of crucial capital goods. Whether this has occured in the Sudan is the topic of the next sections.

4.3 Sudan's Domestic Instability

In this section the link between export instability and fluctuations in national income in Sudan are considered. The foreign trade multiplier for Sudan is also calculated so that the size of the effect of export instability can be assessed.

The aggregate expenditure in an economy has two main components: the expenditure that is injected into the system and the expenditure that arises from within it because of the spending of domestic households. Total expenditure in the economy is thus, total injections (exports, government expenditure and investment expenditure) plus household expenditure on domestically produced goods and services.[1] This means a rise in exports, government expenditure, or investment expenditure, ceteris paribus, will raise the level of national income (Lipsey, 1972, p. 456-471).

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1 This means the total expenditure E = C+G+I+X. But consumption expenditure is commonly defined as all expenditure on goods and services whether produced at home or imported, i.e. total consumption C* = C+M
Imports are withdrawals from the income flow, this means

$$E-M = C+G+I+X-M$$

Rearranging

$$E = (C+M)+G+I+(X-M)$$

$$E = C^{*}+G+I+(X-M)$$

which is the formula often used. (See Lipsey, 1972, p. 457).

In the Sudan, exports contribute more to national income than either government expenditure or gross domestic investment spending. The figures for the period 1956-78 were £S[1] 2567 million, £S 2554 million and £S 2385 million, respectively. This suggests that variations in exports are likely to be powerful generators of fluctuations in national income. Added to this is the fact that one export commodity, that is cotton, generates around 20 per cent of the money income in the economy (Nimeri, 1970).

The export taxes in the country are low (3-5 per cent ad valorem), this renders them to be ineffective in ironing out export fluctuations. For them to cushion the economy from export fluctuation, they need to be high and progressive.[2]

The fluctuations in exports can easily be felt as fluctuations in national income because of the ineffective fiscal and monetary devices of the country that can counteract them, as we will see in the next chapter.

4.3.1 Export Instability and National Income Instability

GNP is used to measure fluctuations in national income rather than GDP. GDP includes the export profits repatriated abroad. If export instability is reflected largely in fluctuations in profits which are expatriated, while local operating costs are relatively steady, Lim (1974, p.82) argues that GDP will exaggerate the degree of domestic instability.

The absolute and percentage deviations in GNP and exports from a linear and a logarithmic trend are given in Table 4.1. Because of data

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1 £S = Sudanese Pound.

2 Such taxes result in more equitable sharing of costs of fluctuations between Public and Private sectors. However, the problem of incentives remains.

TABLE 4.1

SUDAN'S GNP AND EXPORTS, AND THEIR DEVIATIONS FROM TREND

IN CURRENT PRICES 1956-78

(£S)

Year	GNP	Exports	DEVIATIONS FROM: Linear Trend GNP	Linear Trend Exports	Logrithmic Trend GNP	Logrithmic Trend Exports	PERCENTAGE DEVIATION FROM: Linear Trend GNP	Linear Trend Exports	Logrithmic Trend GNP	Logrithmic Trend Exports
1956	299.3	59.7	402.5	28.1	70.2	8.4	134.48	47.07	23.45	14.07
1957	299.3	60.5	318.7	21.6	48.1	5.5	106.48	35.70	16.07	9.09
1958	329.0	64.6	264.5	18.5	53.6	5.7	80.40	28.64	16.29	8.82
1959	338.1	63.7	189.8	10.3	36.1	0.6	56.14	16.17	10.68	.94
1960	339.2	65.6	107.1	4.9	8.1	-2.0	31.57	7.47	2.39	-3.05
1961	385.0	65.6	69.0	-2.4	21.9	-6.8	17.92	-3.66	5.69	-10.37
1962	415.7	65.1	15.7	-10.1	17.6	-13.5	3.78	-15.51	4.23	-19.20
1963	450.0	77.7	-33.6	-4.1	13.5	-5.5	-7.47	-16.18	3.00	-7.08
1964	459.6	90.3	-107.8	0.5	19.0	1.2	-23.46	.50	-4.13	1.33
1965	471.5	86.3	-179.7	-10.7	53.3	-9.2	-38.11	-12.40	-11.30	-10.66
1966	492.0	82.3	-243.1	-22.0	83.4	-20.0	-49.1	-26.73	-16.95	-24.30
1967	503.5	89.0	-315.4	-22.6	127.5	-20.6	-62.64	-25.39	-25.32	-23.15
1968	541.1	93.4	-361.7	-25.4	150.7	-24.1	-66.85	-27.19	-27.85	-25.80
1969	589.3	103.4	-397.3	-22.7	169.3	-22.5	-67.42	-21.95	-28.73	-21.76
1970	697.1	113.2	-373.3	-20.2	134.7	-21.7	-53.55	-17.85	-19.32	-19.17
1971	757.9	123.4	-396.4	-17.3	154.1	-21.1	-52.30	-14.02	-20.33	-17.10
1972	828.7	120.9	-409.4	-27.0	171.3	-37.0	-49.40	-22.3	-20.67	-28.12
1973	888.5	151.3	-433.4	-3.9	208.0	-14.7	-48.78	-2.58	-23.41	-9.72
1974	1236.4	167.1	-169.3	4.6	43.1	-10.7	-13.69	2.75	2.76	-6.40
1975	1495.1	169.4	5.5	-0.3	176.8	-21.1	.37	.20	11.83	-12.46
1976	1827.9	206.4	254.5	29.4	382.5	2.2	13.92	14.24	20.93	1.07
1977	2322.9	230.1	665.7	45.8	738.0	11.3	28.66	19.90	33.71	4.91
1978	2868.3	218.2	1127.2	26.7	1130.5	-16.2	39.30	12.23	39.91	-7.42
Instability Index			48.68	18.99						
Coefficient of variation			84%	48%						

NOTES: Coefficient of variation is the standard deviation divided by the mean.

SOURCE: IMF - Financial Statistics - National Accounts - 1982.

limitations and the non-availability of real values, current ones were used.

Table 4.2 summarises the figures in Table 4.1. The percentage trend deviations of GNP is represented by (ΔY) and of exports by (ΔX). As Table 4.2 shows ΔY and ΔX moved in the same direction for greater parts of the observations. The sympathetic movements were stronger when the linear trend was used, where 78 per cent of the observations moved in the same direction. With the logarithmic trend 65% of the observations moved in the same direction.

TABLE 4.2

RELATIONSHIP BETWEEN PERCENTAGE DEVIATIONS OF GNP FROM TREND (ΔY) AND PERCENTAGE DEVIATIONS OF EXPORT EARNINGS FROM TREND (ΔX) IN CURRENT PRICES (1956-78)

Equation	No. of times when ΔY and ΔX moved in same direction	Simple Regression Analysis $\Delta Y = a + b\ \Delta X$		
		a	b	R^2
Linear	18/23 = 78%	.39	2.58 t(12.41)	.88
Logarithmic	15/23 = 65%	10.93	1.26 t(5.37)	.58

NOTES:

t values were calculated as follows

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

Both values are highly significant.

To determine whether GNP deviations and export deviations were correlated, we followed the conventional approach (MacBean, 1966, Lim, 1974, Stein, 1979) and regressed the percentage trend deviations of the former on that of the latter. The results are presented in the third column of Table 4.2. A statistically positive association between the two variables exists, showing that GNP fluctuations and export fluctuations were closely related. The correlation coefficients (r) were .93, and .76 for the linear and logarithmic trend respectively.

These resutls showed that the direction of changes of export earnings and GNP were consistent. The next question will be whether the impact of export instability on GNP has been aggravated or dampened? To answer the question, we will calculate the foreign trade multiplier.

We would predict that the foreign trade multiplier is greater than one. This is because the coefficient of variation of GNP was 84% and that of exports was 48%.Further the instability index of the former was 48.68%, and for the latter was 18.99. Given the consistency of movements between the two variables, this suggests that the impact of export instability on GNP had been aggravated. Estimated values of 'b' in Table 4.2 also indicate this.

4.3.2 Foreign Trade Multiplier

To calculate the foreign trade multiplier accurately is a long and involved process. Consider the formula for gross national product (GNP):

$$Y = C + I + G + X - M - T \qquad (4.2)$$

where Y = Gross national product at market prices (or national expenditure)

C = Consumers' expenditure

I = Gross capital formation at home

G = Public authorities' current expenditure on goods and services

X, M, = Exports and imports respectively

T = The amount of indirect taxes payable at current rates on the goods and services.

With simple Keynesian consumption, import and tax functions, we can derive a foreign trade multiplier as:

$$\left(\frac{1}{S+m+t}\right) \qquad 4.3$$

where m = marginal propensity to import

S = marginal propensity to save.

t = the proportion of increase in domestic income which accrue to the government.

Equation 4.3 was the foreign trade multiplier suggested by MacBean (1966, p. 92). However, he adjusted it to allow for the leakages from the system, specifically repatriated profits from export earnings re-exports and export taxes. He therefore calculated the multiplier as:

$$\frac{(1 - P_x - m_x - t_x)}{(m_y + S_y + t_y)} \qquad 4.4$$

where:

P_x = the proportion of export proceeds repatriated to foreigners,

m_x = the proportion of export proceeds which are re-exported in natural or processed form,

t_x = is the proportion of export proceeds which accrues to the government through taxes on exports and on exporters income, and

Y, X, m_y, S_y, t_y = are as Y, X, m, s and t respectively.

If MacBean's formulation is applied to Sudan the foreign trade multiplier for the period 1956-78 is 2.09. The figures on which this is based are found in Table 4.3, and a detailed explanation of the calculations are in Appendix 4.B. This suggests that fluctuations in exports would cause more than proportional fluctuations in national income.

TABLE 4.3

VALUES OF THE PARAMETERS OF THE FOREIGN TRADE MULTIPLIER OF SUDAN 1956-78

P_x	0.01
M_x	0.04
t_x	0.05
m_y	0.14
S_y	0.17
t_y	0.12

NOTES:

These figures were calculated in a rough manner. They illustrate rather than determine the extent to which export fluctuations were exaggerated in the national economy.

SOURCE: Appendices 4.B and 4.C.

There are, however, many problems with MacBean's method. For example, he did not include an investment function, and assumed government expenditure was exogenous. If a simple one period investment function is included,

$$I = e + f\,Y \qquad 4.5$$

Still assuming G and X are exogenous, then the multiplier would be

$$\Delta Y = \Delta X \frac{1}{S+ M - f+t}, \qquad 4.6$$

(see Appendix 4.A.1)

where f is the marginal propensity to invest.

Adapting for leakages in the manner of MacBean, equation 4.6 becomes:

$$\Delta Y = \frac{\Delta X (1 - P_x - M_x - t_x)}{S_y + M_y - P_y + t_y} \qquad 4.7$$

as a more realistic foreign exchange multiplier. Clearly there is no need to estimate this multiplier, as it would produce a greater figure than that using the MacBean's formula. The conclusion therefore would be the same.

Even this specification is not very realistic as very simple consumption and investment functions were assumed. To calculate the foreign multiplier accurately would require the econometric estimation of an investment function which incorporated lags and a more realistic consumption function as a minimum. It is not possible to do this with the available data, but there is no reason to suppose that the new foreign trade multiplier would be less than unity. Even more evidence is found by calculating the elasticity of GNP with respect to exports. The estimated equation

$$\text{Log GNP} = -1.68 + 1.50 \text{ Log exports}. \qquad 4.8$$

reveals that the elasticity was 1.50. These results imply that a given percentage change in exports would cause an even greater percentage change in national income.

The conclusion of this section therefore is that export instability has been transmitted to the internal economy of the Sudan. However before we examine the effects of export instability on the economy's rate of growth, we would like to see how other economic variables had reacted to export fluctuations.

4.3.3 Export Instability and the Government Sector

The government sector is particularly important in determining national income in Sudan. This is because both government recurrent expenditure and investment are relatively high compared to private expenditure and investment.

On the other hand, the government relies heavily on the traded sector for its revenue. This is from commodity taxation and from the government's direct involvement in the production and export of cotton. Fluctuations in exports therefore will cause government revenue to fluctuate, which will be reflected in national income fluctuations unless the government usesits expenditure policy as stabilization measures. This section will consider the following questions:

1. How important is the export sector to government revenue?
2. Has government revenue fluctuated with export fluctuations?
3. Has the government's expenditure policy been used as a stabilization device?

