

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

EXPORTS AND ECONOMIC GROWTH:
THEORIES AND EVIDENCE FROM EASTERN
AND SOUTHERN AFRICA



BY

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**EXPORTS AND ECONOMIC GROWTH:
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AND SOUTHERN AFRICA**



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**By
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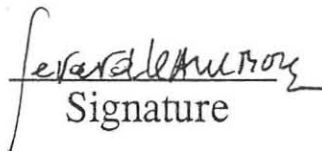
*Exports and Economic Growth:
Theories and Evidence from Eastern and Southern Africa*



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ABSTRACT

Most of the previous empirical studies that tested the link between exports and economic growth focused on cross country regression analysis. This approach, however, suffers from an over simplified assumption of uniform production functions across countries which obscure intercountry differences; these studies use period averages which are misleading if the time series are non-stationary and it is difficult to associate the results obtained with any particular country in the group. In trying to deal with these weaknesses this study has employed individual country time series data to test the relationship between exports and GDP growth as well as to establish the direction of causality between them. Our time series results reveal a positive and significant association between exports and growth in four out of the seven countries investigated, and in three of these countries causality has been found to run from exports to growth.

I. INTRODUCTION

1.1 Statement of the Problem

Very low growth rates or stagnant economic performances have characterized the economies of African countries. Some even recorded negative growth rates. For example, during the period 1960-90, negative growth rates were recorded in seventeen countries of the world of which thirteen were from Sub-Saharan Africa (SSA) (Barro and Sala-I-Martin 1995). For these countries we also note that the mean growth rate in this period was only 0.8 percent per year which is well below the corresponding figure for the fast growing economies (5.83%) and that of all other developing countries as a group (1.76%) (Sachs and Warner, 1997).

A number of factors can be cited to explain the poor economic performance of African countries. One of them is their weak performance regarding international trade. Most African countries are characterized, among others, by large balance of payments deficits, high import dependency, concentration of exports on a small range of primary commodities whose prices are highly volatile, and serious foreign exchange constraints.

Concerning exports, contrary to the experience of South East Asian Countries, the performance of African countries has not been impressive. Some associated this with the implementation of policies and strategies that prevented African countries benefiting from export growth (see for example, Uduebo, 1994). Others went further and suggested to look at the issue back some 200 years (or even more years) ago and analyze how the commodity composition and direction of trade have been shaped (Alemayehu, 1997, J.H. Frimpong-Ansah, 1990).

In any case what we need to remember is that, as far as the African economies are concerned, the export sector is important as it constitutes a large fraction of total production. For example, exports provide a quarter or more of the GNP in 14 out of 27 countries with

data in 1984 (Gersovitz and Paxson, 1990). But, the African countries' share of world total exports has fallen, in many cases drastically. In this light, questions like the following will be of interest. Is the decline in the share of African exports due to supply side problems where these countries' could not maintain the volume of those particular goods they export or is external demand unfavourable for Africa's exports? Have the terms of trade moved against these countries' exports? Does the export sector act as an engine or handmaiden of growth in the context of African countries?

In trying to link Africa's export performance with policy issues, Frimpong-Ansah et al (1990) categorize the factors affecting Africa's exports into two: (i) those that are internal and under the control of the government, namely, price instruments including exchange rate and producer price, and non-price instruments including the strengthening of infrastructure, information dissemination, etc.; (ii) external factors, primarily the external terms of trade and the international trading environment.

In recent years, within the framework of Structural Adjustment Programmes (SAP), African countries have paid increasing attention to export promotion activities and liberalization of the economy. This strategy is becoming popular on the grounds that exports help to achieve increased competition, economies of scale; to provide incentives to earn foreign exchange; and to facilitate the imports of intermediate and capital goods (see, for example, Kunst and Marin, 1987).

Meier (1995) also provided some grounds for such a move towards promoting exports. "The higher the growth-rate of the export sector, the greater is the direct impact of the export sector on employment and personal income, the more the expansion of exports has a "learning effect" in terms of increasing productivity and instilling new skills, the more the export sector is supplied through domestic inputs instead of imports, the more the

distribution of income favors those with a marginal propensity to consume domestic goods instead of imports, the more productive is the investment resulting from any saving of external income, the more extensive are the externalities and linkages connected with the export sector, and the more stable are the export receipts that are retained at home. Some exports fulfil these conditions more rapidly than the others, and countries specializing in these exports will enjoy greater opportunity for development". Outward-Oriented industrialization has thus been perceived as potentially effective for dealing with a myriad of economic problems [Obadan 1994]. That is, the presumption is that liberalization stimulates export performance and this stimulates growth performance (Greenaway, et al, 1994).

In relation with the problems faced by African exports, therefore, we need to look at the role trade policies could play in an attempt to boost new and traditional exports. However, before dealing with any kind of policy issue concerning African exports, we need first to establish that promoting exports to bring about growth can be a successful strategy. That is, we need to test empirically the export economic growth nexus.

This thesis extends our understanding of the relationship between exports and growth by moving away from the more traditional evidence of cross-sectional analysis. Here it is argued that using cross sectional analysis implicitly assumes uniform production functions across countries (a rather over simplification) and obscure intercountry differences and we can not link the results to any particular country from the group. Furthermore, the use of period averages will be inappropriate if the time series we are dealing with is non-stationary. Moreover, we loose important information about growth dynamics within countries if we were to use period averages. In light of this we emphasize the use of time series analysis concentrating on one particular region in SSA, the countries of Eastern and Southern Africa

which belong to a trading Block called the Common Market for Eastern and Southern Africa (COMESA).

1.2 Objectives of the Study

In light of the above, the study has the following objectives:

- a. To examine whether exports affect economic growth significantly.
- b. By considering the countries of Eastern and Southern Africa which have low per capita income and export composition dominated by primary commodities, the thesis will, in a way, examine whether the commodity composition (primary commodity or non-traditional) of exports and the level of development determines the extent to which exports affect growth.
- c. To survey different views in the area of international trade in general and the export-economic growth nexus in particular.
- d. Apply time series techniques (giving particular attention to spurious regression) to overcome problems associated with cross section studies;and
- e. To suggest, on the basis of the empirical evidence, policies and strategies that would help the countries under consideration bring about economic growth.

1.3 Significance of the Study

The significance of this study partly arises from the fact that the formulation of trade policies aimed at improving the performance of an economy requires an understanding of how exports affect economic growth. That is, we need to explicitly identify the channels through which exports affect economic growth. With regard to this, the thesis will provide useful information about the relationship between exports and growth that could guide policy

formulation. Moreover, though the literature on exports and economic growth in developing countries is vast, literature on the countries under investigation is limited. Hence this paper will contribute to the existing literature.

1.4 Hypothesis to be tested

The main hypothesis to be tested in this study is that exports significantly and positively affect economic growth.

1.5 Organization of the Study

The study is organized as follows. The next section provides an overview of the economies under study with particular emphasis on COMESA. In chapter three, a literature review, including a theoretical overview of the export-economic growth nexus and some empirical evidence, is presented. The model, methodology and data are dealt with in chapter 4. Chapter 5 presents the empirical analysis, and the conclusions are contained in Chapter 6.

CHAPTER II

II. Regional Economic Integration and Countries in COMESA

2.1 An Overview of Countries in COMESA

Since the study covers a subregion in Africa where all the countries belong to a trading group, COMESA, instead of dealing with each country, in this chapter we look at COMESA as a group.

As a replacement of the Preferential Trading Area for Eastern and Southern Africa, commonly referred to as the PTA, COMESA was established in December 1994 and comprises about 20 countries¹ (OAU, 1997). "The treaty establishing the PTA was signed on December 21, 1981 within the framework of the Lagos plan of action and the final act of Lagos which entered into force on 30 September, 1982" (Musonda, 1997:6).

The objectives of PTA, among others, as defined in the treaty include (Musonda, 1997; UNECA, 1995):

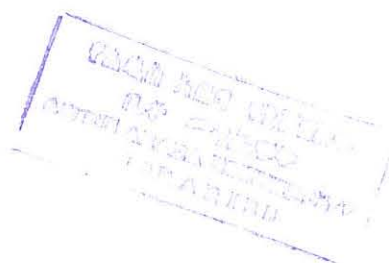
- Promoting cooperation and integration covering all the fields of economic activity, particularly trade, customs, industry, agriculture, monetary affairs, etc., by giving trade promotion a priority for stimulating this cooperation;
- Promoting relations among member states to raise the standard of living of their people;
- The creation of a common market by the year 2000 which allows the free movement of factors of production; and
- To contribute to the well-being of other African countries.

1. These countries are: Angola, Burundi, Comoros, Djibouti, Ethiopia, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Somalia, Sudan, Swaziland, Seychelles, Tanzania, Uganda, Zambia and Zimbabwe.

What we have to note here is that the PTA was created as a first step towards the establishment of a common market for the region. PTA then gave itself a period of ten years to transform the preferential trade area into a common market with a common external tariff and thereafter to an economic union.

In 1994, COMESA was launched not because the countries in the subregion had established a common external market² but rather on the conviction that the economic integration process had reached a stage of maturity allowing a further step in which issues of the subregion would be accorded the priority they deserve (UNECA,1995).

The countries of this regional grouping are categorized as low income developing nations though there are some important intra-regional differences.³ Table 1 presents some basic indicators for most of the countries in the group.



² See the definition of a common market in section 2.2.

³. The differences we notice among the countries in the region support our view of the inappropriate approach of cross-section regression by considering period averages of variables.

Table 2.1: Some basic Indicators, 1995.

Country	Population (millions) mid-1995	GNP per capita (US\$)	Life expectancy at birth (years)	Illiteracy (% of population age 15+)	Access to safe water (% of population)	Area (thousands of Square kilometres)	GDP growth 1980-91
Ethiopia	56.7	100	49	65	27	1222	1.9
Kenya	26.7	260	58	22	49	583	6.4
Tanzania	29.6	130	51	32	49	945	3.0
Uganda	19.2	240	42	38	42	236	2.8
Malawi	9.7	160	43	44	77	-	5.8
Zambia	9.4	370	46	22	59	753	1.4
Zimbabwe	11.0	540	57	15	74	391	1.6
Angola	10.8	410	47	58	-	9.5	-
Burundi	6.5	150	49	65	58	28	4.9
Comoros	0.5	490	56	43	48	2	-1
Lesotho	2	770	61	29	-	30	8.6
Mauritius	1.1	3280	71	17	45	2	6.7
Mozambique	17.9	80	47	60	100	-	-0.7
Rwanda	7.9	110	46	40	63	26	4.7
Sudan	-	-	-	-	-	-	5.6
Seychelles	0.08	6410	72	21	97	-	3.2 ^a
Sub Saharan Africa	589	490	52	43	47	-	-
Low income	3,188	460	63	34	75	-	-

Source: World Bank (1996), Trends in Developing Countries and Musonda M.F. (1997), Intra-Industry trade between members of the PTA/COMESA Regional Trading Arrangement.

a. GNP growth (1980-91)

Considering the countries where data is available, population ranges from .08 to 56.7 million. Land areas also reveal significant differences. Moreover, the GDP growth rate ranged from 8.6% to 1% per annum during the period 1980-1991. GNP per capita is another figure where we notice a large difference (ranging from \$80 to \$6410). Countries with high per capita GNP also show good performances with regard to socio-economic indicators like life expectancy at birth, illiteracy and access to safe water.

The average GDP growth rate of the COMESA countries (3.4%), given high population growth, yields an average per capita income growth in the vicinity of 1%, which is well below the corresponding figure for fast growing economies (about 8%). This is also below the figure for all developing countries (1.8%) (Sachs and Warner, 1997).

There is also a wide difference in the share of gross domestic investment to gross domestic production (GDI/GDP) both among countries and as well as within a country at different points in time. In 1994, the ratio ranged from 60.4% (in Mozambique) to 6.9% (in Zambia). Large in-country differences are noticed in 1994 and in 1985 in countries like Mozambique, Lesotho, Comoros, Zambia and Tanzania. The average figures for the region in 1994 and 1985 are 23% and 19% respectively.