Details of government revenue are provided in Table 4.4. Fluctuations in export earnings will result in fluctuations in domestic incomes and income tax, property tax and non tax revenue (other receipts) will be affected. Fluctuations in domestic income will affect the demand for

TABLE 4.4

THE CENTRAL GOVERNMENT REVENUES, SHOWN BY SUB CATEGORIES FOR THE PERIOD 1956-78

(£S 000,000)

Year	Income Tax	Import Duties	Export Duties	Other Indirect Tax and Sugar Monopoly	Income from Property	Other Receipts	Total Govt Revenue
1956	2.09	7.77	4.89	6.19	5.77	7.49	34.2
1957	2.03	7.35	5.30	6.65	6.48	7.63	35.44
1958	1.39	8.90	9.40	4.70	10.10	8.45	42.94
1959	1.93	13.09	6.00	6.64	1.86	12.46	41.98
1960	1.88	20.14	9.23	10.21	7.88	18.13	67.47
1961	1.59	19.54	8.95	9.91	7.98	16.10	64.07
1962	1.76	17.80	4.27	10.7	6.47	16.02	57.02
1963	2.22	27.79	4.66	6.05	6.85	32.87	60.34
1964	3.44	35.11	4.27	6.96	8.12	20.74	74.18
1965	3.85	25.91	2.85	7.42	3.43	30.24	78.05
1966	4.33	27.16	3.53	9.32	0.79	30.07	73.85
1967	3.69	26.19	3.80	13.30	1.00	37.97	78.54
1968	4.00	28.50	3.50	15.46	3.59	36.82	91.87
1969	5.80	30.20	5.80	32.1	5.00	21.1	100.00
1970	13.10	43.10	6.20	38.1	28.30	20.4	149.20
1971	16.1	51.4	8.10	45.0	24.4	19.4	164.40
1972	18.8	52.7	7.80	45.4	12.6	26.1	163.40
1973	20.3	45.8	8.60	43.5	9.7	48.3	176.20
1974	21.6	52.6	9.70	57.7	12.3	55.6	209.50
1975	30.9	88.9	10.80	45.5	26.8	84.9	287.80
1976	32.2	110.7	12.10	70.80	11.9	49.3	187.00
1977	41.7	109.8	12.60	97.50	20.5	106.3	388.40
1978	48.2	150.1	13.30	150.1	33.90	120.9	516.50

SOURCE: UN National Accounts Statistics - Sudan Economic Surveys.

domestically produced and imported goods. So sales taxes (i.e. other indirect taxes), profits from imported sugar, and import duties collected, will fluctuate. Fluctuations in cotton proceeds, a principal export, will affect both the government's returns as a partner and its profit from cotton marketing.

To see how the government revenue, and the revenue sub-categories have been affected by export fluctuations, the percentage trend deviation of each of these revenue sub-categories along with the total government revenue were regressed on the percentage trend deviations of exports for a period of 23 years covering 1956 to 1978. Data used are presented in Table 4.5. The results[1] obtained are:

$$\Delta IT_t = 19.02 + 8.28\ \Delta X_t \qquad R^2 = .81$$
$$t(9.356)$$

$$\Delta MD_t = 12.53 + 2.95\ \Delta X_t \qquad R^2 = .77$$
$$t(8.31)$$

$$\Delta ED_t = -15.27 + 1.66\ \Delta X_t \qquad R^2 = .46$$
$$t(4.178)$$

$$\Delta OT_t = 13.52 + 5.67\ \Delta X_t \qquad R^2 = .68$$
$$t(6.642)$$

$$\Delta PT_t = -110.37 + 7.64\ \Delta X_t \qquad R^2 = .24$$
$$t(2.575)$$

$$\Delta OR_t = -2.56 + 2.41\ \Delta X_t \qquad R^2 = .51$$
$$t(4.648)$$

$$\Delta GR_t = 6.76 + 2.95\ \Delta X_t \qquad R^2 = .88$$
$$t(12.3027)$$

[1] The approach used was exploratory and not a rigorous one, and therefore the results obtained are tentative and interpreted with due caution.

TABLE 4.5

THE PERCENTAGE TREND DEVIATIONS OF EXPORTS, GOVERNMENT REVENUE, REVENUE SUB CATEGORIES, GOVERNMENT EXPENDITURE, IMPORTS AND FIXED CAPITAL FORMATION (1956-1978)

Year	Exports	Goverment Revenue	Income Tax	Import Duties	Export Duties	Other Taxes	Property Taxes	Other Receipts	Government Expenditure	Imports	Fixed Capital Formation
1956	47.07	182.28	471	212	13	355	72	145	96.70	121.77	218.87
1957	35.70	135.92	388	153	15	275	62	98	74.06	92.34	163.58
1958	28.64	93.76	391	91	49	258	67	55	50.32	74.48	107.07
1959	16.17	56.91	215	58	16	149	-123	41	27.10	44.49	74.78
1960	7.47	50.35	122	49	42	91	36	40	5.12	23.15	39.78
1961	-3.66	23.66	11	23	38	45	27	10	-2.99	0.16	21.04
1962	-15.51	-12.80	-83	-11	-37	13	-3	-13	10.25	-2.66	17.21
1963	-16.18	-7.11	-127	12	-32	-123	-11	34	4.79	-7.02	13.48
1964	.50	-20.98	-99	17	-50	-154	-4	-22	-5.42	-1.57	9.92
1965	-12.40	-50.00	-125	-31	-134	-194	-171	5	-35.24	-12.94	-16.16
1966	-26.73	-67.50	-142	-43	-96	-179	-1182	-7	-40.89	-44.71	-76.23
1967	-25.39	-64.48	-233	-66	-89	-127	-999	5	-39.32	-45.31	-44.44
1968	-27.19	-70.65	-253	-69	-113	-122	-230	-7	-42.84	-53.71	-63.51
1969	-21.95	-72.19	-175	-75	-33	-20	-154	-104	-61.00	-46.60	-79.34
1970	-17.85	-25.74	-35	-34	-39	-12	52	-129	-3.20	-78.97	-82.72
1971	-14.02	-23.49	-22	-22	-2	-4	41	-159	-14.78	-49.98	-105.72
1972	-22.33	-33.67	-14	-28	-10	-13	-21	-106	-15.61	-58.61	-123.57
1973	-2.58	-32.71	-14	-57	-3	-27	-66	-19	-32.46	-74.16	-35.54
1974	2.75	-18.97	-16	-46	6	-3	-38	-10	-29.80	-42.46	-32.49
1975	-0.20	8.04	13	8	13	-40	34	24	4.86	26.59	7.90
1976	14.24	15.65	11	22	20	4	-57	-38	12.83	22.55	42.21
1977	19.90	23.93	27	17	22	26	4	33	21.01	25.34	29.35
1978	12.23	32.07	33	36	24	49	40	38	29.10	32.57	28.05

NOTE: Deviations are from linear trends.

SOURCES: Exports, Imports and Fixed Capital Formation, IMF, Financial Statistics - National Accounts - 1982 issue.
Government Revenue, Revenue Sub Categories, and Government Expenditure. UN. National Account Statistic and Sudan Economic Surveys.

where, prefix notation Δ stands for percentage trend deviation of variable, an

IT_t = income tax, MD_t = import duties, ED_t = export duties

OT_t = other tax and sugar monopoly, PT_t = property tax

OR_t = other receipts and GR_t = government revenue, and

X_t = exports.

The short term oscillations of government revenue and the revenue sub categories seem to be highly correlated with exports fluctuations. The correlation coefficient in most of the equations is very high implying that all sub categories participated in the transmission of export instability to government revenue.

The impact of fluctuations in government revenues on the domestic economy depends on the expenditure response of the government. The greatest transfer of year-to-year export instability would occur where government expenditure increased and decreased in close sympathy with fluctuations in revenues. The least transfer would occur where the government followed a positive policy of budget surpluses in good years of revenue, and deficit, in bad years.

Government expenditure in Sudan for the period (1956-78) does appear to have moved in sympathy with government revenue. From Table 4.5 it is clear that the percentage trend deviation of government expenditure and government revenue moved in the same direction on 20 occasions out of 23. The correlation coefficient between them was .96.

This means that according to our tentative procedures and analysis government spending was procyclical rather than countercyclical. When the percentage trend deviation of government expenditure (ΔGE_t) was

regressed on those of the exports, the result obtained was

$$\Delta GE_t = 1.36 + 1.65\ \Delta X_t \qquad R^2 = .79$$
$$t\ (7.9)$$

This suggests that one of the channels which export instability has taken to the internal economy was through its effect on government revenue, and hence government expenditure.

4.3.4 Export Instability and Imports

In the Sudan a chronic balance of payments deficit has persisted since 1956. So a reduction in export earnings has had to be compensated by similar cuts in imports. In addition to restrictions which the government must introduce in export downturns, the reduction in export producers' incomes can reduce their demand for imports.

When percentage movements in exports and imports around the trend are compared (Table 4.5), it is only in four years (out of 23) that the direction of change was not the same for both. When a lag of one year was allowed, only in three cases (out of 23) were the movements in opposite directions, which implies that exports and imports tend to move in the same direction.

In regressing imports percentage trend deviations (ΔM) on those of exports (ΔX), the following results emerged:

$$\Delta M_t = -1.27 + 2.31\ \Delta X_t \qquad R^2 = .80$$
$$(9.612)$$

$$\Delta M_t = -5.82 + 2.08\ \Delta X_{t-1} \qquad R^2 = .86$$
$$(11.3578)$$

The results suggest a highly significant relation between exports fluctuations and import fluctuations. However imports did not seem to have dampened the response of national income to export changes. One explanation could lie in the low marginal propensity to import (found to be .14) which will not greatly reduce the multiplier effects of the initial changes in exporter incomes.

If the fluctuations of imports force temporary cuts in capital goods imports, a decline in export proceeds may in this way frustrate investment. The relationship between export oscillations and those of fixed capital formation was explored by means of regressing the percentage trend deviation of the latter (ΔI_t) on the former. The results were:

$$\Delta I_t = 6.73 + 3.65\ \Delta X_t \qquad R^2 = .83$$
$$(10.1256)$$

$$\Delta I_t = -1.65 + 2.94\ \Delta X_{t-1} \qquad R^2 = .77$$
$$(8.3847)$$

The results are very significant. However, they were obtained only by means of simple regression analysis. We are only looking at relative movements of the two variable rather than trying to set an investment function. Investment seems to have been another channel transmitting export fluctuations to the internal economy.

4.4 Export Instability and Economic Growth

In previous sections, preliminary evidence was presented which showed that export fluctuations have caused larger fluctuations in both government revenue (and expenditures), and investment. By themselves these findings do n

necessarily mean that export fluctuations have harmed the economy. This question is examined in this section. Specifically the relationship between export fluctuations and economic rate of growth is explored.

Production theory states that, output (Y) is a function of labour (L) and capital (K). Technology is also important. An increase in output (economic growth) can be achieved by increasing labor, capital and technology.

However, labour generally is in abundant supply in LDCs and development theory mostly has concentrated on the role of investment and technology in causing growth. The relationship of investment and export instability is considered in the next section.

4.4.1 Export Instability and Investments

In the Sudan the industrial sector is as yet minute and elementary, and manufactured goods and capital equipment must be imported from abroad and paid for mainly by exports. We saw in the last section that import fluctuations were significantly linked with export fluctuations. Import fluctuations can lead to a discontinuous flow of intermediate and capital goods which are essential to the implementation of development plans in the country. The bottlenecks on the availability of capital goods, will be reflected in a "stop" and "go" approach to executing investment projects. This will in turn introduce costly delays and inefficiencies, that in the long run reduce the rate of return and impede new investments. If this is the situation then one would expect that:

Export Instability ——> Import Instability ——> discontinuous imports of capital goods ——> Low investments ——>low rate of economic

growth .... (4.A.).

In an attempt, to relate the investment rate of growth to export instability, MacBean (1966) estimated the following equation:

$$I = f(X_i, FE, MC, MK_1, MK_2) \qquad (4.11)$$

where:

I = rate of growth of fixed capital formation

X_i = export instability

FE = the growth rate of foreign exchange reserves

MC = The growth rate of the total import capacity of exports

MK_1 = The capital goods imports to domestic fixed capital formation ratio

MK_2 = The capital goods imports to total imports ratio.

The inclusion of MC as an independent variable is to capture other variables that could also affect imports. Not all export earnings are used to finance merchandise imports. Some go for repayment of debts, services, etc. On the other hand, other sources of capital (donations, private and official transfers etc.), can be spent in purchasing imports. So MC, in addition to exports will include items such as net services, private and official donations, long term official capital, etc.

FE, which is the growth rate of foreign exchange reserves should be included because a country may release some of its foreign capital stock in an export downturn to maintain a constant flow of imports. On the other hand, some of the foreign reserves could be deposited, in years

of good export receipts.

X_i, which measures export instability, is the variable of interest in the equation. Export instability was argued to make the imported intermediate and capital goods unavailable at crucial moments in the implementation of development plans. This means export instability (X_i) acts on gross fixed capital formation (I) through its influence on capital goods availability (MK_1 and for MK_2). This leads Lim (1976, p. 315) to argue that X_i, and MK_1 or MK_2 must not appear as independent variables in the same estimating equation

$$\text{and } I = f(MK, MC \quad FE) \qquad 4.12$$

Moreover MK (i.e. capital goods) from the argument of (4.11) above should be presented as

$$MK = f(X_i) \qquad 4.13$$

It follows that equation (4.12) will be

$$I = f(X_i, MC, FE) \qquad 4.14$$

The respective values of the variables in equation 4.14 for Sudan for the period 1956-78 are calculated as follows.

Due to the lack of appropriate capital formation deflators and the incomplete series of wholesale price indexes (which could have been the second best deflator of capital formation), the gross fixed capital formation statistic was deflated by a consumer price index, and the annual increase or decrease of the real figures were taken as the dependent variable.

TABLE 4.6

VARIABLES FOR STATISTICAL ANALYSIS OF THE RELATIONSHIP OF EXPORT FLUCTUATIONS TO FIXED CAPITAL FORMATION IN SUDAN (1956-1978)

Year	I	X_i	MC	FE
1958	0.0898	-0.1417	0.1616	0.2744
1959	0.5908	-0.3625	-0.4133	-0.5022
1960	-0.0912	-0.1518	0.9233	-0.2631
1961	0.0812	0.0937	-0.0304	0.0834
1962	0.2682	-0.0614	-0.0587	0.0550
1963	0.1513	0.2691	0.1039	0.3084
1964	0.1137	0.2336	-0.0659	0.2876
1965	-0.0673	-0.1211	-0.1385	0.1603
1966	-0.2574	-0.1464	-0.0897	0.0452
1967	0.2373	-0.1578	0.2057	0.0404
1968	0.0899	-0.1837	-0.0192	0.1280
1969	-0.1058	-0.0378	0.1435	0.2369
1970	0.0319	-0.0767	-0.1084	0.4066
1971	-0.0507	0.1371	0.1760	-0.2917
1972	-0.1261	0.1086	0.1299	-0.0860
1973	0.1372	0.0015	-0.0825	-0.4818
1974	0.1679	-0.0021	-0.1114	-1.1804
1975	0.2341	-0.6148	0.1342	0.7160
1976	0.6602	-0.4512	0.3327	0.1511
1977	-0.2599	0.2001	-0.0510	0.0165
1978	-0.1376	0.7819	0.2442	0.1268

NOTES:

I = Rate of growth of real fixed capital formation, (Appendix 4.E).

X_i = Fluctuations in the importing power of exports (the deviations from a linear trend of merchandize exports deflated by following year's import price) (Appendix 4.F).

MC = Rate of growth of import capacity (merchandize exports, net services, private and official donations, and long term capital divided by import price index) (Appendix 4.G).

FE = Annual rate of increase of foreign exchange reserves (Appendix 4.H).

X_i measures the instability of the importing power of exports which is defined as the export proceeds divided by import prices. Again no complete series of import prices were at hand, so we constructed a series of import prices for the Sudan from those of other similar countries. (Import price figures, countries chosen, and assumptions made are presented in Appendix 4.D).

MC was calculated by adding to merchandise exports the net services, private and official transfers, and capital other than reserves. The total figures were then divided by import price, and the annual increases were computed.

The annual changes of foreign exchange reserves, along with the above three variables are presented in Table 4.5. From the figures in the table, the estimation of equation (4.14) yields the following results:

$$I = 0.071 - .3966X_{it} - 0.099\ MC_t + 0.105\ FE_t$$

$$(2.448)^* \quad (0.5075) \quad (.9451)$$

No. of observations 21 (1958-78)[1]

$$R^2 = .37$$
$$\bar{R}^2 = .26$$
$$DW = 2.0269$$

$$F = 2.3088$$

The parenthesized figures are the (t) values of which the asterisked one is significant at 5% level of significance.

1 One observation was missed when export receipts were divided by following year import prices. The second was omitted when computing the growth rate of importing power of export (See Appendix 4.G).

The DWS indicates that there is no positive serial correlation. The F test is not significant. The overall relationship explains 37% of the variation in fixed capital formation growth rate in the Sudan.

The results must be treated with a high degree of caution not only because of the insignificance of the F statistic and the relatively low R^2, but also because X_1 measures instability as well as deviations from trend in earnings. However, the sign of X_i was as expected, and the t test was significant. This provides some evidence that export instability in Sudan has adversely affected the rate of growth of capital formation, for the period 1956-78.

4.4.2 Export Instability and Rate of Growth of GDP

The argument presented in (4.A) was that export instability can affect economic growth through its effects on the availability of capital goods. To test this version of the argument, Voivodas (1972), pointed out that the non availability of capital goods should not be limited only to export fluctuations. Fluctuations in the foreign capital inflow, which is an alternative source of foreign exchange, will have an identical effect to those of export fluctuations. Voivodas started his analysis with a Harrod-Domar model as follows:

$$dQ_t/Q_t = 1/g\ (I_t/Q_t) \qquad 4.15$$

where dQ = rate of growth of GDP, g the incremental capital-output ratio, and I_t/Q_t is the domestic investment expenditure to GDP. I_t/Q_t was made to be positively related with capital goods imports to GDP (MK_t/Q_t), and negatively, with its variance, which is used as a proxy for export

instability

$$I_t/Q_t = b_1 (MK_t/Q_t) - C (\text{Var } MK_t/Q_t). \qquad 4.16$$

MK_t/Q_t, was further assumed to be a positive function of exports to GDP ratio (X_t/Q_t), and foreign capital inflow to GDP ratio (F_t/Q_t).

$$MK_t/Q_t = b_2 (X_t/Q_t) + b_2 (F_t/Q_t) \qquad 4.17$$

The variance of MK_t divided by Q_t, was then given by the variance formula as follows:

$$(\text{Var } MK_t/Q_t) = b_2^2(\text{Var } X_t/Q_t) + b_3^2(\text{Var } F_t/Q_t)$$

$$+ 2b_2b_3 (\text{Cov}[X_t,F_t]/Q_t) \qquad 4.18$$

Substituting equation 4.18 for $(\text{Var } MK_t/Q_t)$ and equation 4.17 for (MK_t/Q_t) both in equation 4.16 will yield the following equation:

$$I_t/Q_t = b_2(X_t/Q_t) + b_3 (F_t/Q_t) - cb_2^2(\text{Var } X_t/Q_t)$$

$$-cb_3^2(\text{Var } F_t/Q_t) - 2b_2b_3 C(\text{Cov}[X_t,F_t]/Q_t) \qquad 4.19$$

By substitution of equation 4.19 for (I_t/Q_t) in equation 4.15 equation 4.20 will be obtained:

$$\frac{dQ}{Q_t} = (b_1b_2/g)(X_t/Q_t)+(b_1b_3/g)(F_t/Q_t)$$

$$- (cb_2^2/g)(\text{Var } X_t/Q_t) - (cb_3^2/g)\ (\text{Var } F_t/Q_t)$$

$$- (2b_2b_3c/g)(\text{cov}[X_t,F_t]/Q_t) \qquad 4.20$$

The estimating equation of 4.20, was derived quite systematically as shown above. However Lim (1976, p. 318) pointed out that this derivation is not consistent with the hypothesis that Viovodas was intending to verify. The argument presented in 4.A above, sees export instability as being the cause of capital goods imports (MK) instability. The MK instability will hinder investment in LDCs because it will result in a discontinuity of investment programmes, which depend heavily on the MK. In view of this argument, Lim (1976), altered equation 4.16 to be

$$I_t/Q_t = b_1(MK_t/Q_t) \qquad 4.16a$$

and equation 4.17 to become

$$MK_t/Q_t = b_2(X_t/Q_t) - C_1(\text{Var } X_t/Q_t) + b_3(F_t/Q_t) - C_2(\text{Var } F_t/Q_t) \qquad 4.17a$$

The substitution of equations 4.16a and 4.17a in equation 4.15 will produce the following estimating equation:

$$\frac{dQ_t}{Q_t} = (b_1b_2/g)(X_t/Q_t) + (b_1b_3/g)(F_t/Q_t)$$

$$-(b_1c_1/g)(\text{Var } X_t/Q_t) - (b_1c_1/g)(\text{Var } F_t/Q_t) \qquad 4.20a$$

Equation 4.20a differs from equation 4.20 in not having the covariance term as an independent variable. This difference is an important one, because the intention is to find the separate influences

TABLE 4.7

VARIABLES FOR STATISTICAL ANALYSIS OF THE RELATIONSHIP OF EXPORT, CAPITAL INFLOW AND THEIR FLUCTUATIONS TO THE GROWTH OF GDP IN THE SUDAN (1956-1978)

Year	$dQt/_{Qt}$	$X_t/_{Qt}$	$Xit/_{Qt}$	$Ft/_{Qt}$	$Fit/_{Qt}$
1957	-0.0093	0.001918	0.000397	0.000572	0.000485
1958	0.0174	0.001391	-0.000149	0.000342	0.000218
1959	0.0303	0.001168	-0.000370	-0.000461	-0.000613
1960	0.0001	0.001735	0.000155	0.000120	-0.000303
1961	0.0499	0.001637	0.000091	0.000380	0.000175
1962	0.0690	0.001429	-0.000056	0.000319	0.001100
1963	0.0370	0.001705	0.000236	0.000470	0.000271
1964	-0.0218	0.001749	0.000209	0.000631	0.000359
1965	0.0553	0.001392	-0.000103	0.000269	-0.000015
1966	0.0245	0.001372	-0.000121	0.000353	0.000050
1967	-0.0992	0.001552	-0.000145	0.000349	-0.000016
1968	0.1981	0.001308	-0.000141	0.000334	0.000007
1969	-0.0344	0.001503	-0.000030	0.000182	-0.000182
1970	0.1579	0.001304	-0.000053	0.000213	-0.000122
1971	0.0694	0.001381	0.000088	0.000205	-0.000129
1972	-0.0364	0.001443	0.000072	0.000229	-0.000138
1973	-0.0657	0.001498	0.000001	-0.000130	-0.000545
1974	0.1020	0.001384	-0.000001	0.000849	0.000453
1975	-0.0216	0.001037	-0.000407	0.001150	0.000725
1976	0.2027	0.000975	-0.000248	0.000391	0.000020
1977	0.0848	0.001251	0.000102	0.000153	-0.000204
1978	0.0278	0.001525	0.000386	0.000214	-0.000150

NOTES:

$dQt/_{Qt}$ = The annual rate of growth of Real GDP (Appendix 4.I).

$Xt/_{Qt}$ = Importing power of exports (export receipts divided by following year's import price) divided by Real GDP Statistics (Appendix 4.F)

$Xit/_{Qt}$ = Deviations of importing power of exports from its linear trend divided by Real GDP (Appendix 4.F).

$F_{t/Qt}$ = Importing power of foreign capital inflow (Current account deficits, divided by current import prices) divided by Real GDP (Appendix 4.J).

$F_{it/Qt}$ = Deviations of importing power of capital inflow from its linear trend divided by Real GDP (Appendix 4.J).

of export instability and foreign capital instability (obtained by their respective variances), and not their joint instability which is represented by their covariance term. Further the covariance term will capture some of the effects, which should be attributed to the two instability terms (Lim, 1976, p. 319).

Equation 4.20a was estimated for the Sudan for the period 1956-78, and the respective values of each variable are shown in Table 4.6.

The $\frac{dQ}{Q}_t$ was obtained from the annual difference in real GDP divided by the real GDP of that year.

Export receipts (X_t) and foreign capital inflow (defined as the Current account deficits) were deflated by import prices to denote their purchasing powers, and then divided by real Q_t to obtain X_t/Q_t and F_t/Q_t. The yearly deviations of X_t and F_t from their linear trend values were taken to denote the instability indexes of X_t and F_t, and these were further divided by real Q_t to produce (var X_t/Q_t) and (var F_t/Q_t).