As far as the structure of these economies is concerned we can see that in 1994, while the agricultural sector dominated the economies of Ethiopia, Tanzania, Burundi, Uganda, Rwanda and Malawi, the economies of Seychelles, Mauritius, Mozambique, Kenya, Comoros, Zimbabwe and Zambia were dominated by the service sector. Moreover, we notice the dominance of the industrial sector in the economies of Angola and Lesotho. Such production structures also characterized these economies throughout the 1980s. Annex 1 summarizes the structure of these economies in 1994 and (1985).

With respect to the external sector, one common feature (like most other developing countries) is the dominance of one or two commodities. Another common feature is the

dominance of primary commodities in most of the countries' exports. For example, copper alone accounted for 81.9% of total exports in the years 1989-93 in Zambia and in the same period crude oil's share in Angola's total exports was 89.3%. Annex 2B presents a description of the structure of exports of COMESA countries.

Moreover, the majority of these countries have frequently experienced current account deficits. These countries are also faced with increasing level of budget deficits resulting from too much spending by the government which, in most cases, crowded out private investment since "... government expenditure growth raises the monetary level of gross national income, which increases the demand for money, which, in turn, raises the interest rate levels which tend to depress the level of investment" (Teshome,1996:16). Like other African countries the countries in this subregion also faced overvalued exchange rates, which have penalized the traded goods sector (Frimpong-Ansha,1990), rising foreign debt service costs, inflation and highly regulated pricing mechanisms. In order to counter their economic problems, these countries are implementing Structural Adjustment Programmes which include trade liberalization.

As mentioned earlier, these countries formed a regional grouping (COMESA) on the assumption that it will bring about better performance with regard to economic growth. But does such an arrangement necessarily bring about a better economic performance? Before dealing with the nature of intra-COMESA trade, we look briefly at economic integration in general using the example of a customs union arrangement,⁴ and review economic cooperation among African countries.

⁴. The discussion of a customs union is chosen due to the relatively wide literature on it and also the application of most of its discussion to other kinds of economic integration. Moreover, COMESA is heading towards a customs union though its name implies a common market.

2.2 Economic Integration: An Overview

According to Salvatore (1990, p. 287), "The Theory of economic integration refers to the commercial policy of discriminatively reducing or eliminating trade barriers only among the nations joining together." The degree of economic integration ranges from preferential trade arrangements to free trade areas, customs unions, common markets, and economic unions. In a broader sense, regionalism in the context of trading arrangement is also similarly defined to mean the trend to establish linkages between and among a group of countries within a given geographical space, (in practice countries may not necessarily be geographically contiguous) driven by common and shared interests to cooperate in the areas of trade and other economic sectors in order to achieve a Free trade over and subsequently to establish a customs union with the understanding of the Article XXIV of GATT 1947 and the relevant Article of the Uruguay Round Agreement of WTO, 1995 [UNECA, 1996, P. 3].

Following Salvatore (1990) and Mannur (1995) we may identify five forms of economic integration.

1. Preferential trade arrangements. This is the loosest form of economic integration where member states face lower barriers than when trading occurs with other non-member nations.
2. Free trade area: is an agreement by a group of countries to remove tariffs, quota, etc. among themselves but each country is allowed to set its own barriers on trade with non members. Here we have intra-union free trade but different commercial policies.
3. Customs Union: like a free trade area it allows no tariffs or other barriers among member states. In addition to this it harmonizes trade policies among

members (the member countries have the same commercial policy) to be effective towards the rest of the world. What we have to note here is that, though goods and services move among members, there is still a barrier as to the movement of factors of production. The most often cited example here is the European Economic Community.

4. Common Market. In addition to the movements of goods and services, in this arrangement, factors of production (labour and capital) are allowed to move freely among members.
5. Economic Union. This goes beyond a common market in that not only are trade policies harmonized and factors are allowed to move among members, but also it requires the harmonization of other policies like fiscal and monetary policies. This arrangement also moves further towards the establishment of a common currency and banking system.

Economic integration, therefore, starts from the lowest degree of integration (preferential trade arrangement) and goes to the highest level (economic union) passing through the different levels in between.

In what follows we will briefly look at the possible impacts of economic integration on welfare with particular reference to a customs union.

Before Jacob Viner's (1950) Seminal work, it was believed without doubt that the creation of a customs union would increase the welfare of trading partners. Viner, however, showed such a presumption not to be necessarily so by introducing the concepts of trade creation and trade diversion.

Trade creation occurs when there is a shift in the source of supply from high cost domestic producers to lower cost producers in the partner country following the abolition of

trade barriers. Due to its specialization effect on production based on comparative advantage, trade creation is said to increase welfare of member countries [Mannur (1995), Iyoha (1997), Salvatore (1990), Sodersten and Reed (1994).] That is, it releases resources for use in those activities where the country has comparative advantage. A trade creation customs union is also argued to increase welfare in non-member states through its effect on the real incomes of trade partners because of a spillover into increased imports from the rest of the world (Salvatore, 1990). As far as trade creation is concerned, there are two effects that we should consider. One is the effect on production and the other is the consumption effect which Viner did not consider but considered by Meade, 1955; Lipsey, 1960; and Johnson, 1962.

On the other hand, trade diversion occurs when there is a shift in the source of supply from low cost external producers (rest of the world) to high cost suppliers in the partner countries. This is welfare reducing because a country is wasting resources as imports are directed towards less efficient producers (Sodersten and Reed, 1994; Mannur, 1995).

The net welfare effect of a customs union, therefore, depends on the strength of the two effects. That is, we cannot tell unambiguously that there are gains or losses from a customs union as it depends on the magnitude of the gains from trade creations and the magnitude of losses from trade diversion. A diagrammatical illustration is presented in annex 3.

After noticing that the formation of a customs union does not necessarily increase the welfare of members, research led to the identifications of the conditions under which member countries would benefit from such an arrangement. Salvatore (1990), for example, forwarded six conditions

- "1. The higher the initial tariff among the countries, the scope of welfare gain is large as the scope for trade creation is large.
2. If in pre-customs union arrangements, barriers on trade are low, the formation of a customs union will not lead to a costly trade diversion.
3. The larger the size of the countries and the greater their number in forming a customs union, there is a high probability of low cost producers falling into the union with the implication of higher trade creation than trade diversion.
4. The more competitive rather than complementary are the economies of members the larger will be trade creation.
5. The greater the geographical proximity of members, the higher will be the trade.
6. The higher the proportion of trade among countries before the formation of the union, the higher will be the welfare gain due to the possibility of having more trade creation than trade diversion."

To the above list, Hogendorn (1996) added the issues of elasticities of demand and supply in the member countries and argue that these should be high in order to benefit from a formation of a customs union. Though he presented conditions under which a customs union can be a success, Hogendorn is sceptical about the success of LDCs' customs unions by questioning the conditions themselves.

The above discussion focuses on the static gains of forming a customs union which are said to be less important than the dynamic gains which are related to economic growth. [Iyoha 1977; Salvatore 1990; Mannur 1995]. Dynamic gains are often associated with increased competition which helps to expand domestic and foreign investment and exploitation of economies of scale due to enlarged markets." A customs union turns out to be an effective way of expanding market size. An increased market size leads to increased

demand and through the profit-maximizing actions of producers to an increase in industrial output. This raises income per head which feeds back by raising demand and increasing market size. These now raise industrial output again and so on with the growth process becoming cumulative. Hence, a customs unions can play a critical role in shifting an economy from a stationary state to a dynamic growing one" (Iyoha, 1977, P. 91].

The dynamic benefits are not without questions. Harry Johnson (as quoted in Mannur, 1995) argued that economies of scale resulting from market integration are negligible. The proponents of regional integration also forwarded their doubts of such benefits for some set of countries. Iyoha (1977), for example, argued that a customs union may not necessarily lead to growth in most developing countries as the majority of these countries' exports are directed to the industrial country markets. The above discussion focuses on partial equilibrium analysis of a customs union. Further exploration and more useful analysis is given in a general equilibrium framework which incorporates the reaction of partners to the action of home country (see, for example, Mannur (1995)) but such a discussion is beyond the scope of this study.

From our discussion above, there is a need to look at the issue of regional integration from different angles. In this study the countries of our focus belong to COMESA and we should look at COMESA in the above light. In the following we will look at intra-COMESA trade but before that we briefly look at economic integration in Africa, focusing on what initiated it and what has been achieved.

2.3 A brief Look at Regional Integration in Africa

Several decades have passed since African countries started to discuss the necessity of economic integration among themselves. And, there have also been several attempts to

organize themselves in regional groupings. Such attempts are said to have been driven by both external and internal factors [Ndongko, 1985].

Among the internal factors, according to Ndongko, the most important one has been the awareness by African countries of the relatively small size of their individual national economies, limited markets, and differences between countries in their resource endowments, which impede individual country's attempts to bring about economic growth." Consequently, it has been contended by many African scholars and policy-makers that, if Africa is to achieve self-sustained development and raise its standard of living in the long-run, cooperation in the production and distribution of the basic necessities and strategic goods and services, on at least a regional level, must be regarded by all African states as a necessary condition for the successful attainment of their social and economic objectives" [Ndongko, 1985, P. 155]. On a theoretical ground, the issue of size has also been emphasized by Mbojoro (1985), though the actual success of a regional grouping according to him, largely depends on the organizational setup of the integration scheme. The other internal factor Ndongko mentioned is related to industrial activities in African countries. Here it is argued that, besides the very low levels of industrial activities and manufactured exports, the manufacturing sub-sector has very weak or negligible links with the other sectors which forced these countries to have a high level of dependence on imports from other regions. Economic integration, in this regard, therefore, is expected to solve this problem by efficiently allocating industrial activity and production capacity and by enabling the use of local raw materials in an effective way.

Regional economic grouping in Africa is also said to be motivated by the nature of internal trade between African countries and the developed world. According to Ndongko, the limited amount of foreign exchange obtained from exporting primary commodities

compounded with the high cost of imported goods, forced the African states to look at the alternative of grouping themselves. The other very important reason to have economic integration is the necessity of strengthening the bargaining power of Africa in different trade negotiations [UN ECA, 1996]. Moreover, regional integrations in other continents also encourage Africans to think about their own grouping.

The above points, among others, have all hastened movement towards the creation of regional economic groupings in Africa but what does experience tell us about their achievements?

As far as economic integrations in Africa are concerned the experience does not appear impressive. The following table, adopted from Hogendorn (1996, pp, 539-540), describes some regional trade arrangements among African countries.



Table 2.2: Regional Trade Arrangements Among African Countries

Regional Grouping	Year Founded	Members	Comments	Intra Union trade as % of total (where available)	
				1960	1990
UDEAC (Central African Customs and Economic Union)	1966	Comoros, central African Republic, Chad Congo, Equatorial Guinea, Gabon	The oldest, small, not properly organized and very poor performance with regard to implementation	5%	4.6%
East African Community	1967	Kenya Tanzania, Uganda	Most benefits were said to accrue to Kenya, the community disintegrated and borders were closed		
CEPGL (Economic Community of the Great Lakes States)		Rwanda, Burundi, Zaire	Has not yet been able to lower barriers	1%	0.2%
MRU (Mano River Union)	1973	Guinea, Liberia, Sierra Leone	Rendered ineffective by 1990s civil war in Liberia and armed in surgency in Sierra Leone	0.2%	0.3%
CEAO (West African Economic Community)	1974	Benin, Burkina Faso, Co'te d'Ivoire, Mali, Mauritania, Niger, Senegal	Reasonably good performance. For example, a cut in non tariff barriers and expansion of intra-union trade to 10%.		
ECOWAS (Economic Community of West African States)	1976	Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leon, Togo	Was scheduled to abolish all tariffs in 1989, but "progress negligible," and virtual paralys-is in the mutual reduction of trade barriers, "very strict rules of origin are a hindrance. Problems have arisen because the former French colonies in ECOWAS use the strictly managed CFA France while other members (Ghana, Nigeria, Sierra Leone) have had much looser money management and rapid integration. Also, the CEAO has trade rules not always compatible with those of ECOWAS.	1.2%	5.5%

Table 2.2 (Cont'd)

Regional Grouping	Year Founded	Members	Comments	Intra Union trade as % of total (where available)	
				1960	1990
SADDC (Southern Africa Development Coordination Council)	1980	Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zaire, Zimbabwe	More concerned with growth projects than with reductions in trade barriers. Squabbles over its domestic content rules.	2.4%	3.95
Legos Plan of Action	1980	All African Countries	No progress to report		

Source: JAN S. Hogendorn (1996), Economic Development (third edition) pp. 539-540.