The results of the analysis for the period under study are:

$$\frac{dQ}{Q}_t = .548 \quad - 345.69 \quad X_t/Q_t \quad + 235.875 \; X_{it}/Q_t$$

$$(3.3802) \quad (3.1659) \qquad (2.0021)$$

$$-48.27 \; F_t/Q_t + 60.015 \; F_{it}/Q_t$$

$$(0.6541) \qquad (1.006)$$

$$R^2 = .39$$

$$\bar{R}^2 = .25$$

$$F = 2.7569$$

$$DW = 2.646$$

These results are very odd ones. Both exports and capital inflow have negative signs, while their instabilities have positive ones. Such results are difficult to explain since they suggest that exports and capital inflow will negatively contribute to the rate of economic growth. So we lagged the independent variables for a year, to allow some time for the effects of export instability to befelt within the economy. The results obtained are shown below:

$$\frac{dQt}{Qt} = -.2955 + \underset{(1.447)}{205.280}\ \frac{X_{t-1}}{Q_{t-1}} - \underset{(1.8979)*}{276.0151}\ \frac{X_{t-1}}{Q_{t-1}}$$

$$+ \underset{(1.4916)}{117.2897}\ \frac{F_{t-1}}{Q_{t-1}} - \underset{(.6906)}{46.2684}\ \frac{F_{it-1}}{Q_{t-1}}$$

No. of observations = 22 (1957-78)[1]

$R^2 = .24$

$\bar{R}^2 = .06$

$F = 1.306$

$DW = 2.598$

All the independent variables have the expected signs. The DW showed no positive serial correlation. The F test is not significant and the overall relationship explains only 6% of the variation in the rate of growth of GDP in Sudan. However, though the estimated equation showed poor results, the coefficient of X_{it-1} indicates a negative and significant (at 5% level) relation between GDP growth rates and export instability in the Sudan.

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1 The missing observation was due to dividing export receipts by the following year import prices.

When we omit the variables relating to foreign capital inflow, the results were:

$$\frac{dQ}{Q_t} = .5067 - 325.10\ \frac{X_t}{Q_t} + 219.238\ \frac{X_{it}}{Q_t} \qquad R^2 = .36$$

$$t(3.34) \quad t(3.109) \quad t(1.928) \qquad \bar{R}^2 = .29$$

$$\frac{dQ_t}{Q_t} = -.2247 + 181.878\ \frac{X_{t-1}}{Q_{t-1}} - 181.6629\ \frac{X_{it-1}}{Q_{t-1}} \qquad R^2 = .20$$

$$\bar{R}^2 = .12$$

The adjusted $\bar{R}^2$ in both cases increased meaning that the inclusion of foreign capital inflow does not improve the explanatory value of the regression.

The negative relation obtained between export instability and the rate of growth of the Sudanese economy tends to support the findings of the previous section. Again with some reservation, we conclude that there is evidence that export fluctuations reduced the rate of growth of GDP in Sudan for the period 1956-1978.

4.5 Conclusion

The major conclusions of this chapter are:

1. There was a consistent relationship between export instability and GNP instability, suggesting that export fluctuations were transmitted to the internal economy.
2. The value of the foreign trade multiplier was greater than one, meaning that export instability had a more than proportional effect on internal economy.

3. Government revenue and expenditure, imports and capital formation fluctuated in the same manner as exports. This caused fluctuations in national income. This was offset partly by similar fluctuations in imports, but this effect was not large because of the law marginal propensity to import (MPM).

4. In an attempt to determine whether export instability was harmful to the growth of the economy, the rate of growth of both capital formation and GDP were regressed on export instability. Though the overall explanatory powers of the equations were not high, the coefficients of export instability were negative and significant. This led us to conclude with some caution that export instability reduced both the growth rate of capital formation and the economic growth rate of the Sudan.

The analysis in sections 4.3.1 to 4.4.2 is exploratory for various reasons mentioned. Hence, the results should be regarded as being tentative and indicative of the relationship rather than conclusions.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY OBSERVATIONS

5.1 Introduction

In this sub-thesis the problems posed by export instability have been considered. Most of the theoretical literature favoured the argument that export instability could have an adverse effect on the rate of economic growth, although there was some support for the hypothesis that instability could in fact stimulate growth. The empirical evidence of other studies did not settle the debate. Support for both hypotheses was found.

An attempt was made to determine the causes of this divergence in empirical results. In doing this it was concluded that cross-sectional studies covering a large number of very different countries were unlikely to produce reliable results. A single country approach was preferable.

This approach was applied to the Sudan. However some qualifications must be made about the data that were used. For example in estimating the causes of instability data problems meant that two time periods had to be estimated separately. This reduced the degrees of freedom for each equation, and it obviously would have been preferable to estimate one equation for the whole period. Moreover, reliable deflators could not be found. This had two effects. Firstly, current values had to be used when assuming the impact of export instability on fluctuations in other economic variables. Secondly, an estimation of the real purchasing power of export earnings had to be constructed from data available in similar

countries to Sudan, when examining the impact of fluctuations on real growth. These and similar problems mean that the results should be considered carefully before policy is examined. It also meant that more sophisticated methods of analysis were inappropriate. The analysis that was used sought only to identify major trends rather than to put exact numerical values on them.

Given these qualifications the data suggested that the Sudan faced a relatively high degree of export instability in the 60's and 70's. Moreover the evidence suggested that this instability was transmitted to the economy as a whole and adversely affect the rate of economic growth.

If this is accepted, it remains to determine the policy options available to Sudan to overcome these problems. These policies are briefly introduced in the next section and criteria for judging whether they should be applied are discussed. Then sections 5.3 and 5.4 deal with the policy options the Sudan government can adopt unilaterally, and with the assistance of international organizations respectively. The final section will be a brief summary of the major conclusions of the sub-thesis.

4.2 Criteria for Judging the Stabilization Policies

The Sudan could reduce the harmful effects of export instability in two ways. It could use 'cushioning' or 'stabilization' policies. The objective of the former is to reduce the undesirable impact of instability, while the latter aims to reduce export instability (Coppock, 1977). It must be remembered that stabilization means reducing the short term fluctuations around a long term trend. It does not necessarily mean fixing them at a given level (Suliman, 1965).

Before these policies are applied, a government must ensure that the instability is of sufficient importance to warrant this action. There is no exact formula to determine this. However the government can be guided by the country's past experience and/or the experience of other countries, to have an idea about how much export instability the country's economy can bear, and to determine the country's warning level of export instability (Coppock, 1977)

In making this decision Coppock (1966, 1977), argues that the following points should be considered:

1. The policy should be reasonably effective in relieving or reducing undesirable export instability and/or cushioning the domestic economy against the negative effects of this instability.
2. The policy should be administratively feasible at reasonable costs. For example direct control measures against instability (taxes, subsidies, quantitative control, price control) are technically difficult to administer, and need well-trained experienced and devoted bureaucracies for implementation. These are lacked by many LDCs.
3. The financial requirements of the policy, aside from its administrative costs, should not be too high.
4. The policy should not be likely to hamper economic development. For example, if the government applies an export-quota and starts purchasing and accumulating above-quota surpluses, then there would be an investment in stocks of commodities, which in addition to being unproductive, may in later years have to be destroyed or dumped at prices far below the purchase price. Such a policy would continue to promote, or at least not discourage investment in primary-product industry and delay the movement of resources out of the industry (Mikesell, 1963, p. 80).
5. The policy should not be likely to produce undesirable side effects. For example the promotion or curtailment of exports (through taxes, subsidies, quantitative controls, etc.) must take into account the possibility of retaliation by foreign government.

These points imply that some form of cost/benefit analysis of government intervention should be undertaken. It is by no means clear that the benefits to the economy of reducing export fluctuations would be greater than the costs of many of the more commonly proposed methods of stabilization.

However numerical estimates of such costs and benefits are beyond the scope of this study. In the next two sections, some of the policies which might reduce the negative impact of export instability on Sudan are considered. However, it is assumed that they would not be introduced until a thorough study of the costs and benefits had been completed.

5.3 National Policies in Sudan

In this section both stabilization and cushioning policies which Sudan could pursue by itself will be considered. In the discussion we will briefly introduce the theory of each policy, and then see the possibility of its implementation in the Sudan.

5.3.1 Policies for Reducing Export Instability

Under this category the reduction in export instability can be attained through quantitative controls, foreign exchange controls and export taxes and subsidies.

Quantitative control can be a direct measure of reducing instability. The government can curtail exports by applying restrictive quantitative controls (export-quota), and can expand them by relaxing these measures. The direct control measures have some disadvantages. They are likely to reduce gains from trade, and there is a chance of retaliation by other governments.

In an exchange-control system the government can reduce exports by decreasing the amount of foreign exchange that exporters are permitted to retain. On the other hand, it can promote exports by increasing the

amount of foreign exchange that exporters are permitted to keep (Coppock, 1977, p. 137).

With respect to export taxes, a tax system that subsidized or penalized exports as they deviated from a planned expansion path can help in achieving stabilization. Export tax will be levied immediately at the very source of the cycle; thus it has the merit of tapping income fluctuations as they arise. Further it is easy to administer. The problem with export tax in Sudan is its low rates (3-5 percent ad valorem). If the export tax is to be effective as stabilization means it has to be progressive and high. However high export rates may discourage production for exports.

5.3.2 Cushioning Policies

The argument presented in the first chapter showed that, an upswing of export earnings will increase the producer's income. Through the multiplier effect, this may lead to an increase in aggregate demand. When aggregate demand exceeds aggregate supply, prices will rise, and further instabilities can be generated within the economy. Through both the monetary and fiscal policies the government can cushion the economy from export change repercussions. Let us discuss each in turn.

5.3.2.1 Monetary Policy

Monetary policy can serve as a device of combating the expansionary and contractionary effects of export instability through its influence on private saving and investments. In times of export shortfalling, the central bank can buy security bonds, lower the interest rate, and expand the availability of credits to encourage investment and/or reduce

savings. This increases the injections into, and reduces the withdrawals from the circular flow of the national income. Selling of security bonds, increasing interest rates, and reducing the available credits are the devices to be used in the face of export booms.

As it is the case with most LDCs, the monetary policy may be of limited scope as a stabilization tool in Sudan. Instruments of monetary policy, such as open market operations and changes in reserve requirements play a very limited role in the country. However credit directives, its expansion (contraction) with export downs (ups) will be a more suitable device, and easy to administer, given the shortage of administrative talents (Lees, 1977, p. 98).

5.3.2.2 Fiscal Policy

On the fiscal side, the government can cut overall demand by increasing revenue taxes and/or decreasing its own expenditure. On the other hand, in an export trough where there is a tendency for aggregate demand to decline, the government has to decrease its own revenue, and increase its own expenditure to avoid slumps in the national income. In most LDCs however, changes in government revenue and/or its expenditure is subject to many practical obstacles (legislative, political, administrative, statistical).

Fiscal policy as a stabilizing device in Sudan can work through both the revenue and the expenditure sides. However a fundamental problem of taxation in Sudan, that renders it ineffective as stabilization tool, is its heavy reliance on income-inelastic commodity taxation. A tax system

that would be sensitive to upward and downward changes in national income, would be the one with returns which are elastic with respect to changes in national income. This is generally supposed to be achieved through high income taxes on corporations and individuals. In the case of other indirect taxes, the emphasis should be placed on taxing the goods with high income elasticity of demand (see MacBean, 1966, p. 237-247).

To improve the stabilizing power of tax structure in the country the following actions would be necessary:

1. Improvement of income tax which could be achieved through a reduction of exemption limits, an increase of tax rates, or widening the tax base.
2. Introduction of new direct taxes, that grow more than proportional with national income such as wealth tax and capital gains taxes.
3. To deal directly with export instability, export tax has to be high and progressive.
4. The tax administrative machinery in the country needs to be improved considerably (Lees, 1977).

Obviously these measures would have significant costs which would have to be evaluated properly.

With respect to expenditure policy, public expenditure should not follow the current level of revenue. It has to be planned with an average revenue level, so the government will make surpluses in good revenue years that will be spent in years of revenue falls.

Thus fiscal policy would appear to have the best chance of successfully reducing the impact of export fluctuations in Sudan. Specifically, export taxes and countercyclical government expenditure patterns should be evaluated.

Other cushioning devices that do not deal directly with aggregate demand regulations are marketing boards and stabilization funds.

Marketing boards smooth the prices and incomes of producers. They achieve this goal by acting as monopolies which buy all the output of the producers at prices fixed by the board and sell the product for what it will fetch in the world market. In good years of high world prices, the board can make a "profit" that forms a reserve fund. The fund can be used as price supplement when prices fall beyond an agreed level. It also can retain quantities in periods of low price to sell in periods of high price. The stabilization funds achieve similar goals by fixing a minimum producer prices by Law. It should also be pointed out that any marketing board set up to successively undertake the abovementioned activities would first require a group of highly talented personnel from various fields on its staff.