From the above table, we can see that in the majority of cases attempts at regional integration have not been successful. For example, The average intra union trade as a percentage of total trade in 1985 was 1.9% whose corresponding figure in 1990 was 2.9%. The possible reasons for such sluggish performances, among others, include the tendency of benefits to concentrate on the better-off members and the inability of the better-off to compensate the others, lack of commitment by members and conflicting interests of similar groupings in the same region (Salvatore (1990), Ndongko (1985)). Also, such south-south trading arrangements are said to have more trade diversion.

We have tried above, to look at the issue of regional economic cooperation, first, by presenting a brief theoretical assessment of the customs union and then reviewing African integration schemes. In the following we present intra-COMESA trade. And, such an arrangement should be seen in light of the above discussion.

2.4 Intra-COMESA Trade

At the beginning of this chapter we mentioned that COMESA came into being as a replacement of PTA. One difference we noted between these two arrangements was that while PTA concentrated on government-to-government cooperation, COMESA emphasizes the private sector in recognition of the vital role the latter can play. Moreover, to meet the objectives which we have outlined earlier, member states have agreed on the following (OAU (1997), Appendix)):

- the complete elimination of tariff and non-tariff barriers to trade, the elimination of customs duties and the adoption of Common External Tariff;
- the free movement of capital, labour, goods and the right of establishment;
- standardised technical specifications and quality control;

- standardised taxation rates (including value added tax and excise duties), and conditions regarding industrial co-operation, particularly on company laws, intellectual property rights and investment laws; and
- the eventual adoption of a single currency and the establishment of a monetary union.

In light of the above agreements and under the overall goal of promoting sustainable growth and development in member states, one of the basic objectives of the PTA/COMESA strategy is to increase intra-COMESA trade to more than 25% of its global trade by the year 2000 and even more thereafter (Musonda (1997)) and to transform the trading group into a common market. But what has been already achieved concerning intra-COMESA trade?

During the years 1982-1992, the average figure for intra-PTA/COMESA trade as a percentage of Total PTA/COMESA trade with third countries was about 5.4% . Looking at exports and imports separately, we notice that intra-PTA/COMESA exports as a percent of total PTA/COMESA exports was about 6.1% on average in 1982-1992 and the corresponding figure for imports was about 4.4 % . This difference, though not so large, can be explained by the nature of imports which are predominantly intermediate goods and fuel whose sources are countries outside the union. [See Annex 4]. We can observe from the above figures that the overall trade among COMESA members has been limited and this casts some doubt on the possibility of generating enough capacity in member countries so that trading among each other can be enlarged.

As far as the direction of COMESA trade is concerned we notice the usual bias towards third countries. Of total COMESA trade, more than 90% is directed to third countries (see the chart in annex 5). Moreover, neighbours more often trade with each other rather than with non-neighbour COMESA members (Annexes 6 & 7 illustrate this) though

there are some countries (Kenya and Zimbabwe) that are trying to trade with a wide range of countries within the group. Furthermore, we notice the dominance of Zimbabwe, Kenya and Zambia in the case of exports, and the dominance of and Uganda, Tanzania and Mozambique in the case of imports as far as intra-COMESA trade is concerned.

Comparing the objectives and agreements of COMESA with what has already been achieved, there is a lot that remains to be done. Setting a goal of achieving 25% intra-union trade in the year 2000, but achieving something in the vicinity of 6% in 1992 demonstrates slack performance by member states. Moreover, though countries are trying to reduce their tariffs (For example Kenya reduced the maximum tariff from 170% to 60% and Rwanda from 270% to 100%) as required by the formation of the union, the objective of eliminating tariffs to zero level by the year 2000 seems to be an overambitious target. Furthermore, though tariff barriers are reduced, non tariff barriers seem to set some serious impediments to trade (UNECA, 1995). However, one thing that comes out as a success in PTA/COMESA trade arrangement is the establishment of supporting institutions. These include, among others: the Trade and Development Bank of Eastern and Southern Africa (The PTA Bank); the PTA clearing house; and the PTA Federation of Chambers of Commerce and Industry.

Different constraints have been identified to explain why performances have not been as expected. OAU (1997 P. 12) gives a good account of this by categorizing the constraints as economic, political or historical factors.

The following are the identified economic factors

- Competitive rather than complementary economics, leading to very narrow self interests;
- Orientation towards international rather than regional economies;
- Vulnerability to fluctuations in export earnings;

- Heavy indebtedness which constrains growth;
- inequality in distribution of benefits;
- Poor physical and other infrastructure; and
- Extreme poverty, negating long term visions.

The political factors include, among others, the existence of different ideologies among members and extreme personalization of power in individual countries. Colonial legacy with language barriers, border conflicts, different currency zones, previous trading partners, among others, constitute the historical factors.

The efforts that should be made by member countries can be inferred from the constraints identified. That is, countries need to build their supply capacities, improve infrastructures and develop support services. They also need to improve their institutional arrangements and timely implement COMESA decisions (like tariff cuts) (UNECA, 1995) (Musonda (1997)). All in all, they need to design schemes that enhance intra-regional trade, depoliticize regional cooperation, resolve border conflicts and maximize short term gains while minimizing the short term costs of cooperation (OAU(1997), P. 13). Moreover, it is argued there is a scope to enhance intra-COMESA trade if countries can identify their potential, for example, in exporting (Annex 8).

This chapter discussed the issue of economic cooperation by focusing on the trading group COMESA to which our sample countries belong. Our intention was not to go into the details of economic integration schemes. Rather, we tried to show a general picture of the countries under the study in the framework of regional economic integration which they adopted to bring about better economic performance. In the following chapter, we present a literature review focusing on the export-economic growth nexus.



III. LITERATURE REVIEW

3.1 Theoretical Background

The idea that trade can act as a stimulant for growth has a long history and is also a subject of controversy. Many economists [Balassa(1978) and Tyler(1981)] have the view that trade plays the role of engine of growth and the point of departure is the principle of comparative advantage developed by Ricardo. The latter came as a replacement of the notion of absolute advantage forwarded by Adam Smith. For Ricardo, the basis for comparative advantage is differences in factor productivity which is determined by environmental differences between countries. Defining comparative advantage in this way, he stated that a country will produce and export the commodity in which it has a comparative advantage. Meaning, the comparative advantage principle asserts that a country will specialize in the export of the products that it can produce at the lowest relative cost.

The Ricardian theory of international trade is accused of several limitations which are often centred on three issues (Iyoha (1995), p.8:

- a. The explanation of the reason for intercountry differences in comparative advantage is rather nebulous and is less than satisfactory when applied to manufactures.
- b. The assumption of one factor of production, Labour is unsatisfactory. This assumption led Ricardo to use the labour theory of value, which itself is unsatisfactory.
- c. Differences in the international pattern of demand are ignored. Thus, the model is supply driven.

As an attempt to modify the Ricardian theory, the neo-classical theory of external trade evolved. Neo-classical economists (following the Heckscher Ohlin framework) also

associate the cause or existence of trade with international differences in relative factor supplies (relative factor endowments), cross country differences in production functions, and intercountry differences in the pattern of demand [Todaro, (1994), Iyoha (1995)]. According to neo-classical (modern) theory, each country tends to have a comparative advantage in that commodity which uses the country's abundant factor. That is, a labour abundant country, for example, tends to export commodities which are relatively labour intensive and imports capital intensive products. In all cases, conventional trade theory associates trade, if done according to comparative advantage, with economic growth.

Specifically, it is argued that trade has both static and dynamic gains (Iyoha 1995, Mullei 1994). The static gains are said to derive from expanded opportunities to reallocate productive resources through specialization along a given production possibility frontier. These are also called direct benefits. On the other hand, the dynamic gains from trade are said to arise from the outward move of the country's production possibility frontiers. In connection with the dynamic gains of trade four points are identified by Harbeler (1988) quoted in Iyoha 1997, pp. 5-6.

First, trade provides material means (capital goods, machinery and raw and semi-finished materials) indispensable for economic development. Secondly, even more important, trade is the means and vehicle for the dissemination of technological knowledge, the transmission of ideas, for importation of know-how, skills, managerial talents and entrepreneurship, Thirdly, trade is also the vehicle for international movement of capital especially from the developed to the under-developed countries. Fourthly, free international trade is the best anti-monopoly policy and the best guarantee for the maintenance of a healthy degree of competition.

The conventional trade- theory has been challenged on the ground of its explanatory and predictive power. At least three factors stand out (Wangwe, 1990):

- a. The changing character of international trade.
- b. The changing roles and relative competitive positions of countries in the world economy.
- c. Changing views in the field of economics, especially as regards the analysis of industrial structure and competition.

Its empirical validity has also been questioned - the Leontief Paradox, for example (Sodersten & Reed, 1994). Patterns of trade have also changed where the north-north trade is getting more importance in which case countries with similar factor endowments are trading among each other (see for example Linder, 1961).

Moreover, the conventional trade theory implies that developing countries with relatively more unskilled labour and land endowment should continue to produce and export raw materials, fuel, minerals and food which use the above factors more intensively and import manufactured goods which use relatively more capital and skilled labour. Such an arrangement then cause all or most of the dynamic benefits of trade and industrialization to accrue to the developed nations leaving the poor economies of developing nations poorer. Therefore, most developing countries attack the traditional theory of trade on the basis of its being completely static and irrelevant to the development process.

Recognizing the above weaknesses, Salvatore (1990) suggested the technique of comparative statics to asses the traditional theory in terms of changes in factor supplies, technology and taste. Here, he argued that a nation's pattern of development is not determined at a given point in time and forever rather it changes with existing conditions. "... Developing nations are not necessarily or always relegated by traditional trade theory

to export mostly primary commodities and import mostly manufactured products. For example, as a developing nation accumulates capital and improves its technology, its comparative advantage shifts away from primary products to simple manufactured goods first and then to more sophisticated ones... As a result, traditional theory, with the qualifications noted above, is of relevance even for developing nations and the development process" (pp. 313-314).

Recently, the dynamic aspect of comparative advantage rather than the static one has received more attention. Here the role of innovations and technological advances are said to be the basis for comparative advantage. However, here also, it has been argued that the dynamic comparative advantage theories apply only to a limited number of manufactured commodities and only to a limited number of countries which are endowed with research and development capabilities [Iyoha, 1995].

Other theories of trade (under the category of contemporary theories of external trade) also developed to modify certain aspects of the conventional theory of external trade. In the following we present some of them and the discussion follows Iyoha, 1995.

One of the contemporary theories is developed by Staffan B. Linder (hence the name Linder's theory of external trade) which accepts the neo-classical theory regarding primary commodities but argues against it for being inadequate in explaining trade on manufactured commodities. According to Linder trade in manufactured goods depends on the domestic market and his argument is based on the following points (Iyoha 1995, PP 11-12).

- "a. Potential demand in the home market is more visible to entrepreneurs and they are therefore more likely to respond to it;
- b. invention and innovation are more influenced by demand in the home market and are therefore likely to respond more to it;

- c. the process of adjustment and adaptation is more likely to be intense when it concerns the home market. This is because the learning process requires feedback."

What Linder then argues is that trade in manufactured goods will be high among those countries with similar demand structure and per capita income.

In Linnemann's size and distance theory called the Gravity model, trade is said to vary directly with the size and inversely with the distance among countries. Linnemann, in testing the theory, tried to explain how variations in the volume of exports are affected by size (population and national income) and distance. In neo-classical theory however, distance was not considered to be a barrier to trade.

The availability theory of international trade, on the other hand, simply states that for some scarce resources like oil trade exists because a given country has that particular resource.

For economies functioning inside their production frontier, the vent-for-surplus theory says that trade exists because involving in it helps a country move to and produce along its production possibility frontier.