Before suggesting any of these cushioning and stabilizing policies (aside from fiscal policy recommended earlier) let us recall some of the results obtained in Chapter Three. Our analysis there revealed that fluctuations in export proceeds were caused mainly by fluctuations in quantities supplied, which in turn was caused by yield variability. So in dealing with export receipts fluctuations, a thorough examination of causes of yield fluctuations of each commodity and actions towards their stabilization can reduce instability a great deal. Pests and weeds control, credit availability, extention services, agricultural research, the

development of subsistence agriculture, and most important the improvement of infra-structure particularly transportation will greatly help in this area. In addition, improvements in these respects is also likely to increase employment, rural development and economic growth generally

Another important finding in Section 3.7.2 which will help us to select the appropriate crop for stabilization is that fluctuations in export earnings of each commodity was found to be above that of total exports. This suggests that the random movements in various commodity receipts were offsetting, leading to some stabilizing impact in total earnings. So in an attempt to stabilize the proceeds of a commodity (through marketing board, stabilization funds, quantitative controls, etc.) the government has to be very careful in selecting that commodity and should make sure that its stabilization will not destabilize the total export earnings.

To check on which commodity by its stabilization, can lessen the overall export instability, the procedure which was used by Stein (1979, p. 197) was adopted.

The trend values of each export commodity were substituted for their actual values and the total export instability was then recalculated. The objective is to determine how total instability would be affected if the government in the Sudan was very successful in stabilizing completely the export proceeds of an individual good. The results obtained are presented in Table 5.1. It is clear that with the exception of cotton in the two periods, and gum in the second period, any attempt for stabilization of one commodity would have increased the overall instability. Stabilization of cotton which could have greatly reduced the instability

TABLE 5.1

HYPOTHETICAL INSTABILITY INDEXES

Period of Study --->	1956-68 Actual Instability Index = 12.42			1969-80 Actual Instability Index = 9.83		
Commodity Stabilized	(X) Hypothetical Instability Index	(Y) Difference from Actual Index	(Z) Percentage of the Difference	(X) Hypothetical Instability Index	(Y) Difference from Actual Index	(Z) Percentage of the Difference
Cotton	4.84	-7.58	-61.03	9.51	-0.32	-3.26
Ground nuts	13.00	+0.58	+4.67	14.49	+4.66	+47.41
Sesame	12.51	+0.09	+0.72	11.20	+1.37	+13.94
Gum Arabic	13.11	+0.69	+5.56	8.36	-1.47	-14.95
Cakes & Meals	12.59	+0.17	+1.37	10.03	+0.20	+2.03
Durra	12.76	+0.34	+2.73	10.19	+0.36	+3.66
Livestocks	13.06	+2.74	+22.06	10.69	+0.86	+8.75
Hides & Skins	13.29	+0.87	+7.00	10.85	+1.02	+10.36

NOTES:

(X): The instability index of total export earning when a particular commodity is stabilized.

(Y): Obtained by substracting the actual instability index from the hypothetical one calculated in (X). A negative value means the overall instability will be lessened and a positive value indicates that it will be increased.

(Z): Obtained by dividing (Y) by the respective actual instability index, to obtain the extent to which instability will be increased or decreased.

SOURCE: Tables 5.A, 5.B in the Appendix.

in the earlier period, would have reduced it very marginally in the second. Gum stabilization, in the second period, would have lessened the overall instability more than stabilization of cotton. Again the reduction is not that great. Thus, it is likely that the costs (e.g. administration, transactions and interests) incurred in some of these policies would have probably outweighed the benefits.

5.4 International Policies

In dealing with international policies we will follow the same pattern as in national policies in considering both stabilization and cushioning policies.

5.4.1 Policies for Reducing Export Instability

The international policies for reducing export instability tend to be direct control measures. The most popular devices used are the bilateral and multi-lateral commodity agreements.

Bilateral agreements are established between two countries, as their name indicates. The two countries will enter into a bilateral agreement which covers specified commodities for specified period of time, with quantities and prices all specified. In some cases, the bilateral agreements cover all or nearly all the trading between the two countries as used widely by Communist countries.

Through bilateralism and the pre-determination of prices, the countries involved in the agreement can protect their economies from the fluctuation of the prices of the commodities included in the agreement. In some cases some of these agreements turn to be just expressions

of intention, while others are binding contracts with bilateral clearing accounts that are supposed to be balanced periodically. So these agreements as Coppock (1966, p.205) mentioned, could be stabilizing or destabilizing depending upon the negotiations, degree of fulfilment and provisions for renewing or revising or cancelling the agreements.

Sudan conducted many bilateral agreements with different countries, especially Egypt, Eastern European Countries, China and the EEC. A trade agreement with China in 1975 had guaranteed a market for Sudan cotton crop which had been hit by lower world market prices in 1974. The country had also made some trade arrangements as a result of signing the Lomé Conventions with the EEC and renewing it in 1979.

The bilateral arrangements permit the trading partners to maintain a domestic price structure that is not totally related to the world trade price structure. This means, when Sudan conducts these agreements it should negotiate to include those commodities where price fluctuation is the major cause of instability i.e. gum and hides and skins. Further the agreement should not include a crop in isolation from others as this may destabilize the export earning as we saw earlier.

5.4.2 Cushioning Policies

In case of a sharp downturn in export receipts, what international measures can be taken to cushion the effects of these declines? The most obvious thing is the international borrowing, by which the governments can maintain a desired level of imports in times of exports slumps. The international borrowing can take a variety of forms, the most popular one dealing with export instability is the compensatory financing. The

compensatory financing may not be as large as some governments would like but it is still sizable and can be expanded.

Coppock (1977, p. 138), mentioned three problems related to this type of international facility:

1. The funds may not be of sufficient amount;
2. They may not be as readily available, on acceptable terms, as the demanders would like; and
3. Although the funds will enable the countries to maintain their imports at the desired levels these funds do nothing directly to encourage the deteriorating export industries. However with all its drawbacks the fund can be a major factor in dealing with export instability.

During export upswings, the countries can pay back what they have previously borrowed or they can deposit some of the money with the IMF for the future outcomes.

The Sudan being a member in IMF, can utilize the funds in stabilization of its export earnings. However the heavy reliance on the IMF can lead to further economic ties and financial dependence of the country.

Other sources of foreign funds that can stabilize export earnings, are the Lome Convention (STABEX)[1] Stabilization System. The aim of the stabex is to provide a remedy for the adverse effects of unstable export receipts and thus help the ACP[2] countries to secure economic stability, profitability and steady growth. (Lomé Convention, 1975). Under the stabex the EEC provides

1 Stabex is the code name given to the system.

2 ACP = African, Caribbeen and Pacific States.

a financial aid for stabilization that will be divided into annual instalments, allowing for a certain degree of flexibility between the various instalments. Sudan and 24 LDCs are exempted from repayments on the transfers they receive.

Being a member of the Arab League, its proximity to oil-rich Arab countries, and being an important supplier of food and other exports to the Arab Nations, Sudan has a further advantage in getting finance from these countries. This has happened over the Seventies through loans and grants offered by these countries, which helped maintain imports in years of poor export receipts. However with the recent fall in oil prices, this may not be an important stabilizing factor in the future.

5.5 Conclusion

The issue of export instability, its causes and supposed effects, have been considered of great importance by many international agencies (IMF, IBRD, UN, etc.) and have dominated the trade and economic development of literature for many years. Traditionally, export instability experienced by LDCs was argued to arise from primary product exports, commodity and geographic concentration. Its effect was believed to be caused by similar disturbances in the economies of these countries, that result in a low rate of the economic growth.

The empirical findings of previous studies showed very divergent and inconclusive results for both causes and effects. Our study adopted the one-country approach to study the problem, and looked at both causes and impacts of instability in Sudan for 1958 to 1980 period.

With regard to the causes, the results suggest that commodity concentration has not been a major cause of instability. There was evidence that geographic concentration may have had a marginal effect on instability. However, the major cause of instability in export receipts seemed to

have been variations in the quantity of exports which in turn was caused by fluctuations in yield.

In analysing the impact of instability on the internal economy, the evidence suggested that export instability had been transmitted to the internal economy. The effect of export instability on the rate of growth of capital formation and the gross domestic product as a whole was found to be negative.

Policies which could ameliorate these impacts were considered. However it has been argued that a thorough study of the costs and benefits of the policies should be undertaken before they are introduced.

APPENDIX 2.A

STATISTICAL MEASURES OF INSTABILITY

We mentioned in chapter two that part of the confusion about both the causes and effects of instability could lie in the different indexes employed by different studies. The indexes used by Massel (1964), Lawson (1974) and Murray (1978) are mentioned below:

Massell (1964) used two measures of instability. The first was the standard error of estimate (square root of the unexplained variance) divided by the mean of the observations.

$$I_i = \sqrt{\frac{\Sigma(u_t)^2}{\quad}}$$

I = instability index

$u_t = X_t-(B_o+B_1 t)$

X_t = Exports in year t

N = number of years

$\bar{X}$ = arithmetic mean = $\frac{\Sigma X_t}{N}$

The second was the average annual percentage rate of change in the value of exports (trend corrected):

$$I_1 = \Sigma W_t/N, \text{ where } W_t = \frac{\left|u_{t+1} \quad u_t\right|}{\text{Max}[X_t, X_{t+1}]}$$

Lawson (1974) also used two measures. The first was the standard deviation of the observed deviations from an exponential time trend,

$$I_1 = \frac{\sqrt{\Sigma(U_t - U)^2}}{N}$$

U_t = observed differences in period t, between observed and the estimated values.

I, N, t = as above.

The second was the normalized standard error of deviations from an estimated linear trend,

$$I_2 = \frac{\frac{1}{N-2}\sqrt{\sum_{t-1}^{N} (X_t - X)^2}}{\bar{X}}$$

X_t = actual values of exports in year t

X = the estimated value of exports

N, $\bar{X}$, t = as above.

Murray (1978) employed 5 different indexes. The first was the Coppock index:

$$CI = [(\text{antilog } \sqrt{\text{vlog}}) - 1] \times 100$$

where $$\text{vlog} = \frac{1}{N-1} \sum_{t=1}^{n-1} (X_t - \bar{X})^2$$

$X_t = \log(X_{t+1}/X_t)$ and

$$\bar{X} = \frac{1}{N-1} \sum_{t=1}^{n-1} X_t$$

$$= \frac{1}{N-1} (\log X_n - \log X_1)$$

CI = Coppock Index

All other variables are as above.

The second was the MacBean Index

$$MI = \frac{100}{N-4} \Sigma_{t=3}^{N-2} (1X_t - MA_t 1/MA_t)$$

MI = MacBean Index

MA_t = is a five year moving average of the X_t centred on year t.

X_t = as above.

The third was the normalized standard error used by Massel and Lawson earlier.

The fourth was the deviations of values from the estimates obtained when a constant percentage growth rate is allowed for. The parameters a and b in the equation are obtained by least squares

$$X_t = a\ e^{bt}$$

or $\text{Log } X_t = \log a + bt$

The Index I is given by

$$I_4 = \sqrt{\frac{1}{N} \Sigma_{t=1}^{n} (X_t - ae^{bt})^2 \text{ X } 100/\bar{X}}$$

The variables are as above.

The final was the mean absolute deviation of values from the estimates obtained from a moving five year average of logarithmic values:

$$I_5 = \frac{100}{N-4} \Sigma_{t=3}^{N-2} (1X_t - ML\ A_t 1/MLA_t)$$

MLA_t = the natural value of a five year moving average of the logarithmic trend.

All other variables are as above.

APPENDIX 3.A

QUANTITIES OF SUDANESE EXPORTS BY COMMODITIES (1956-1980)

Year	Cotton	Ground Nuts	Sesame	Gum Arabic	Cakes & Meals	Dura	Live-Stock	Hides & Skins
1956	115	64.10	30.41	48.79	46.56	18.10	208.05	3.76
1957	63	73.15	41.00	42.92	54.36	58.95	193.14	4.37
1958	79	63.88	29.88	48.07	56.44	12.27	129.50	3.49
1959	180	64.56	44.73	42.58	73.13	73.06	148.14	4.66
1960	106	67.34	76.37	51.81	63.78	170.98	115.32	4.34
1961	106	86.29	62.80	51.24	88.23	93.03	132.78	4.28
1962	160	121.30	77.22	38.75	n.a.	75.52	n.a.	n.a.
1963	180	117.97	69.65	47.12	142.03	73.84	95.21	6.05
1964	115	156.45	101.41	53.64	170.43	61.23	93.28	3.47
1965	117	159.38	70.59	57.60	165.80	111.70	237.15	5.47
1966	143	107.94	n.a.	54.75	180.23	78.65	180.48	5.89
1967	172	108.86	75.50	51.73	172.63	.59	228.78	4.24
1968	184	88.26	84.72	50.74	222.26	54.84	226.24	5.01
1969	954	82.14	112.60	49.04	185.83	1.78	237.91	15.70
1970	1300	65.89	83.75	61.45	250.43	0	188.37	5.76
1971	1473	115.06	84.44	41.97	178.59	32.43	149.70	8.83
1972	1292	116.82	83.13	39.24	169.12	55.28	153.79	5.70
1973	1219	138.43	101.86	33.94	169.83	93.95	229.10	8.16
1974	417	99.05	83.51	20.79	57.74	89.22	253.79	5.28
1975	783	204.96	56.62	15.64	161.78	45.08	72.60	6.04
1976	969	282.80	88.76	26.17	179.69	74.45	44.77	6.03
1977	1008	143.27	92.99	33.31	151.62	103.83	169.93	8.02
1978	752	97.21	75.96	38.76	160.66	46.92	278.11	4.86
1979	999	37.42	16.02	44.15	147.34	172.02	193.40	3.31
1980	617	22.09	57.19	26.23	177.68	286.25	361.87	4.28

NOTES:

- Quantities are in thousands of metric tons
- Cotton (1956-1968) in tons - and from (1969-1980) in bales
- Live stocks, thousands of heads
- n.a. = not available

SOURCES: UN - Yearbook of International Trade Statistics (1956-68).

Bank of Sudan - Annual Report for Years (1969-80)

APPENDIX 3.B

UNIT VALUES OF SUDANESE EXPORTS BY COMMODITY (1956-1980)

(EXPRESSED IN SUDANESE POUNDS (LS)

Year	Cotton	Ground Nuts	Sesame	Gum Arabic	Cakes & Meals	Dura	Live-Stocks	Hides & Skins
1956	363	59.13	67.41	109	20.83	19.89	7.31	230
1957	364	64.25	72.93	109	17.11	20.48	10.65	200
1958	282	53.69	37.63	108	18.78	23.64	12.34	200
1959	223	55.45	61.48	120	22.97	27.86	7.36	190
1960	313	56.19	60.10	135	21.79	16.38	12.75	210
1961	294	62.23	66.56	120	21.88	15.99	11.15	210
1962	272	55.07	73.04	118	n.a.	19.59	n.a.	n.a.
1963	253	54.25	69.35	121	24.64	21.13	10.92	210
1964	281	58.68	63.60	127	24.23	25.15	9.33	280
1965	267	53.96	67.29	131	23.88	21.84	8.39	230
1966	243	67.26	n.a.	131	25.30	23.78	9.92	270
1967	238	59.80	86.49	161	23.98	33.90	8.96	340
1968	264	52.12	73.42	155	20.20	19.51	9.28	300
1969	52	72.92	71.23	177	22.49	22.47	9.78	320
1970	49	83.62	77.61	148	22.20	n.a.	12.32	298
1971	47	81.09	94.74	191	24.97	33.61	13.43	220
1972	56	83.12	110.31	231	25.96	30.03	14.24	580
1973	69	93.84	105.14	218	46.52	31.11	14.10	740
1974	103	183.34	197.70	686	38.80	49.32	17.69	720
1975	90	167.74	210.88	483	32.02	49.47	14.19	530
1976	101	137.87	194.80	429	28.33	42.58	13.18	620
1977	129	201.02	196.37	406	51.64	45.94	25.48	540
1978	140	213.25	252.50	382	47.70	56.69	28.77	800
1979	151	266.44	392.01	422	49.34	78.60	35.68	1110
1980	187	267.99	434.78	691	74.46	150.29	45.71	1550

NOTES:

- Unit values are obtained by dividing the value figures in Table 3.1) by the quantity figures in Appendix 3.A.
- Unit values of cotton, are per ton for the period (1956-68) and per bale (1969-1980).
- Unit values of livestock are per head.

SOURCES: Table 3.1, and Appendix 3.A.

APPENDIX 3.C

AREA AND YIELD OF SUDAN MAIN CROPS (1969-1980)

CROP ——>	COTTON		GROUND NUTS		SESAME		DURA	
Year	Acreage	Yield	Acreage	Yield	Acreage	Yield	Acreage	Yield
1969	1118	586	782	252	1090	112	2780	255
1970	1256	537	1083	377	1356	129	4345	345
1971	1209	604	903	389	1773	159	4698	325
1972	1219	561	1527	251	1805	151	4722	458
1973	1141	487	1558	313	2801	121	3956	339
1974	1194	562	1724	315	2167	111	5208	312
1975	1228	524	1717	510	2199	128	5864	297
1976	988	326	2066	451	2291	104	6179	328
1977	1006	456	1894	391	2288	111	6287	286
1978	1120	499	2629	388	2349	104	6662	303
1979	1036	392	2330	348	2061	104	7202	329
1980	996	318	2352	362	1989	105	6349	263

NOTES:

- Area in thousands feddans (1 feddan =1.03 acres).
- Yield in thousands metric tons.

SOURCE: Bank of Sudan - Annual Reports, different issues.

APPENDIX 4.A

FOREIGN TRADE MULTIPLIER

To formally derive the foreign trade multiplier, let us start with the national income identity

$$Y \equiv C + I + G + X - M - T \qquad 4.A.1$$

Let us assume that consumption function, import function and tax functions are:

Consumption $C = a + cY,$

Imports $M = b + mY,$

Taxes $T = d + tY.$

Inserting these functions into (4.A.1) above gives the following equation:

$$Y + a + cY + I + G + X - b - mY - d - tY. \qquad 4.A.2$$

If an autonomous change in demand occurs, income will move to a new equilibrium. The difference between the two equilibriums will be:

$$Y_2 - Y_1 = a + cY_2 + I_2 + G_2 + X_2 - b - mY_2 - d - tY_2$$

$$-a - cY. - I_1 - G_1 - X_1 + b + mY_1 + d + tY_1 \qquad 4.A.3$$

If the autonomous change was in exports (X), and if the income changes induce no further change in exports, nor any change in investment or government expenditure, the change in equilibrium income will be:

$$\Delta Y = C\Delta Y + \Delta X - m\Delta Y - t\Delta Y \qquad 4.A.4$$

($\Delta Y = Y_2 - Y_1$ throughout equation 4.A.3)

$$\Delta Y = \frac{\Delta X}{[(1-c) + m + t)]} \qquad 4.A.5$$

Substituting S" marginal propensity to save' into place of (1-c) (C as shown above is marginal propensity to consume) then equation 4.A.5 will be written as:

$$\Delta Y = \Delta X - \frac{1}{S + m + t} \qquad 4.A.6$$

This was the foreign trade multiplier used by MacBean (1966, p. 93).

APPENDIX 4.A.1

FOREIGN TRADE MULTIPLIER

Another Formula

Let us start with the same national income identity

$$Y \equiv C + I + G + X - M - T. \qquad 4.A.1.1$$

In addition to the three functions inserted earlier let us insert a fourth one-period investment function of the form

$$I = e + fY.$$

Equation 4.A.1.1 will be

$$Y = a + cY + e + fY + G + X - b - mY - d - tY \qquad 4.A.1.2$$

With the same method used earlier, and with the assumption that change in export will induce further changes in investment whereas government expenditure is not affected, then the change in equilibrium income will be

$$\Delta Y = c\Delta Y + f \Delta Y + \Delta X - m\Delta Y - t\Delta Y \qquad 4.A.1.3$$

$$\Delta Y = \frac{\Delta X}{(1-c) - f + m + t} \qquad 4.A.1.4$$

$$\Delta Y = \frac{\Delta X}{s + m - f + t} \qquad 4.A.1.5$$

APPENDIX 4.B

THE OBSERVATIONS OF SOME OF THE PARAMETERS OF FOREIGN TRADE MULTIPLIER OF SUDAN (1956-78)

(L S 000,000)

Year	Mx	tx	ty
1956	1.45	4.89	21.81
1957	2.55	5.30	22.51
1958	3.64	9.40	25.09
1959	3.30	6.00	23.52
1960	2.72	9.23	40.11
1961	3.09	8.95	39.02
1962	4.83	4.27	36.73
1963	1.67	4.66	22.81
1964	1.52	4.27	49.17
1965	0.82	2.85	44.96
1966	0.95	3.53	40.25
1967	0.55	3.80	36.77
1968	0.32	3.50	51.55
1969	0.35	5.80	73.10
1970	0.82	6.20	122.6
1971	0.62	8.10	136.9
1972	1.23	7.80	129.5
1973	1.56	8.60	119.3
1974	4.44	9.70	144.2
1975	6.07	10.80	192.1
1976	6.40	12.10	225.6
1977	7.89	12.60	269.5
1978	5.75	13.30	382.3

SOURCES:

Mx = re-export figures, IMF - IFS, (1956-1968). Bank of Sudan-Annual Reports, (1968-1978).

tx = Export Duties - UN National Accounts Statistics

ty = Government tax revenue - excluding export duties - UN National Accounts Statistics
All revenue sub categories were included because they will be affected by changes in export earnings, see section 4.3.3.

NOTES: No figures are available for the proportion of exports repatriated abroad (Px). As far as we know nothing of export sector is foreign owned = result in expatriated profit - However instead of assuming Px = 0, it is assumed to be 0.01.

APPENDIX 4.C

MARGINAL PROPENSITY TO IMPORT AND TO CONSUME

r	$ US Import Price	Exchange Rate	LS Import Price	LS Constant Import Price 1975	LS Value of Imports	LS Import at 1975 Constant Prices	LS G.N.P.	LS Consumer Price	LS G.N.P. at 1975 Prices	LS Consumption	Consumption at Constant Prices
6	38	2.8716	13.23	32.46	40.40	124.46	299.3	31.8	941.2	247.5	778.3
7	40	2.8716	13.93	34.17	56.56	165.55	299.3	32.1	932.4	247.5	771.0
8	39	2.8716	13.58	33.32	53.12	159.42	329.0	34.6	950.9	267.7	773.7
9	39	2.8716	13.58	33.32	50.95	152.91	338.1	34.5	980.0	288.0	834.8
0	40	2.8716	13.93	34.17	56.91	166.55	339.2	34.6	980.3	278.0	803.5
1	38	2.8716	13.23	32.46	73.98	227.91	385.0	37.6	1023.9	307.4	817.6
2	39	2.8716	13.58	33.32	79.76	239.37	415.7	38.2	1088.2	326.0	853.4
3	41	2.8716	14.28	35.03	88.60	252.93	450.0	40.0	1125.0	345.9	864.8
4	43	2.8716	14.97	36.73	85.26	232.13	459.6	41.6	1104.8	361.4	868.8
5	43	2.8716	14.63	35.89	64.54	179.83	471.5	40.5	1164.2	370.9	915.8
6	43	2.8716	14.97	36.73	69.16	188.29	492.0	41.2	1194.2	382.2	927.7
7	43	2.8716	14.97	36.73	66.37	180.69	503.5	45.8	1099.3	342.7	748.2
8	44	2.8716	15.32	37.59	80.10	213.09	541.1	41.2	1313.3	371.7	902.2
9	45	2.8716	15.67	38.44	79.75	207.47	589.3	46.4	1270.0	409.2	881.9
0	47	2.8716	16.37	40.16	89.39	222.58	697.1	48.2	1446.3	479.1	994.0
1	50	2.6449	18.90	46.37	103.07	222.28	757.9	48.9	1549.9	528.1	1080.0
2	54	2.6449	20.42	50.10	105.28	210.14	828.7	55.5	1493.2	634.5	1143.2
3	65	2.3804	27.31	67.52	135.58	200.80	888.5	64.0	1388.3	611.0	954.7
4	88	2.3454	37.52	92.05	220.98	240.07	1236.4	80.7	1532.1	846.0	1048.3
5	100	2.4536	40.76	100	321.31	321.31	1495.1	100	1495.1	1231.3	1231.3
6	94	2.4716	38.03	93.30	304.81	326.70	1827.9	101.7	1797.3	1340.6	1318.2
7	101	2.3640	42.72	104.81	336.14	320.71	2322.9	118.7	1956.9	1827.1	1539.2
8	111	1.9190	57.84	141.90	401.30	282.80	2868.3	142.3	2015.6	2379.5	1672.2

ES:

Import prices are in US Dollars, they have been divided by exchange rates to get prices in LS (Sudanese Pounds).

After obtaining import prices in L S in Column (4), the year 1975, has been taken as the base year and the other figures were adjusted accordingly.

Marginal propensity to consume MPC = $\frac{\Delta C}{\Delta Y}$ = .73, (obtained from C = 40 + .73 G.NP., both at constant prices).

Marginal propensity to import MPM = $\frac{\Delta M}{\Delta Y}$ = .14, (obtained from M = 45 + .14 G.N.P., both at constant prices).