Another theory, developed by Vernon (1966) ,is called product cycle (Imitation/Technological gap) theory. The basic hypothesis here is that a country exports a commodity innovated internally at least for some time. Here comparative advantage is said to rely on innovation. But such a comparative advantage, according to Vernon, does not last forever as others start to produce the same commodity. The Product cycles refer to the different phases that a given product passes through. The first one is the sale of the new, innovated product to the domestic market. The second phase is the export of the product. The third phase involves the possible movement of the company innovating the product to

foreign countries to reduce transport costs and beat a high tariff in a given foreign market. In the fourth phase the product will be imitated and standardized, and will be produced elsewhere. The cycle will end when the innovator country starts to import the product. The important factor here is the time lag between innovation and imitation hence the name imitation gap.

Finally, there is the theory of strategic trade policy which tries to explain trade in manufactures that uses advanced technology. This theory rejects the assumptions of constant returns to scale and perfect competition (assumed by the conventional trade theory) and replace them with the assumptions of increasing returns to scale and imperfect competition. The combination of these assumptions with the requirement of high-tech industries for large scale research and development investment leads to an oligopolistic market structure and such an arrangement motivates the intervention of the government as those industries have strategic importance.

Though contemporary theories have been advanced to modify the conventional theory, they are accused of being incomplete in their attempt to explain the three major issues of international trade theory, namely, the cause, composition and volume of trade. So, it has been argued in the literature that none of the above theories could be used as a substitute for the neoclassical theory. "The contemporary theories are stimulating but incomplete and can not replace the neoclassical theory of external trade" Iyoha (1995) P. 14.

The beneficial effect of external trade on growth in the neoclassical sense as discussed above is described by the notion of trade as an "engine of growth" where export is given a greater role in bringing about growth. Iyoha(1995) gave examples of nations where trade has actually acted as an engine of growth. These include: Canada, Australia, Sweden and Denmark where the transition from developing to developed nations is said to have been

primarily driven by international trade. In the second half of the 20th century, the strong performance of the economies of the "four tigers"-South Korea, Taiwan, Hong Kong and Singapore has been attributed to a healthy and strong external trade sector.

Others, however, have argued against the view that trade is an engine of growth, especially, for the less developed countries (LDCs). Mannur (1996), for example, expressed his disagreement by stating that "the less developed countries (LDCs) view foreign trade not as a proverbial "engine" of economic growth, but as a mechanism of global income disputes between the rich and the poor countries where the weak are exploited by the strong. LDCs think that foreign trade was, and still is, an engine of growth for the less developed countries of the 18th and the 19th centuries who are today's developed industrial societies."

A somewhat intermediate view was given by Kravis (1970) where trade was considered not an engine of growth but as a handmaiden, playing a supportive role while internal conditions are emphasized. "... The term "engine of growth" is not generally descriptive and involves expectations which can not be fulfilled by trade alone; the term "handmaiden of growth" better conveys the role that trade can play." (P. 869)

So far we have dealt with some theories and arguments about international trade. Our aim, however, is to test the hypothesis related to the export-economic growth nexus. In what follows, we examine the mechanisms through which exports affect economic growth.

3.2 The Export-Economic Growth Nexus

One subject of considerable interest to development economists is the issue of the link between export performance and economic growth. Most economists argue that a strong export performance assists economic growth while some say that there is no significant relationship between export growth and economic growth. This, of course, is an empirical

issue which should be tested in the context of different settings. The present study tries to test this relationship for Eastern and Southern Africa countries.

Balassa (1989) cited the "staple theory" of economic growth developed by Innis (1957) to explain three ways through which increases in exports lead to economic growth. First, export growth is said to have backward linkages by creating demand for transport facilities and domestically produced inputs. This, in turn, stimulates the development of the agricultural sector (which is the major sector in most developing countries). The second point is that trade provides an impetus for the establishment of processing activities. The creation of a final demand linkage where income increases in the export sector are spent on domestically produced goods and services is the third one.

Feder (1982) associates export growth with various benefits. He mentions greater capacity utilization, economies of scale, incentives provided for technological improvement and efficient management due to competitive pressure from abroad. He argues that the above benefits are real because managerial productivities in export-oriented industries are higher than those in non-export-oriented ones. From this argument, he concludes that countries which have adopted policies that are less biased against exports benefited from closer-to-optimum resource allocation and higher growth.

In addition to efficiency and enlargement of the market size effects, Dollar (1992) (quoted in Berg and Schmidt (1994)) provided two additional benefits of exports. According to him, exports help the growth of a country's economy by improving productivity as "first there are externalities associated with export industries; second, export earnings allow a country to use external capital without running into difficulties of servicing foreign debt." [Berg and Schmidt (1994), P. 249].

Kruger (1985) gives some explanations for the widely accepted technological effects of exports. She argues that since poor countries have relatively small domestic markets for most manufactured goods and profitability is confined to selling to these small markets, production and capacity will be uneconomic as they are of small size. By orienting production towards exports, she points out, developing countries are able to construct manufacturing facilities of efficient size and hence take advantage of economies of scale.

In addition to the minimum efficient size, she associates the second technological effect with relative factor endowments. "Poor developing countries have, by definition, abundant supplies of relatively unskilled labour and relatively little capital (and skills). An export-oriented strategy permits countries to use the international market to exchange their own relatively labour intensive commodities for capital intensive goods. They are able to take advantage of the division of labour and of specialization." Kruger, 1985:198 To this she adds two other advantages of exports. One is the capability of exports to prevent countries from making some of the costly mistakes often associated with inward-oriented, restrictive trade and development industrial strategies. The other is that exports force policies upon governments that generally lead to better economic performance by the private sector.

For Winblatt and Schrage(1985), however, manufactured exports rather than primary agricultural commodity exports facilitate economic growth. "Unlike the case of primary commodities quantum changes in manufactured exports do stimulate economic growth, implying that comparative advantages are embodied in manufactures rather than in primary commodities".

In Lamfalussy's model, export-led growth is important for three main reasons (quoted in McCombie and Thirlwall, 1994 P. 425):

- i) the rate of growth of exports, as a determinant of demand, is assumed to be an important determinant of investment;
- ii) growth requires imports, and if exports do not rise as fast as import requirements, growth will be constrained by the balance of payments; and
- iii) the smaller the domestic market, the greater the importance of external demand in enabling economies to reap economies of scale in production to make enterprises viable that would otherwise not be so.

Beckerman's export-led growth model demonstrates a virtuous circle in productivity growth induced by an initial export stimulus. Higher export and output growth, he argued, implies higher productivity growth which in turn contributes to a lower rate of growth of wage costs per unit of output. The lower rate of increase in unit labour costs then leads to a lower rate of domestic price increase which results in further acceleration in the rate of growth of exports as export growth is taken to be a function of the difference in the rate of growth of domestic and foreign prices expressed in the same currency. In this way, the export-induced virtuous circle in productivity growth becomes complete. Productivity gains are seen to translate in an increase in price competitiveness so that, in addition to the positive influence of exports on productivity, the model also predicts a causal influence of price competitiveness on exports (see Kunst and Marin (1987) for details).

In contrast to the above arguments about the links between exports and economic growth, some people have argued against the view of promoting exports by developing countries. This position is associated with the notion of export pessimism with its two brands: the old and the new. First, the old export pessimism had its origins in the thinking of Raul Prebisch (1950) and Hans Singer (1950) based on two fundamental premises (as quoted in Edwards 1993, P. 1358).

- "1. A secular decline in the international price of raw materials and commodities would result in the absence of industrialization in the LDCs, in an ever-growing gap between the rich and poor countries, and
2. In order to industrialize, the smaller countries required (temporarily) assistance in the form of protection to the newly emerging manufacturing sector which is in line with the infant industry argument for industrialization."

Others have taken the view that trade acts as a lagging factor instead of being an engine of growth as far as the Least Developed Countries (LDCs) are concerned. Nurkse, for example, advanced some reasons (quoted in Iyoha 1995 and 1997).

- a. The advanced economies have shifted away from industries where the raw material content of finished products is high to those where it is low;
- b. due to the rising share of services in total output of advanced economies, the raw material demand is said to lag behind the rise in their national output;
- c. low income elasticity for many agricultural commodities;
- d. substantial economies have been achieved in the uses of natural materials;
- e. man-made substitutes are increasingly displacing natural raw materials.

In sum, the old brand of export pessimism is associated with the idea of low price and income elasticity of demand and cyclical movements in prices as far as the exports of developing countries are concerned (Prebisch, 1950). Moreover, it was argued that markets could not absorb all the exports that would come if developing countries shifted to export promotion strategy at the same time. The result of such a pessimistic view was the adoption of an import substitution strategy (ISS) by many developing countries, a strategy which typically included: (IMF, 1992)

- high levels of protection to a number of industries with a very wide range of effective protection, i.e., protection against the value added component of imports;
- fairly detailed and complex quantitative controls and bureaucratic regulations; and
- an overvalued exchange rate.

Indeed by the growth performance of many developing countries the adoption of an import substitution strategy was not, however, a success. Some reasons for the failure are the disadvantages that are associated with ISS. These include (Salvatore (1990)):

- "1. Domestic industries grow accustomed to protection from foreign competition and have no incentive to become more efficient.
2. Import substitution leads to inefficient industries because the smallness of the domestic market in many developing nations does not allow them to take advantage of economies of scale.
3. After the simpler manufactured imports are replaced by domestic production, import substitution becomes more and more difficult and costly (in terms of the higher protection and inefficiency) as more capital intensive and technologically advanced imports have to be replaced by domestic production" (P. 327).

Also, the export pessimism which was the basis for the adoption of ISS was accused of being ill founded. Bhagwati (1988), for example, pointed out the phenomenal growth of exports and income in many Asian countries, the shift in the export composition of developing countries towards manufactures, and the potential for intra industry specialization

as evidence against the notion that world demand is a binding constraint for developing countries' exports.

The failure of ISS has led developing countries to shift to an export led growth strategy with the adoption of incentive structures which do not discriminate against exports. The promotion of efforts across the world has given rise to the second brand of export pessimism. This new export pessimism view is mainly concerned about the protectionist measures of developed countries which tend to undermine the shift to export promotion strategies. The new pessimism, however, is also said to be ill founded. As Mullei (1994) argued, "... export pessimism (declining terms of trade or protectionist backlash from developed countries) completely ignores the fact that increased exports by developing countries are matched by increased imports from developed countries and since global mechanisms for export promoting trade strategy call for a more open trading regime, there can not be but little basis for any developing country to be unduly pessimistic about its export prospects. Exports of developing countries still constitute a very small share of world trade in exports and need not be targeted at the developed country markets only. A significant portion of exports from a developing country can also be directed at other developing countries" P. 39.

Considering the use of commodity exports, inspite of the widespread commodity pessimism, a number of countries have been successful in bringing about per capita income growth through the exports of primary commodities. At subsectors level also, there are many commodities that have shown a high level of production and export growth in developing countries. These success stories then cast some doubts on the validity of commodity-dependence pessimism (Yabuki and Akiyama, 1996).

Yabuki and Akiyama argue that commodity dependence per-se is not the root of the problem. They suggest the conduct of appropriate policies as solutions. These include "eliminating price controls and state monopolies, promoting research and development, developing infrastructure in transportation and communication, enticing foreign capital and technology transfers, and establishing a legal system for the use of innovative financial instruments" (p. 40).

However, the protectionist threat can not be overlooked. As Panagariya and Schiff (1990) argued: "The general case for export pessimism has lost much of its force, at least for now. Concerns have remained very much alive, however, with respect to some specific countries and commodities. Thus, fears continue to be expressed that a simultaneous expansion of exports of certain commodities (e.g., Cocoa, Coffee and tea) by several African countries, most recently resulting from the adoption of structural adjustment programs, may lead to a decline in real incomes and exports revenues of the countries" P. 170.

has it explained
and why

Despite the disputes, most economists agree with the idea that a strong export performance facilitates economic growth. But, they argue that different factors affect the transmission of the benefits to the rest of the economy. Balassa for example argues that

"the extent of transmission of economic growth from the export sector to the rest of the economy will vary positively with the size of the export sector and the rate of growth of exports and negatively with relative importance of foreign ownership in production. Other factors that bear on this relationship include the use of skilled against unskilled labour, the capital intensity of the production process, and economies of scale in export production, their requirements of exports, the availability of underutilized factors in the rest of the economy, the level of entrepreneurial skills, and the distribution of income." [Balassa (1989), P. 1666]

In emphasizing the importance of foreign ownership in production Todaro (1994) said that "with the proliferation of multinational corporations and the international ownership or the means of production in a wide range of countries, aggregate statistics for LDC export earnings may mask the fact that LDC nationals, especially those in lower income brackets, may not benefit at all from these exports. The major gains from trade may instead accrue to non nationals who often repatriate large proportions of these earnings. The trade that is being carried out may look like trade between rich and poor. But in reality such trade is being conducted between rich nations and other nationals of rich nations operating in Third World."

Lewis (1989), on the other hand, argues that how the benefits (what he calls the economic rents) from exports are managed will lead to either success or failure of primary commodity exporting countries. According to him, answers to the following questions (which all relate to economic policy) are important in analyzing the differences among primary exporting countries.

1. By what method should the rents be captured?
2. How should the rents, once captured, be used?
3. How can linkages (other than through the government budget) from rent-generating primary exporting activities to the rest of the economy be exploited to encourage broader-based growth?
4. How should cyclical fluctuations in export earnings be managed?

A well thought approach to the above questions, it is said, will enable developing countries (most of which are primary commodity exporters) to be beneficiaries of their export sector.

So far the paper has tried to provide some background to the hypothesis, that "export growth accelerates economic growth." Now, it reviews the empirical evidence.

3.3 A Review of Empirical Evidences

The hypothesis that "export growth accelerates economic growth" has been tested by different economists in the context of developing countries. Although, most of these tests [in the form of ordinary least squares regression and/or correlation coefficients tests] are based on cross-country analysis, tests based on time-series studies have also been carried out. We review both types of studies below.

3.3.1. Cross-sectional studies

Michaely (1977) tried to test the above hypothesis by examining the correlation between the variables which represent these two magnitudes of economic performance. Data was used for 41 less developed countries, categorized into two sub-groups based on per capita income, for the years 1950 to 1973. For the more developed countries the Spearman rank correlation coefficient was found to be 0.523 and this was statistically significant at 1% level. This established a positive association between export performance and economic growth for the better-off countries. On the other hand, Michaely found a rank correlation coefficient of -0.04 which is practically zero for the least developed ones. What is implied here is that growth is affected by export performance only after a minimum level of development is attained.

Balassa (1978) tested the hypothesis for eleven developing countries (the countries chosen here have established an industrial base) for the period 1960-73. He found a correlation coefficient figure of 0.703 which was statistically significant. Balassa also

performed a regression analysis by including exports in a production function. He found all regression coefficients to be significant at 5% level. He interpreted the regression coefficient of the export variable to imply that a one per cent rate growth of exports would be associated with 0.04 percent growth rate of GNP.

⊕ Tyler (1981), using the average real growth rate of total exports as a regressor in analyzing the relationship between GDP growth and export growth for the period 1960-1977, found a positive and significant relationship between GDP growth and export growth for 55 middle income developing countries.

In line with the hypothesis which states that the marginal productivity of factors is higher in the export sector and that exports generate positive externalities, Feder (1982) undertook a test on a sample of semi-industrialized less developed countries for the years 1964-1973. He found the coefficient of the export variable (which incorporates the above productivity and externality effects) to be positive and significantly different from zero supporting the main hypothesis presented earlier. Feder concluded from his result that growth in developing countries cannot be attained by merely increasing the level of capital and labour but it should be complemented by reallocation of the existing resources from the less efficient non-export sector to the more efficient export sector.

⊕ Kavoussi (1984) did his analysis by separating his sample of 73 countries into two groups (low income and middle income) based on per capita GNP (using \$360 as the benchmark) for the years 1960-1978. He sought to determine whether the relationship between growth of exports and that of the economy is affected by the level of development (as argued for example by Tyler). In both sets of countries, Kavoussi found the coefficient of the export variable (growth rate of exports) to be positive and highly significant. Furthermore, in his attempt to examine the impact of the composition of exports on the



relationship between exports and growth, he found the growth of primary exports of low income countries to be strongly associated with economic growth. On the other hand, among middle-income countries, gains from export expansion were found to be significant only for those countries where there was a shift to exports of manufactured products.

Having earlier shown the positive impact of exports on economic growth, Balassa (1985) re-examined whether that positive impact exists if the time coverage is changed. In particular, he chose the 1973-79 period of external shocks. This period of oil shocks affected many developing countries adversely. In particular, the balance of payments deficits were substantial. His idea was to test whether the already established positive relationship between exports and growth in the period of world rapid economic growth also applied in times of world recession like the period of the oil shocks. He utilized the same framework as in his earlier work but included countries in a lower rank of development.⁵ He found that the rate of growth of exports positively and significantly affected the rate of economic growth. He also obtained a similar result using the alternative export variable proposed by Feder (export growth multiplied by the share of exports to GDP). Furthermore, by including some policy variables in his regression, he concluded that outward oriented policy at the beginning of the period of external shocks as well as reliance on export promotion in response to the shocks have favourably affected growth.

Obedokun (1991), tried to look at the issue by using cross section data that covers 85 countries. The countries so chosen were from different regions of Africa, Asia, and the Western Hemisphere. He also divided the period of estimation into two, 1970-80 and 1980-87. Concerning the African countries, he found export to be an engine of growth in both

⁵. His study included, among others, Zambia, Mauritius, Kenya, Tanzania and Malawi which are also included in the present study.

periods. His analysis is based on two types of models (like that of Ram(1987) as described latter).

Martin Lussier (1993), made a comparative study of works done by Fosu (1990a) and Helleiner (1986). His results reveal that different model specifications (the way the export variable is used) can best explain the difference in the authors' empirical results⁶. Besides the comparison, he extended the empirical investigation to the 1980's (Fosu and Helleiner's works covered the 60's and 70's). His results reveal that, whereas no export coefficient estimates were significant when cross-section data were employed, all export growth coefficients (different export growth coefficients because data was divided in 3 country sets - SSA, Low-income and African countries) were positive and significant when panel data were used. Moreover, the estimations results were found to be extremely sensitive to the specification of the export variable.

⊕ In an attempt to identify the main determinants of exports and economic growth, Gylfason (1997) tried to look at the effect of primary exports on growth. He used a cross sectional data covering 160 countries over the 1985-1994 period. He found the effect of primary exports on growth to be negative. He concluded that "... Other things being equal, in countries with a primary export share of 80 percent, the rate of growth of per capita GNP will be 1.2 percent below that of other countries where primary exports account for only 20 percent of merchandise exports"(P.27).

3.3.2. Time-series Studies

Arguing that the hypothesis of export promotion should be taken to be not an

⁶ While Fosu found a positive and significant relationship between export and output (using export growth rate), Helleiner's result showed the relationship to be neither significant nor positive (using export share in output).

assertion of correlation, but also an assertion of causation, Jung and Marshall (1985) used Granger causality test to examine the long-run relationship between export and growth for 37 developing countries for the period 1950-1981. They found significant positive relationships for only 4 countries. The surprising thing about their finding was that for the countries believed by most observers to have sound export growth policies (like Taiwan and Korea) there was no statistical support for the export-led growth hypothesis.

Instead of using GDP growth as a dependent variable, Chow (1987) used industrial development which is proxied by manufacturing production. Using Sims' causality test for eight newly industrialized countries, he found bidirectional causality between exports growth and development of manufacturing industries in six of the eight countries and unidirectional causality in one country (running from growth of exports to development of manufacturing industries). He concluded that exports not only promote the growth of national income but also lead to structural transformation in developing countries.

Arguing that differences among countries is masked when a cross-country analysis is done, Ram (1987) performed time series analysis on 88 countries for the period 1960 to 1982. (He, however, also reported cross-country results). He used two models: one was the conventional production function specification with the growth of exports included as an argument. In the other model the export variable was specified to capture the productivity and externality effects of exports. Country specific time series results have shown the coefficient of the export variable (in both formulations) to be positive for 80% of the countries, 50% of which are statistically significant at least at the 90% confidence level. The coefficients of the export variables with negative signs were not statistically significant.

Concerning his cross-country analysis, Ram found the estimated coefficients of the export variables to be positive and statistically significant in all cases except for low-income

LDCs over the 1960s. The cross-section analysis covered two sample periods, one from 1960 to 1972, and the other from 1973 to 1982.

Suggesting the necessity of checking for the stationarity and cointegration properties of the original exports and GDP series before using Granger or Sims causality tests, Bahamani-Oskooee and Alse (1993) conducted a Granger causality test augmented by the above suggestions. Specifically, an error correction term was included in the Granger's formulation and the error-correction models so formed introduced an additional channel through which Granger causality could be detected. Taking nine LDCs in their analysis, they obtained bidirectional causality between export growth and output growth for all countries in their sample.

④ In line with the view of Ram that cross-section studies obscure intercountry differences and discard information about dynamic behaviours within countries, Berg and Schmidt (1994) conducted a time series analysis (on a country basis) on the issue of international trade and growth. They performed the analysis for 17 Latin American countries for the period 1960-87. Using exports as a proxy for international trade, they found a positive long-run relationship between export growth and economic growth for the majority of the 17 countries. What is important about their work is their attempt to closely deal with the issues of possible spurious regressions, non-stationarity and cointegrating relationships among variables. The model they use is the conventional framework where the growth of real exports is included in a neoclassical type production function and where the growth rate of labor force and investment share to GDP are used as additional arguments. Moreover, they specify different equations for different countries depending on unit root tests' results.

④ Iyoha (1995), tested the hypothesis for Nigeria, using current export earnings and one period lagged GDP as regressors and current GDP as regressand. He found, using OLS

estimation, 0.23 and 1.12 as short-run and long-run elasticities respectively, which led him to conclude that exports have powerful effects on economic growth. In his work, he used a time series analysis for the period 1974-1993.

Iyoha (1997) also tested the same hypothesis using data from ECOWAS (Economic Community of West African States). He undertook both cross-country and country specific time series analyses. The cross country analysis found the export variable to be positive and significant. The country specific time series results also found the export variable to be positive and significant in 12 out of 14 countries considered. Both bivariate and multivariate models were estimated using OLS, in the multivariate case other trade variables (debt ratio, debt service ratio, openness measured by the ratio of exports plus imports to GDP and terms of trade) were used apart from exports.

Amoateng and Adu (1996) argue against the majority of bivariate causality analyses (for example those which use Granger causality test) on the ground that they omit other relevant variables which can bias the results. In line with this argument, they included external debt service as a third variable and conducted a trivariate causality relationship. They suggested that, "... the expected positive relationship between export revenue and economic growth may not be observed because the resources from exports are directed to servicing external debt instead of investment." (P. 22) The trivariate causality test was conducted for 35 African countries (where sub-samples were formed according to the level of income and region) for the period 1971-1990. They found statistically significant relationships: (i) between growth of GDP and growth of exports; (ii) between GDP growth and debt servicing; and (iii) between export growth and debt servicing. The implication of these findings is that higher GDP growth rates are associated with high growth rates of both exports and external debt service. This means that, if a greater proportion of the export

revenue of developing countries is used to service external debt, then what is left will be very little to finance investment and bring about growth.

The empirical evidence we have reviewed shows us that the issue of export-economic growth nexus still remains open for further investigation though most results reveal positive association. Most of the studies focus on cross-section analysis with different shortcomings. These include the obscurity of important intercountry differences, the inappropriate use of period average and the loss of dynamic behaviour within countries. On the other hand, most of the time series analyses (with the exception of Berg and Shmidt (1994) that regress output growth on export growth (or this growth multiplied by the share of exports in GDP) neglect the issues of spurious regression, stationarity and cointegration which are very important concepts. In this paper we try to deal with these shortcomings by emphasizing time series analysis. The following chapter discusses the models, methodology and data that will be used in our analysis.