RCE: IMF - International Financial Statistics - various issues.

APPENDIX 4.C

MARGINAL PROPENSITY TO IMPORT AND TO CONSUME

Year	$ US Import Price	Exchange Rate	LS Import Price	LS Constant Import Price 1975	LS Value of Imports	LS Import at 1975 Constant Prices	LS G.N.P.	LS Consumer Price	LS G.N.P. at 1975 Prices	LS Consumption	Consumption at Constant Prices
1956	38	2.8716	13.23	32.46	40.40	124.46	299.3	31.8	941.2	247.5	778.3
1957	40	2.8716	13.93	34.17	56.56	165.55	299.3	32.1	932.4	247.5	771.0
1958	39	2.8716	13.58	33.32	53.12	159.42	329.0	34.6	950.9	267.7	773.7
1959	39	2.8716	13.58	33.32	50.95	152.91	338.1	34.5	980.0	288.0	834.8
1960	40	2.8716	13.93	34.17	56.91	166.55	339.2	34.6	980.3	278.0	803.5
1961	38	2.8716	13.23	32.46	73.98	227.91	385.0	37.6	1023.9	307.4	817.6
1962	39	2.8716	13.58	33.32	79.76	239.37	415.7	38.2	1088.2	326.0	853.4
1963	41	2.8716	14.28	35.03	88.60	252.93	450.0	40.0	1125.0	345.9	864.8
1964	43	2.8716	14.97	36.73	85.26	232.13	459.6	41.6	1104.8	361.4	868.8
1965	43	2.8716	14.63	35.89	64.54	179.83	471.5	40.5	1164.2	370.9	915.8
1966	43	2.8716	14.97	36.73	69.16	188.29	492.0	41.2	1194.2	382.2	927.7
1967	43	2.8716	14.97	36.73	66.37	180.69	503.5	45.8	1099.3	342.7	748.2
1968	44	2.8716	15.32	37.59	80.10	213.09	541.1	41.2	1313.3	371.7	902.2
1969	45	2.8716	15.67	38.44	79.75	207.47	589.3	46.4	1270.0	409.2	881.9
1970	47	2.8716	16.37	40.16	89.39	222.58	697.1	48.2	1446.3	479.1	994.0
1971	50	2.6449	18.90	46.37	103.07	222.28	757.9	48.9	1549.9	528.1	1080.0
1972	54	2.6449	20.42	50.10	105.28	210.14	828.7	55.5	1493.2	634.5	1143.2
1973	65	2.3804	27.31	67.52	135.58	200.80	888.5	64.0	1388.3	611.0	954.7
1974	88	2.3454	37.52	92.05	220.98	240.07	1236.4	80.7	1532.1	846.0	1048.3
1975	100	2.4536	40.76	100	321.31	321.31	1495.1	100	1495.1	1231.3	1231.3
1976	94	2.4716	38.03	93.30	304.81	326.70	1827.9	101.7	1797.3	1340.6	1318.2
1977	101	2.3640	42.72	104.81	336.14	320.71	2322.9	118.7	1956.9	1827.1	1539.2
1978	111	1.9190	57.84	141.90	401.30	282.80	2868.3	142.3	2015.6	2379.5	1672.2

NOTES:

- Import prices are in US Dollars, they have been divided by exchange rates to get prices in LS (Sudanese Pounds).
- After obtaining import prices in LS in Column (4), the year 1975, has been taken as the base year and the other figures were adjusted accordingly.
- Marginal propensity to consume MPC = $\frac{\Delta C}{\Delta Y}$ = .73, (obtained from C = 40 + .73 G.NP., both at constant prices,.
- Marginal propensity to import MPM = $\frac{\Delta M}{\Delta Y}$ = .14, (obtained from M = 45 + .14 G.N.P., both at constant prices).

SOURCE: IMF - International Financial Statistics - various issues.

APPENDIX 4.D

COMPUTATION OF IMPORT PRICE

To obtain the importing power of exports, export receipts have to be divided by import prices. A complete series of the import prices for the Sudan could not be obtained. So we tried to construct the import prices for the Sudan from those of similar countries.

The assumption we made is that though different LDCs tend to produce and export, divergent commodities, their imports tend to be more or less similar.

The countries with similar imports to Sudan were obtained from World Tables, published by the World Bank (1975). The percentages of food and raw materials, fuels and lubricants, machinery and equipment and other manufactured products, were provided therein.

Those countries which import similar percentage of the four categories as Sudan, were selected. The countries were Ethiopia, Kenya, Sri Lanka, and Tunisia. The import prices of each country were obtained from IMF, IFS; the average was worked out and taken to denote Sudan import prices. The figures are provided in the following page.

Year	Ethiopia	Kenya	Sri Lanka	Tunisia	Sudan Estimated
1956	57	34	27	34	38
1957	59	35	30	37	40
1958	59	34	27	34	39
1959	58	34	27	36	39
1960	59	35	27	38	40
1961	56	32	27	37	38
1962	57	33	27	38	39
1963	58	35	30	41	41
1964	57	35	36	43	43
1965	58	36	33	42	42
1966	60	36	33	43	43
1967	61	36	32	43	43
1968	63	36	34	44	44
1969	62	37	37	45	45
1970	63	37	34	47	47
1971	67	41	42	49	50
1972	74	45	43	54	54
1973	85	56	54	65	65
1974	90	81	91	83	88
1975	100	100	100	100	100
1976	106	102	75	92	94
1977	114	112	85	94	101
1978	127	126	92	99	111

SOURCE: IMF - International Financial Statistics - 1982.

APPENDIX 4.E

ANNUAL RATE OF GROWTH OF FIXED CAPITAL FORMATION

Year	Gross Fixed Capital Formation	Consumer Prices	G.F.C.F. at 1975 Prices	Annual Increase in Real G.F.C.F.	Annual Rate of Increase of Real G.F.C.F.
1956	21.2	31.8	66.67		
1957	21.2	32.1	66.04	-.63	-.0095
1958	24.9	34.6	71.97	5.93	.0898
1959	39.5	34.5	114.49	42.52	.5908
1960	36.0	34.6	104.05	-10.44	-.0912
1961	42.3	37.6	112.50	8.45	.0812
1962	54.5	38.2	142.67	30.17	.2682
1963	65.7	40.0	164.25	21.58	.1513
1964	76.1	41.6	182.93	10.68	.1137
1965	69.1	40.5	170.62	-12.31	-.0673
1966	52.2	41.2	126.70	-43.92	-.2574
1967	71.8	45.8	156.77	30.07	.2373
1968	70.4	41.2	170.87	14.10	.0899
1969	70.9	46.4	152.80	-18.07	-.1058
1970	76.0	48.2	157.68	4.88	.0319
1971	73.2	48.9	149.69	-7.99	-.0507
1972	72.6	55.5	130.81	-18.88	-.1261
1973	95.2	64.0	148.75	17.94	.1372
1974	140.2	80.7	173.73	24.98	.1679
1975	214.4	100.0	214.40	40.67	.2341
1976	362.0	101.7	355.95	141.55	.6602
1977	312.7	118.7	263.44	-92.51	-.2599
1978	323.3	142.3	227.20	-36.24	-.1376

$\dot{I}$ = Growth Rate of Fixed Capital Formation.

SOURCE: IMF International Financial Statistics, National Accounts, 1982 issue.

APPENDIX 4.F

FLUCTUATIONS IN THE IMPORTING POWER OF EXPORTS

Year	Exports	Import Prices Mt	$ US Importing Power of X Xt/M_{t+1}	Exchange Rate	L S Importing Power of Exports X_t	Time (t)	LS Importing Power of Exports X_t	Trend Value of Importing Power of Exports $\hat{X}_t$	Deviation of Importing Power from Trend $(X_t-\hat{X}_t)$ X_{it}
1956	205.9	38		2.8716					
1957	148.1	40	5.1475	2.8716	1.7926	0	1.7926	1.4219	0.3707
1958	128.1	39	3.7974	2.8716	1.3224	1	1.3224	1.4641	-0.1417
1959	195.3	39	3.2846	2.8716	1.1438	2	1.1438	1.5063	-0.3625
1960	183.8	40	4.8825	2.8716	1.7003	3	1.7003	1.5485	0.1518
1961	176.0	38	4.8368	2.8716	1.6844	4	1.6844	1.5907	0.0937
1962	228.9	39	4.5128	2.8716	1.5715	5	1.5715	1.6329	-0.0614
1963	240.9	41	5.5829	2.8716	1.9442	6	1.9442	1.6751	0.2691
1964	197.6	43	5.6023	2.8716	1.9509	7	1.9509	1.7173	0.2336
1965	204.4	42	4.7048	2.8716	1.6384	8	1.6384	1.7595	-0.1211
1966	208.2	43	4.7535	2.8716	1.6553	9	1.6553	1.8017	-0.1464
1967	215.1	43	4.8419	2.8716	1.6861	10	1.6861	1.8439	-0.1578
1968	244.3	44	4.8886	2.8716	1.7024	11	1.7024	1.8861	-0.1837
1969	256.2	45	5.4289	2.8716	1.8905	12	1.8905	1.9283	-0.0378
1970	284.3	47	5.4511	2.8716	1.8983	13	1.8983	1.9705	-0.0767
1971	309.0	50	5.6860	2.6449	2.1498	14	2.1498	2.0127	0.1371
1972	324.7	54	5.7222	2.6449	2.1635	15	2.1635	2.0549	0.1086
1973	441.1	65	4.9954	2.3804	2.0986	16	2.0986	2.0971	0.0015
1974	384.4	88	5.0125	2.3454	2.1372	17	2.1372	2.1393	-0.0021
1975	411.8	100	3.8440	2.4536	1.5667	18	1.5667	2.1815	-0.6148
1976	588.8	94	4.3809	2.4716	1.7725	19	1.7725	2.2237	-0.4512
1977	658.2	101	5.8297	2.3640	2.4660	20	2.4660	2.2659	0.2001
1978	563.0	111	5.9297	1.9190	3.0900	21	3.0900	2.3081	0.7819

$ US: US dollar, L S: Sudanese Pound.

X_t : Importing power of exports

X_{it} : Deviations of importing power of exports from its linear-trend (taken as a measure of instability)

SOURCE: IMF - International Financial Statistics - 1982 issue.

APPENDIX 4.G

IMPORTING CAPACITY OF EXPORTS

Year	$ US Exports Xt	$ US Net Services (t)	$ US Private Unreg. Transfer (t)	$ US Official Unreg. Transfer (t)	$ US Capital Other than Reser. t	$ US Total (t)	$ US Import Prices (t)	$ US Total (+) : M_{t+1} Import Capacity	Exchange Rate	LS Import Capacity S	LS Growth of Importing Power	MC Growth Rate of Importing Power
1956	205.9	-29.1	-2.3	-0.9	-13.0	160.6	38		2.8716			
1957	148.1	-28.3	-3.4	0.3	65.4	182.1	40	4.02	2.8716	1.4000		
1958	128.1	-20.0	-6.9	0.6	4.9	107.0	39	4.67	2.8716	1.6263	0.2263	0.1616
1959	195.3	-25.7	-1.7	8.9	24.9	210.7	39	2.74	2.8716	0.9542	-0.6721	-0.4133
1960	183.8	-30.2	-1.1	19.8	21.8	194.1	40	5.27	2.8716	1.8352	0.8810	0.9233
1961	176.0	-40.9	-0.9	22.7	30.6	187.5	38	5.11	2.8716	1.7795	-0.0557	-0.0304
1962	228.9	-65.1	-	16.9	37.0	217.7	39	4.81	2.8716	1.6750	-0.1045	-0.0587
1963	240.9	-63.5	-2.3	14.1	24.4	213.3	41	5.31	2.8716	1.8491	0.1741	0.1039
1964	197.6	-57.2	-3.7	2.6	39.0	178.3	43	4.96	2.8716	1.7273	-0.1218	-0.0659
1965	204.4	-53.4	-1.7	3.7	14.1	167.1	42	4.25	2.8716	1.4880	-0.2393	-0.1385
1966	208.2	-51.7	-0.9	2.6	43.4	201.6	43	3.89	2.8716	1.3546	-0.1334	-0.0897
1967	215.1	-50.0	-0.6	2.3	35.6	202.4	43	4.69	2.8716	1.6332	0.2786	0.2057
1968	244.3	-49.0	-0.6	-1.2	43.1	236.6	44	4.60	2.8716	1.6019	-0.0313	-0.0192
1969	256.2	-53.8	-0.6	-1.1	19.6	220.3	45	5.26	2.8716	1.8317	0.2298	0.1495
1970	284.3	-58.3	-1.2	1.5	27.9	254.2	47	4.69	2.8716	1.6332	-0.1985	-0.1084
1971	309.0	-55.2	-0.9	-1.4	58.2	309.7	50	5.08	2.6449	1.9207	0.2875	0.1760
1972	324.7	-66.9	3.5	6.3	40.8	308.4	54	5.74	2.6449	2.1702	0.2495	0.1299
1973	441.1	-83.1	6.3	-1.7	2.4	365.0	65	4.74	2.3804	1.9912	-0.1790	-0.0825
1974	384.4	-136.7	4.9	18.4	255.1	496.1	88	4.15	2.3454	1.7694	-0.2218	-0.1114
1975	411.8	-140.6	-1.2	46.7	304.8	621.5	100	4.96	2.4536	2.0068	0.2374	0.1342
1976	588.8	-148.5	-0.6	20.9	145.2	605.8	94	6.61	2.4716	2.6744	0.6676	0.3327
1977	658.2	-107.7	-0.3	21.0	101.9	673.1	101	6.00	2.3640	2.5381	-0.1363	-0.0510
1978	563.0	-47.6	1.3	15.1	56.1	587.9	111	6.06	1.9190	3.1579	0.6198	0.2442

$ US = U.S. Dollar - LS, Sudanese Pound

MC = Rate of Growth of Importing Capacity of Exports

SOURCE: IMF - International Financial Statistics - 1982.