IV. The Model, Econometric Method and Data

4.1 Model Specification

The basic sources of growth model frequently used in the literature [see for example, Khan and Reinhart (1990), Helleiner (1990), Greenaway et al (1994)] in the context of developing countries can be presented as⁷

$$\frac{\Delta Y}{Y} = \alpha_0 + \alpha_1 \frac{I^*}{Y} + \alpha_2 \frac{\Delta L}{L} + \alpha_3 \frac{\Delta Z}{Z} \dots (1)$$

where $\frac{\Delta Y}{Y}$ = the rate of growth of GDP,

$\frac{I^*}{Y}$ = the share of investment to GDP,

$\frac{\Delta L}{L}$ = the rate of growth of labour force,

$\frac{\Delta Z}{Z}$ = the rate of growth of other factors,

α_1 = marginal productivity of capital

α_2 = the marginal contribution of labor

α_3 = the marginal contribution of other factors.

In the above equation proponents of export-led growth like Balassa and Tyler include the growth of exports in place of other factors⁸. Therefore, the basic model to test the

⁷ This is a standard production function growth model. *The investment variable can also be in growth rate form as used by Tyler.

⁸ Some use export share to GDP or the growth rate of this ratio (See for example Sheehey (1992)).

hypothesis can be written as⁹:

$$\frac{\Delta Y}{Y} = \beta_0 + \beta_1 \frac{\Delta I}{Y} + \beta_2 \frac{\Delta L}{L} + \beta_3 \frac{\Delta X}{X} \dots (2)$$

where $\frac{\Delta X}{X}$ = is the rate of growth of exports

(the interpretation of the other variables remains the same as in equation 1)

Equation (2) is one variant of the basic model used in this thesis to test the hypothesis, and we call it the conventional formulation.

A more interesting formulation that provides a formal rationalization for the inclusion of export variables in growth equations is provided by Feder (1982). Feder's framework specifically identifies two basic justifications for incorporating export variables. One is the existence of productivity differences between the export sector and the non-export sector (where the former is assumed to be more productive). The second is the assumption of the existence of beneficial externalities generated by exports. The implication of these two points is that export growth permits the attainment of closer-to-optimal resource allocation and hence higher growth.

Given the above justification for the inclusion of the export variable in the growth models, the model which is used in this study (from now on called Feder's formulation) can be derived as follows.

Following Feder(1982),we begin with an economy that has two distinct sectors (exports and non-exports) though in reality we have firms producing for both domestic and international market. The two sectors' output are function of the factors allocated to the

⁹ One can derive such an expression by taking total differential on both sides of a production function of the form $y=f(L,k,x)$.

sector (rather than aggregate production function). As it is assumed above that exports have beneficial externalities on the non-export sector, the output of the non-export sector is also a function of exports.

$$\text{Let } N = F(K_n, L_n, X) \dots (3)$$

$$X = G(K_x, L_x) \dots (4)$$

where N = non-exports

X = exports

K_n, K_x = respective sector capital stock

L_n, L_x = respective sector labour force



If marginal factor productivities were the same in

both the export and the non-export sectors the ratios $(\frac{G_L}{F_L} \text{ and } \frac{G_K}{F_K})$ would have been one.

However, since it is assumed that marginal productivities are higher in the export sector the above ratios differ by a factor δ .¹⁰

$$(\frac{G_L}{F_L} = \frac{G_K}{F_K} = 1 + \delta \dots (5))$$

$$\text{where } G_L = \frac{\partial X}{\partial L} \quad G_K = \frac{\partial X}{\partial K}$$

$$F_L = \frac{\partial N}{\partial L} \quad F_K = \frac{\partial N}{\partial K}$$

These ratios represent each sector's marginal productivity with respect to labour and capital.

Example, $G_L = \partial x / \partial L =$ marginal productivity of labour in the export sector.

A number of reasons can be cited as to why marginal factor productivities are higher in the export sector. As discussed previously one can mention severe competition that exports face with the rest of the world which induces innovation, adaptability, and efficient management of resources.

¹⁰ δ contains factor productivities not productivity differentials which are due to externalities.

By differentiating equations (3) and (4) we get:

$$\dot{N} = \frac{\partial N}{\partial K} \cdot \dot{K}_n + \frac{\partial N}{\partial L} \cdot \dot{L}_n + \frac{\partial N}{\partial X} \cdot \dot{X}$$

Since \dot{K}_n (the rate of growth of capital stock) can be approximated by investment (I_n),

$$\dot{N} = F_K I_n + F_L \dot{L}_n + F_X \dot{X} \dots (6)$$

$$\dot{X} = \frac{\partial X}{\partial K} \cdot I_x + \frac{\partial X}{\partial L} \dot{L}_x$$

$$\dot{X} = G_K I_x + G_L \dot{L}_x \dots (7)$$

where I_n and I_x are respective sector gross investments, \dot{L}_n and \dot{L}_x are sectoral changes in labour force, and F_x describes the marginal externality effect of exports on the output of non-exports.

Let $GDP = Y = N + X$

Therefore,

$$\dot{Y} = \dot{N} + \dot{X} \dots (8)$$



Substituting equations 5, 6, and 7 in equation 8, we get:

$$\dot{Y} = F_K I_n + F_L \dot{L}_n + F_X \dot{X} + G_K I_x + G_L \dot{L}_x$$

$$\dot{Y} = F_K I_n + F_L \dot{L}_n + F_X \dot{X} + (1 + \delta) F_K I_x + (1 + \delta) F_L \dot{L}_x$$

$$\dot{Y} = F_K I_n + F_L \dot{L}_n + F_X \dot{X} + F_K I_x + \delta F_K I_x + F_L \dot{L}_x + \delta F_L \dot{L}_x$$

$$\dot{Y} = F_K(I_n + I_x) + F_L(\dot{L}_n + \dot{L}_x) + F_x \cdot \dot{X} + \delta (F_K I_x + F_L \dot{L}_x)$$

Since,

$$I = I_n + I_x \text{ and } \dot{L} = \dot{L}_n + \dot{L}_x$$

We can write,

$$\dot{Y} = F_K I + F_L \dot{L} + F_x \dot{X} + \delta (F_K I_x + F_L \dot{L}_x) \dots (9)$$

From (5) $G_L = (1 + \delta) F_L$ and $G_k = (1 + \delta) F_k$

substituting (5) in (7) we have

$$\dot{X} = (1 + \delta) F_k I_x + (1 + \delta) F_L \dot{L}_x$$

and,

$$\dot{X} = [(1 + \delta) (F_k I_x + F_L \dot{L}_x)]$$

Further

$$\frac{\dot{X}}{1 + \delta} = F_k I_x + F_L \dot{L}_x \dots (10)$$

Substituting (10) in (9)

$$\dot{Y} = F_K I + F_L \dot{L} + F_x \dot{X} + \delta \frac{(\dot{X})}{1 + \delta}$$

Or

$$\dot{Y} = F_k I + F_L \dot{L} + \dot{X} \left[F_x + \frac{\delta}{1+\delta} \right] \dots (11)$$

Denoting $F_k = \alpha$ in (11), we have

$$\dot{Y} = \alpha I + F_L \dot{L} + \dot{X} \left[F_x + \frac{\delta}{1+\delta} \right]$$

Assuming a linear relationship between the real marginal productivity of labour in a given sector and average output per labour in the economy like, $F_L = \beta (Y/L)$, we can write the above as:

$$\dot{Y} = \alpha I + \beta \left(\frac{Y}{L} \right) (\dot{L}) + \dot{X} \left[F_x + \frac{\delta}{1+\delta} \right]$$

Then dividing by y , we get:

$$\frac{\dot{Y}}{Y} = \alpha \left(\frac{I}{Y} \right) + \beta \frac{\dot{L}}{L} + \left(F_x + \frac{\delta}{1+\delta} \right) \frac{\dot{X}}{Y}$$

Which can be written as:

$$\frac{\dot{Y}}{Y} = \alpha \frac{I}{Y} + \beta \frac{\dot{L}}{L} + \left(F_x + \frac{\delta}{1+\delta} \right) \left(\frac{\dot{X}}{X} \right) \left(\frac{X}{Y} \right) \dots (12)$$

Equation (12) is the basis for our empirical work.

Designating $(\delta/1+\delta) + (F_x)$ by γ , equation 12 can be re-written as

$$\frac{\dot{Y}}{Y} = \alpha \frac{\dot{I}}{Y} + \beta \frac{\dot{L}}{L} + (\gamma \left(\frac{\dot{X}}{X} \right) \left(\frac{X}{Y} \right)) \dots (12')$$

where (.) stands for change (differential) per unit of time. If we have equal marginal productivities across sectors ($\delta = 0$ in equation 12) and if there are no beneficial externalities ($F_x = 0$ in equation 12) and equation (12) reduces to the basic neo-classical growth model. To conclude that marginal productivities are higher in the export sector and that exports generate beneficial externalities in the economy, the parameter γ in equation (12') should be positive and significantly different from zero. Equation (12') implies that the rate of growth of GDP is composed of the contribution of factor accumulation given by growth of capital and labour plus the gains brought about by shifting factors from the low productive non-export sector to the more productive export sector.

There is a need to estimate both formulations (in cross country analysis as well as country specific time series cases) because of the different characteristics the two models have (see Ram, 1987 & Obedokun, 1991). While the conventional formulation allows the inclusion of other growth factors like the share of government expenditure, it does not clearly show the mechanisms through which exports affect economic growth. Feder's formulation, on the other hand, shows the ways through which exports affect economic growth. However, in such formulation it is difficult to include other variables that determine growth.

The two models can be formulated as follows:

$$\frac{\Delta Y}{Y} = \beta_0 + \beta_1 \frac{\dot{I}}{Y} + \beta_2 \frac{\Delta L}{L} + \beta_3 \frac{\Delta X}{X} + U_1 \dots (13)$$

and



$$\frac{\dot{Y}}{Y} = \theta + \alpha \frac{\dot{I}}{Y} + \beta \frac{\dot{L}}{L} + \gamma \left(\frac{\dot{X}}{X} \right) \left(\frac{X}{Y} \right) + U_2 \dots (14)$$

where (13) is the conventional framework and (14) the Feder's framework and U_1 and U_2 are white noise disturbance terms.

We expect β_3 from equation (13) and γ from equation (14) to be positive. Also, β_1 from equation (13) and α from equation (14) are expected to be positive. On the other hand, β_2 of equation (13) and β of equation (14) can either be positive or negative depending on whether the country is a labour-surplus country or not.

4.2 Econometric Methods

In this research we emphasize time series analysis and the econometric methods concentrate on the discussion of some basic concepts of time series¹¹

4.2.1 Stationary and Non-Stationary Series

When we deal with the stationarity of variables we normally deal with weak stationarity as the strong stationarity is more of a theoretical concept. Weak stationarity is defined in terms of sample moments (mean and variance). X_t is stationary, if

1. $E(X_t) = \mu$, i.e. the mean is independent of time which means as time goes on the mean does not change.
2. Variance $(X_t) = \delta^2 < \infty$ i.e. the variance exists or it is finite.

For a normal distribution the above two are sufficient to establish stationarity but if

¹¹ For the cross section part we use OLS estimations using the two types of models we have discussed earlier and the necessary diagnostic tests are performed. We do not go into the details of the cross section part as our main concern is the time series analysis

we do not have a normal distribution then we need to add the third property which is ergodicity i.e. $(X_t, X_{t+k}) \rightarrow 0$ as $k \rightarrow \infty$. Meaning, memory of the series will die out when we compare observations that are distant in time (the longer the distance between observations of x , the covariance disappears). When the first moment (mean and variance) are not constant (grow over time) we are faced with the problem of non-stationarity.

For a stationary process in time series, shocks are necessarily temporary but a non-stationary series necessarily has permanent components. The following table summarizes some properties of stationary and non stationary series [Enders (1995)].

Table 4.1: Some Characteristics of Stationary and Non-stationary Series

Characteristic	Stationary series	non-stationary series
Mean reversion (expected crossing of the mean)	often (fluctuates around a constant long-run mean)	seldom (no longrun mean to which the series returns.)
Variance	has a finite variance that is time invariant	Unbounded (the variance is time-dependent and goes to infinity as time approaches infinity)
Auto correlation function (ACF)	has a theoretical correlogram that diminishes as lag length increases	The theoretical autocorrelations do not decay out, but in finite samples, the sample correlation dies out slowly
Memory	Temporary	Permanent

Characterizing a series like above, a level stationary series is said to be integrated of order zero designated by $I(0)$. On the other hand, most non-stationary series are $I(1)$ or random walk though we may have $I(2)$ or higher order non-stationary variables. In general, a series

is said to be integrated of order d if it becomes stationary after differencing d times designated as $X_t \sim I(d)$ (Adam, 1992). Hence an $I(0)$ variable, for example, is stationary without differencing.

The whole idea of dealing with stationary and non-stationary (Integrated) series is to avoid spurious regression¹² which results from regressing a non-stationary variable on another. We can describe the spurious regressions problem as follows: If we have two random walk $I(1)$ variables, X_t and Y_t , whose first differences are given as $\Delta Y_t \sim \text{NID}(0, \delta_y^2)$ and $\Delta X_t \sim \text{NID}(0, \delta_x^2)$ and are also assumed to be independent by construction, then in their linear regression of the form $Y_t = \beta X_t + \varepsilon_t$ we expect the value of β to approach zero as the sample size increases so that $t_\beta \sim \text{NID}(1, 0)$. Due to the integrated (being non-stationary) properties of the variables, however, the sample moments will not converge to constants as in the case of stationary variables. Rather, the sample moments converge to random variables which are functions of Wiener processes. Therefore, in such regressions instead of approaching to zero, the t -statistics will approach two.

Hence we will be misled if we use the t -distribution by wrongly rejecting the null of no correlation between variables. As a rule of thumb, as suggested by Granger and Newbold (1974), we suspect a spurious regressions if we have R^2 greater than Durbin-Watson (DW) statistics. To avoid the problem of spurious regression, we can either change the data to make it stationary before conducting a regression or use the technique of cointegration. Therefore, in any time series analysis the first thing we have to do is to test the variables involved in a regression for unit roots.

¹² We might get values which "look good" in the sense of having high R^2 values and significant t -ratios but which indeed, have no real meaning.

4.2.2 Tests for Unit roots

Though there are different unit root tests like Phillips and Perron's (PP) test, Schmidt and Phillips LM (LMSP) test, Kwiatkowski, Phillips, Schmidt and Shin (KPSS) test and Park's-G-test, we employ the most widely used test -the augmented Dickey-Fuller (ADF) test. But, as the ADF test is the Dickey Fuller (DF) test augmented for some lag structure we begin our discussion with the DF test.

A. The DF Test for Unit Root

If we assume the Data Generating Process (DGP) to be given by:

$$Y_t = \rho Y_{t-1} + \varepsilon_t \quad (1)$$

where $\varepsilon_t \sim \text{NID}(0, \delta^2)$, the DF test is a test on the size of the coefficient ρ . That is, whether $\rho=1$ or not (Adam, 1992).

If we subtract y_{t-1} from both sides of equation (1), we get:

$$\Delta Y_t = \pi Y_{t-1} + \varepsilon_t \quad (2)$$

where $\pi = \rho - 1$. The null hypothesis is $H_0: \pi = 0$ (or unit root (non-stationarity)). If we add a constant in equation (2), we get

$$\Delta Y_t = a_0 + \pi Y_{t-1} + \varepsilon_t \quad (3)$$

If a time trend is further included,

$$\Delta Y_t = a_0 + \beta_t + \pi y_{t-1} + \varepsilon_t \quad (4)$$

In (3) and (4) the null hypothesis is $H_0: \pi = 0$. Rejecting the null, therefore, means that we have a stationary series.

If there are more than one unit root, then testing for a single unit root will be misleading. Therefore, following Pantula's principle,¹³ it is better to start with higher order unit roots (basically two unit roots) by applying the DF test to the first difference of the series. If the result is a rejection, then we move to test the given variable at level. If the residuals are serially correlated, which is not unusual for such a DGP, the residual variance estimates will be biased and inconsistent and the simulated distributions in Fuller (1976) can not be used (Sjoo, 1997). This is solved by using the ADF test.

B.The ADF test for unit Root

The ADF test solves the above problem by augmenting the DF test with some lag structures as follows:

$$\Delta Y_t = \pi y_{t-1} + \sum \sigma_i \Delta y_{t-i} + \varepsilon_t \dots\dots\dots(2')$$

$$\Delta Y_t = a_0 + \pi y_{t-1} + \sum \sigma_i \Delta y_{t-i} + \varepsilon_t \dots\dots\dots(3')$$

$$\Delta Y_t = a_0 + \beta t + \pi y_{t-1} + \sum \sigma_i \Delta y_{t-i} + \varepsilon_t \dots\dots\dots(4')$$

The ADF test is better than the DF test since the augmentation leads to empirical white noise residuals and the empirical distributions are valid. Like the DF test, the null hypothesis here is also $H_0: \pi=0$ in equations 2', 3' and 4'. Choosing the length of augmentation is a typical problem in ADF test .

4.2.3 Cointegration

Suppose we have $X_t \sim I(d)$ and $Y_t \sim I(e)$ where $e < d$, in general a linear combination of these two series has an order of integration equal to the highest order of the two

¹³. Pantula's principle says that higher order integration dominates lower order, so start by testing higher order, usually I(2).

component series (Curthbertson, Hall and Taylor, 1992). If we designate the linear combination of X_t and Y_t by Z_t then $Z_t \sim I[\max(d,e)]$. For two variables of the same order of integration, their linear combination will also be of the same order of integration as the two variables. The exception from this rule is called cointegration where a linear combination of integrated variables results in a lower order of integration. If Y_t and X_t are $I(1)$, we expect their linear combination also to be $I(1)$. But, if the two variables cointegrate, then their linear combination will be $I(0)$. That is, the linear combination of these variables is stationary even though individually they are not.

The basic idea here is that for variables to form a meaningful longrun relationship, a common stochastic trend should be shared among them in the long run. That is, they should not drift apart from each other as time goes on. Therefore, the important thing is to test whether integrated variables cointegrate so that a meaningful longrun relationship can be established.

4.2.3.1. Tests for Cointegration

Though there are different tests for cointegration, we focus on the two-step procedure by Engle and Granger and the Johansen's test.

A. The Engle-Granger Two Step Procedure

Given $Y_t \sim I(1)$ and $X_t \sim I(1)$, then

Step 1. Do OLS on $Y_t = \alpha + \beta X_t + \varepsilon_t$ (regression on levels) which is called cointegrating regression; save the residual from this regression.

Step 2. Test whether $\hat{\varepsilon}_t$ (the estimated residual) is $I(0)$ or $I(1)$. This can be done

by ADF test which is formed as

$$\Delta \hat{\epsilon}_t = \alpha + \pi \hat{\epsilon}_{t-1} + \sum \Delta \hat{\epsilon}_{t-1} + U_t$$

The null hypothesis here is $\pi=0$ (unit root) and the alternative is that the variables are cointegrated. The relevant test statistics used here is different from the usual unit root test on a variable because here we have a derived variable.

The major problems in the above procedure are: the assumption of only one cointegrating vector, the choice of lags in the ADF test and the assumption of a common factor in the dynamics of the system.

B. Johansen's Test For Cointegration

This starts with a general Vector Auto Regressive (VAR) model of the form (Sjoo,1997):

$$X_t = \pi_1 X_{t-1} + \pi_2 X_{t-2} + \dots + \pi_k X_{t-k} + \psi D_t + \mu + \epsilon_t$$

where X_t is a vector of macroeconomic variables, D_t is a vector of deterministic terms, dummies, seasonal dummies, etc. μ is a vector of constants and ϵ_t is a vector of residuals assumed to be NID $(0, \Omega)$.

We can rewrite the above equation in Vector Error Correction Model (VECM) as:

$$\Delta X_t = \pi X_{t-1} + \sum \Gamma_i \Delta X_{t-i} + \psi D_t + \mu + \epsilon_t$$

Where $\pi = (-1 + \pi_1 + \pi_2 + \dots + \pi_k)$

$$\Gamma_i = \sum_{j=i+1}^k \pi_j$$

In the above formulation, the number of independent rows in π -matrix will be equal to the number of cointegrating relationships. In other words, the rank of π is equal to the number of cointegrating vectors which can be determined by the number of significant

eigenvalues in the estimated π ($\hat{\pi}$). We have three possibilities concerning the rank of π , given that the dimension of the matrix is P .

- a. Rank (π)=0, which means there is no eigenvalue which is different from zero, implying no cointegration.
- b. rank (π)= p , which means the number of significant eigenvalues is equal to the number of variables (full rank). This implies that all variables are stationary.
- c. $0 < \text{rank}(\pi) < P$, which means π has reduced rank. This implies that there are some distinct cointegrating vectors in the series whose number are determined by the rank of the matrix.

If π has reduced rank the cointegrating vectors are given as, $\pi = \alpha\beta'$, where β_i represents the i^{th} cointegration vector and α_j represents the effect of each cointegrating vector on the $\Delta X_{p,t}$ variables in the model (Sjoo (1997)).

We can use two tests to determine the number of cointegrating vectors (Sjoo (1997)).

1. Maximum eigenvalue test (λ_{\max}) given as: $\lambda_{\max} = T \log(1 - \hat{\lambda}_r)$, for $r=0, 1, 2, \dots, P-2, P-1$. The null is that there exist P cointegrating vectors against the alternative of $P+1$ vectors.
2. The trace test is given as:

$$\lambda_{\text{trace}} = -T \sum_{i=r+1}^P \log(1 - \hat{\lambda}_i)$$

where T is the total number of observations and λ_i are the estimated eigenvalues from π matrix corresponding to its rank. The null hypothesis is $\lambda_i = 0$.

The practical problem of the Johansen's procedure is the choice of a correct combination of lags and dummies to make the residual a white noise.

4.2.4 The Error Correction Model (ECM)

While a model in differences of variables gets around the problem of spurious regression, it does so at the cost of not being able to discover the long run relationship between variables of our interest. The error correction model solves this by combining the long run information with a short run adjustment mechanism.

An ECM can be represented as:

$$\Delta Y_t = \sum_{i=0}^k \beta_i \Delta X_{t-i} + \sum_{i=1}^k \sigma_i \Delta Y_{t-i} + \alpha ECM_{t-1} + \epsilon_t$$

where ECM_{t-1} is the error corrections term which represents the deviation from the longrun steady state relation between the two variables. α in the above equation represents how changes in ΔY_t reacts to deviation from the long run equilibrium. The error correction term is one period lag of the saved residual from the cointegration relation in the two-step procedure or is obtained from cointegration vectors in the Johansen's procedure. As long as we have cointegration among variables, as noted by Engle and Granger (1987), there is an ECM formulation. We can use the t-distribution to test the significance of the parameter estimate of the ECM as the conventional properties of the distribution hold asymptotically. The choice of appropriate lag structure is a problem in estimating the ECM.

4.2.5. Granger Non-Causality Test

We need also to test for Granger non-causality as a positive relationship between two variables in an ordinary least squares regression does not tell us which variable precedes the other. That is, if there exists a relationship between two variables say Y_t and X_t , the direction of causation may not necessarily be from X_t to Y_t . It can be the other way around or we can also have bi-directional causality.

According to Granger, if a cointegrating relationship is found, then there must exist Granger causality in at least one direction. On the other hand, if no cointegration is found we can conclude that there is no Granger causality. A necessary condition for a variable, X_t to cause another variable, y_t , is that the lagged values of X_t must predict Y_t . In a bivariate case, the test can be presented by the following autoregressive distributed lag model:

$$Y_t = \sum \alpha_i Y_{t-i} + \sum \beta_i X_{t-i} + \epsilon_t$$

The lag length is determined such that ϵ_t is a white noise process. If $\beta_1 = \beta_2 = \dots = \beta_i \neq 0$, then X_t is said to Granger cause Y_t but if all β -parameters are zero then X_t can not cause Y_t . Having X_t Granger causes Y_t does not exclude the reverse direction of causality as the two are independent. That is, two variables can Granger cause each other. A similar formulation that shows Y_t Granger causes X_t is presented as:

$$X_t = \sum \alpha_i X_{t-i} + \sum \beta_i Y_{t-i} + \epsilon_t$$

The F-statistics is used to test the null of $\beta_i = 0$ (no Granger causality) in the above formulations.

4.3 Data Description and Sources

Investment Share to GDP

Earlier, we have discussed the existence of differences among countries in our sample. Given their differences, we measure the capital variable as the ratio of investment to GDP. This makes the variable comparable across the countries in the sample.