APPENDIX 4.H

ANNUAL RATE OF DECREASE OF FOREIGN EXCHANGE RESERVES

Year	Foreign Reserves	Annual Decrease	Annual Rate of Decrease (FE)
1956	191.1		
1957	121.0	70.9	0.3695
1958	87.8	33.2	0.2744
1959	131.9	-44.1	-0.5022
1960	166.6	-34.7	-0.2631
1961	152.7	13.9	0.0834
1962	144.3	8.4	0.0550
1963	99.8	44.5	0.3084
1964	71.1	28.7	0.2876
1965	59.7	11.4	0.1603
1966	57.0	2.7	0.0452
1967	54.7	2.3	0.0404
1968	47.7	7.0	0.1280
1969	36.4	11.3	0.2369
1970	21.6	14.8	0.4066
1971	27.9	-6.3	-0.2917
1972	30.3	-2.4	-0.0860
1973	44.9	-14.6	-0.4818
1974	97.9	-53.0	-1.1804
1975	27.8	70.1	0.7160
1976	23.6	4.2	0.1511
1977	23.1	.5	0.0165
1978	20.5	2.6	0.1268

FE = Annual rate of decrease of foreign reserves.
The reduction in foreign reserves was given the positive sign, meaning that some of reserves was released for buying imports, i.e. reduction of reserves is positively related to capital goods imports and vice versa.

SOURCE: IMF, Financial Statistics - 1982 issue.

APPENDIX 4.I

THE RATE OF GROWTH OF REAL G.D.P.

Year	G.D.P.	Consumer Prices	G.D.P at 1975 Prices	Annual Increase in Real G.D.P.	Annual Rate of Increase in Real G.D.P.
1956	300	31.8	943.4		
1957	300	32.1	934.6	-8.80	-0.0093
1958	329	34.6	950.9	16.30	0.0174
1959	338	34.5	979.7	28.80	0.0303
1960	339	34.6	979.8	.10	0.0001
1961	386.8	37.6	1028.7	48.90	0.0499
1962	420	38.2	1099.5	70.80	0.0690
1963	456.2	40.0	1140.5	41.00	0.0370
1964	464.1	41.6	1115.6	-24.90	-0.0218
1965	476.8	40.5	1177.3	61.70	0.0553
1966	496.9	41.2	1206.1	28.80	0.0245
1967	497.6	45.8	1086.5	-119.60	-0.0992
1968	536.3	41.2	1301.7	215.20	0.1981
1969	583.2	46.4	1256.9	-44.80	-0.0344
1970	701.5	48.2	1455.4	198.50	0.1579
1971	761.1	48.9	1556.4	101.00	0.0694
1972	832.4	55.5	1499.8	-56.60	-0.0364
1973	896.8	64.0	1401.3	-98.50	-0.0657
1974	1246.2	80.7	1544.2	142.90	0.1020
1975	1510.8	100	1510.8	-33.40	-0.0216
1976	1848.0	101.7	1817.1	306.30	0.2027
1977	2339.7	118.7	1971.1	154.00	0.0848
1978	2882.7	142.3	2025.8	54.70	0.0278

Last column was computed as $\frac{Q_{t+1} - Qt}{Qt}$.

SOURCE: IMF - International Financial Statistics - National Accounts - 1982 issue.

APPENDIX 4.J

THE FOREIGN CAPITAL INFLOW, IT'S DEVIATION FROM TREND

Year	$ US Capital Inflow	$ US Import Prices	$ US Importing Power	Exchange Rate	LS Ft Importing Power	Time	Trend	F_1 Actual -Trend
1956	-52	38	-1.3684	2.8716	-0.4765	0	0.0559	-0.5324
1957	62	40	1.5500	2.8716	0.5398	1	0.0868	0.4530
1958	36.4	39	0.9333	2.8716	0.3250	2	0.1177	0.2073
1959	-50.6	39	-1.2974	2.8716	-0.4518	3	0.1486	-0.6004
1960	-13.5	40	-0.3375	2.8716	-0.1175	4	0.1795	-0.2970
1961	42.6	38	1.1211	2.8716	0.3904	5	0.2104	0.1800
1962	39.3	39	1.0077	2.8716	0.3509	6	0.2413	0.1096
1963	63.1	41	1.5390	2.8716	0.5359	7	0.2722	0.3087
1964	86.9	43	2.0209	2.8716	0.7038	8	0.3032	0.4006
1965	38.2	42	0.9095	2.8716	0.3167	9	0.3341	-0.0174
1966	52.5	43	1.2209	2.8716	0.4252	10	0.3650	0.0602
1967	46.8	43	1.0884	2.8716	0.3790	11	0.3959	-0.0169
1968	55.0	44	1.2500	2.8716	0.4353	12	0.4268	0.0085
1969	29.6	45	0.6578	2.8716	0.2291	13	0.4577	-0.2286
1970	41.9	47	0.8915	2.8716	0.3105	14	0.4886	-0.1781
1971	42.1	50	0.8420	2.6449	0.3184	15	0.5195	-0.2011
1972	49.1	54	0.9093	2.6449	0.3438	16	0.5504	-0.2066
1973	-28.2	65	-0.4338	2.3804	-0.1822	17	0.5813	-0.7635
1974	270.7	88	3.0761	2.3454	1.3116	18	0.6123	0.6993
1975	426.4	100	4.2640	2.4536	1.7379	19	0.6432	1.0947
1976	165.1	94	1.7564	2.4716	0.7106	20	0.6741	0.0365
1977	72.2	101	0.7140	2.3640	0.3020	21	0.7050	-0.4030
1978	92.1	111	0.8297	1.9190	0.4324	22	0.7359	-0.3035

$ US = U.S. Dollar

LS = Sudanese Pound

F_t = Importing power of foreign capital inflow

F_1 = Foreign capital deviations from its linear trend (taken as a measure of instability).

SOURCES: IMF - International Financial Statistics - 1982.

IMF - Balance of Payment Statistics (various issues).

APPENDIX 5.A.

THE TREND VALUES OF SUDAN EXPORTS (1956-80)

Year	Cotton	Ground Nuts	Sesame	Gum Arabic	Cakes & Meals	Dura	Live-Stocks	Hides & Skins
1956	30.52	3.92	2.32	4.66	.57	1.26	1.35	.69
1957	31.43	4.22	2.68	4.93	.93	1.28	1.38	.76
1958	32.35	4.52	3.05	5.21	1.29	1.31	1.41	.82
1959	33.26	4.82	3.42	5.48	1.64	1.33	1.44	.89
1960	34.18	5.13	3.79	5.75	2.00	1.35	1.47	.96
1961	35.10	5.43	4.16	6.02	2.36	1.37	1.50	1.02
1962	36.01	5.73	4.52	6.28	2.72	1.40	1.53	1.09
1963	36.93	6.03	4.89	6.56	3.08	1.42	1.56	1.15
1964	37.84	6.33	5.26	6.83	3.43	1.44	1.59	1.22
1965	38.76	6.63	5.63	7.10	3.79	1.47	1.62	1.29
1966	39.67	6.94	5.99	7.37	4.15	1.49	1.65	1.35
1967	40.59	7.24	6.73	7.64	4.51	1.51	1.67	1.42
1968	41.50	7.54	7.10	7.91	4.86	1.53	1.70	1.48
1969	47.11	10.51	6.78	6.59	3.43	-5.29	-0.10	2.09
1970	54.52	11.49	7.90	7.53	3.93	-3.13	0.74	2.38
1971	61.93	12.46	9.03	8.46	4.43	-0.96	1.57	2.67
1972	69.35	13.44	10.15	9.39	4.92	1.21	2.41	2.95
1973	76.76	14.41	11.28	10.32	5.42	3.37	3.24	3.24
1974	84.18	15.39	12.40	11.25	5.92	5.54	4.08	3.53
1975	91.59	16.36	13.53	12.18	6.42	7.71	4.91	3.82
1976	99.00	17.34	14.65	13.11	6.92	9.87	5.75	4.11
1977	106.42	18.31	15.78	14.05	7.42	12.04	6.58	4.39
1978	113.83	19.29	16.91	14.98	7.91	14.21	7.42	4.68
1979	121.25	20.26	18.03	15.91	8.41	16.37	8.25	4.67
1980	128.65	21.22	19.16	16.84	8.91	18.54	9.09	5.26

NOTES:

- For each commodity we fit two linear trends. One for the period (1956-68) - and the other for the period (1969-80). Trends are obtained by regressing actual values of each commodity on time.

SOURCES: UN - Year Book of International Trade Statistics - (1956-1968).

Bank of Sudan Annual Report - (1969-1980).

APPENDIX 5.B

EXPORT VALUES AFTER THE SUBSTITUTION OF TREND VALUES (FOR ACTUAL VALUES) FOR SUDAN 1956-1980

Year	Cotton	Ground Nuts	Sesame	Gum Arabic	Cakes & Meals	Dura	Live-Stock	Hides & Skins
1956	54.16	65.46	65.60	64.65	64.93	66.23	65.16	65.16
1957	57.35	48.37	48.54	49.11	48.85	48.93	48.19	48.74
1958	49.84	40.85	40.61	39.76	39.99	40.78	39.56	39.88
1959	56.59	64.71	64.14	63.86	63.43	63.13	63.82	63.46
1960	61.68	61.39	59.85	59.43	61.26	59.20	60.65	60.72
1961	63.02	59.14	59.06	58.96	59.51	58.59	59.10	59.22
1962	67.06	73.63	73.46	76.29	74.70	74.50	75.29	74.70
1963	68.49	76.75	77.18	77.99	76.70	76.98	77.64	76.99
1964	72.60	64.25	65.91	67.14	66.40	67.00	67.92	67.34
1965	74.70	65.17	68.02	66.71	66.97	66.17	66.77	67.18
1966	74.64	69.46	70.12	69.97	69.37	69.40	69.64	69.53
1967	73.80	74.79	74.26	73.36	74.43	75.55	73.68	74.03
1968	73.82	83.77	81.71	80.89	81.20	81.29	80.43	80.80
1969	83.26	90.14	84.38	83.54	84.87	80.29	83.20	85.91
1970	94.76	109.89	105.31	102.34	102.28	100.78	102.33	104.59
1971	106.39	117.50	115.40	114.80	114.34	112.32	113.93	115.10
1972	120.86	129.08	125.33	124.66	124.88	123.90	124.57	123.99
1973	152.09	153.59	152.74	155.09	149.69	152.62	152.18	149.34
1974	162.93	119.24	117.90	147.53	125.69	123.15	121.60	121.76
1975	173.87	134.45	154.06	157.10	153.71	157.95	156.35	153.10
1976	194.21	171.36	190.37	194.89	194.84	199.71	198.17	193.40
1977	205.04	219.69	227.70	230.72	229.77	237.45	232.43	230.21
1978	211.24	200.90	200.07	202.53	203.54	213.89	201.76	203.12
1979	202.65	242.96	244.42	229.93	233.81	235.52	243.02	233.96
1980	284.55	286.64	265.63	269.85	267.02	246.86	263.89	269.96

NOTES:

- The figures under each commodity are the value of exports minus the actual value of the commodity in question plus the trend value of that commodity.

SOURCES: UN - Year Book of International Trade Statistics -(1956-1958).

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