Some have argued that the investment variable should be expressed as the rate of change of investment to GDP or the rate of growth of investment. This, however, implies that countries with low but increasing level of investment will have faster rate of growth of



investment than those countries with high but stable level of investment. Therefore, as in most previous studies, we measure the capital variable as the investment to GDP ratio. The source of data on this variable is the International Financial Statistics (IFS) (various issues). In the case of Uganda the figures for some years are augmented by data from World Bank tables (various issues).

Population Growth Rate

As far as the countries of Eastern and Southern Africa are concerned data on labour supply, its utilization rate as well as its growth rate are very scarce and unreliable. We could not get data on labour force growth rate. However, if labour participation ratios remain relatively constant, then the labour force will be proportional to the overall population. We, therefore, proxy the growth rate of labour force by the growth rate of the whole population. This is also in accordance with most of the previous works. Data on this variable was collected from various issues of World Tables.

Growth rate of real GDP

For the time series analysis this is computed as annual percentage change of real GDP given as $\frac{Y_t - Y_{t-1}}{Y_{t-1}}$. For the cross section case, the growth rate is calculated by fitting the

log of real GDP to time and taking the coefficient of time as the average annual growth rate. Data on real GDP variable was collected from International Financial Statistics year book 1992, 1995 and 1997 issues.

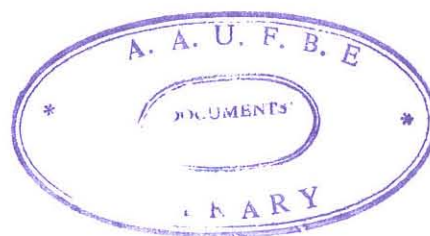
Growth rate of Exports

The average annual growth rate of real export earnings is estimated in the same

manner as the real GDP variable, using annual data on real exports earnings. The annual percentage change of real exports is computed from real exports series for the time series analysis. For the cross section case, the growth rate is calculated by fitting the log of real exports to time and taking the coefficient of time as the average annual growth rate. Data on exports is obtained from IFS year books of 1992, 1995 and 1997.

Exports Share of GDP

This variable is obtained by dividing real exports by real GDP. Data was collected from IFS various issues but Uganda's data is augmented by World Tables (various issues). For all countries except Mauritius (where 1990 is used as the base year), the base year 1987 is used for computations. For the cross-section estimation, 17 countries with data for 21 years average (1970-1990) are used and the sources are various issues of IFS and World Tables.¹⁴ For the time series analysis the countries covered are Kenya, Tanzania, Ethiopia, Malawi, Mauritius, Uganda and Zambia and the period of analysis is indicated in each country's regression results.



¹⁴. These are: Burundi, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, Somalia, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

V. ANALYSIS OF RESULTS

5.1 Tests for Order of Integration

The time series characteristics of all variables for all the seven countries are considered. Following the Pantula principle, we begin by testing the existence of two unit roots (I(2)-ness). The results of the ADF tests are presented in table 5.1.

Table 5.1: Unit Root Tests for I(2)-ness

	DGRGDP		DIGDP		DGPOP		DGRXS		DXSHGDX	
	without trend	trend included	without trend	trend included	without trend	trend included	without trend	trend included	without trend	trend included
Ethiopia	-6.5188 (-3.685)	-6.5058 (-4.323)	-7.6302 (-3.685)	-7.8094 (-4.323)	-5.2960 (-3.685)	-5.1343 (-4.323)	-5.7984 (-3.685)	-5.6851 (-4.323)	-5.7511 (-3.685)	-5.6372 (-4.323)
Kenya	-6.5553 (-3.685)	-6.3726 (-4.323)	-7.7017 (-3.685)	-7.6037 (-4.323)	-14.296 (-3.685)	-14.020 (-4.323)	-11.212 (-3.685)	-11.030 (-4.323)	-10.993 (-3.685)	-10.807 (-4.323)
Malawi	-11.335 (-3.685)	-11.181 (-4.323)	-6.6277 (-3.685)	6.7199 (-4.323)	-10.585 (-3.685)	-10.902 (-4.323)	-6.6679 (-3.685)	-6.5706 (-4.323)	-6.8392 (-3.685)	-6.7207 (-4.323)
Mauritius	-9.1138 (-3.675)	-8.9488 (-4.308)	-6.3143 (-3.675)	-6.2258 (-4.308)	-8.9426 (-3.675)	-8.9384 (-4.308)	-8.8930 (-3.675)	-8.7277 (-4.358)	-8.8307 (-3.675)	-8.6675 (-4.308)
Tanzania	-8.3764 (-3.696)	-8.2305 (-4.338)	-8.8642 (-3.696)	-8.6973 (-4.338)	-9.9673 (-3.696)	-9.8712 (-4.338)	-7.1285 (-3.696)	-7.2138 (-4.338)	-6.3921 (3.696)	-6.5401 (-4.338)
Uganda	-6.3751 (-3.696)	-6.5732 (-4.338)	-6.5045 (-3.696)	-6.9893 (-4.338)	-11.797 (-3.696)	-11.515 (-4.338)	-9.2237 (-3.696)	-9.0424 (-4.338)	-15.725 (-3.696)	-15.611 (-4.338)
Zambia	-12.100 (-3.696)	-12.011 (-4.338)	-7.0858 (-3.696)	-6.9512 (-4.338)	-8.5054 (-3.696)	-8.4062 (-4.338)	-10.363 (-3.696)	-10.156 (-4.338)	-11.578 (-3.696)	-11.354 (-4.338)

Figures in parentheses are critical values at 1%.

Note: DGRGDP is the difference of the growth of real GDP; DIGDP is the difference of investment share to GDP; DGPOP is the difference of the growth of population; DGRXS the difference of the growth rate of real exports and DXSHGRX is the difference of the export variable representing the growth of exports multiplied by the share of exports to GDP.

From table 1, the results of the ADF test with trend and without trend show that the null of the existence of two unit roots is a pure rejection for all variables in all countries. Therefore, we proceed to test the existence of a unit root. Table 5.2 presents the ADF results for a unit root.

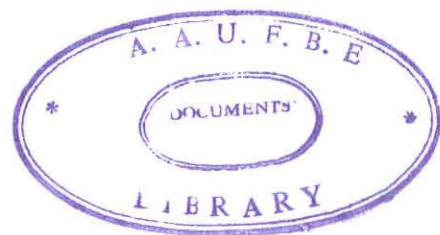


Table 5.2: Unit Root Tests for I(1)-ness

	GRGDP		IGDP		GPOP		GRXS		XSHGRX	
	without trend	with trend	without trend	with trend	without trend	with trend	without trend	with trend	without trend	with trend
Ethiopia	-3.0495 (-2.966)	-3.1082 (-3.573)	-2.2402 (-2.966)	-2.7852 (-3.573)	-3.0966 (-2.966)	-2.9895 (-3.573)	-4.0706 (-2.966)	-4.0226 (-3.573)	-3.8746 (-2.966)	3.8525 (-3.573)
Kenya	-3.3409 (-2.966)	-4.13337 (-3.573)	-3.9717 (-2.966)	-3.9450 (-3.573)	-8.3771 (-2.966)	-8.3640 (-3.573)	-5.6091 (-2.966)	-5.8014 (-3.573)	-6.1822 (-2.166)	-6.4092 (-3.573)
Malawi	-4.6296 (-2.966)	-5.6747 (-3.573)	-2.3059 (-2.966)	-2.5821 (-3.573)	-5.4088 (-2.966)	-5.3530 (-3.573)	-5.6468 (-2.966)	-5.5295 (-3.573)	-5.5334 (-2.966)	-5.4688 (-3.573)
Mauritius	-4.8032 (-2.963)	-4.8365 (-3.567)	-2.2279 (-2.963)	-2.0332 (-3.567)	-7.1139 (-2.963)	-7.1603 (-3.567)	-6.0739 (-2.963)	-6.0431 (-3.567)	-5.9289 (-2.963)	-5.8605 (3.567)
Tanzania	-4.0209 (-2.971)	-3.9428 (-3.587)	-5.4087 (-2.971)	-5.4999 (-3.58)	-7.1388 (-2.971)	-7.0045 (-3.58)	-3.5631 (-2.971)	-4.5601 (-3.58)	-3.1880 (-2.971)	-4.3972 (-3.58)
Uganda	-2.8249 (-2.971)	-3.4645 (-3.58)	-1.3048 (-2.971)	-1.4513 (-3.58)	-5.9498 (-2.971)	-5.8034 (-3.58)	-5.7426 (-2.971)	-5.8175 (-3.58)	-7.8409 (-2.971)	-8.9142 (-3.58)
Zambia	-6.5128 (-2.971)	-7.3110 (-3.58)	-2.1353 (-2.971)	-3.7873 (-3.58)	-6.2113 (-2.971)	-6.0548 (-3.58)	-7.4846 (-2.971)	-7.3945 (-3.58)	-7.7651 (-2.971)	-7.8263 (-3.58)

Figures in parentheses are critical values at 5%.

Note: GRGDP is growth rate of real GDP; IGDP is investment share to GDP; GPOP is growth rate of population; GRXS is growth rate of real exports and XSHGRX is growth rate of exports multiplied by exports as a share of GDP.

Table 5.3: SUMMARY OF THE ORDER OF INTEGRATION OF VARIABLES

	GRGDP	IGDP	GPOP	GRXS	XSHGRX
Ethiopia	I(0)	I(1)	I(1)	I(0)	I(0)
Kenya	I(0)	I(0)	I(0)	I(0)	I(0)
Malawi	I(0)	I(1)	I(0)	I(0)	I(0)
Mauritius	I(0)	I(1)	I(0)	I(0)	I(0)
Tanzania	I(0)	I(0)	I(0)	I(0)	I(0)
Uganda	I(1)	I(1)	I(0)	I(0)	I(0)
Zambia	I(0)	I(1)	I(0)	I(0)	I(0)

From table 5.2, both the with and without trend ADF results show that the GRGDP is stationary in level (I(0)) in all cases except Uganda. In the case of Ethiopia, since we have a mixed result, we checked the plot of the series which indicates stationarity. For Uganda, this series is found to be non-stationary which is further confirmed by the plot of the series. This shows that the growth rate of real GDP series for Uganda is an I(1) series.

The IGDP series is found to be non stationary in level (I(1)) in five of the seven cases. The exceptions are Kenya and Tanzania where this series is found to be stationary. That is the IGDP is an I(0) series for Kenya and Tanzania. In the Zambian case, as we have a mixed result, we therefore checked the plot of the series, which indicates non-stationarity.

The population growth rate series is found to be stationary in levels (I(0)) for all cases except Ethiopia. In the case of Ethiopia, while the ADF test without trend accepts stationarity, the with trend ADF test shows the non stationarity of the series in levels. Since

the result is mixed we proceeded to look at the plot of the series which supports non-stationarity. Therefore, the GPOP series for Ethiopia is I(1).

Both the with and without ADF tests confirm stationarity of the two variants of the export variable (growth of real exports and the growth of exports multiplied by the share of exports to GDP) in levels for all countries hence the two variants of the export variable are I(0) in all cases.

The results of the ADF tests suggest that there is a need to specify our two models on a country basis depending on the order of integration of the variables.¹⁵ In the following we proceed with our analysis on a country basis to test our hypothesis.

5.2 Individual Country Results

5.2.1. Kenya¹⁶

According to the ADF tests, all variables are stationary in levels for Kenya. This implies that the models for Kenya can be specified in levels of the variables and the following results are obtained¹⁷.

The Conventional Formulation

$$\text{GRGDP} = -3.44 + 0.33\text{IGDP}^{**} + 0.18\text{GPOP} + 0.10\text{GRXS}^{***}$$

$$\begin{matrix} (-1.046) & (2.298) & (0.797) & (2.567) \end{matrix}$$

$$R^2=0.32; F(3,26) = 4.1289[0.0161]; DW = 1.5$$

Note: In this study, unless otherwise stated :

*** Represents significance of the variable at 1%

** Represents significance of the variable at 5%

* Represents significance of the variable at 10%

¹⁵. Infact we have 4 combinations of stationarity and non-stationarity behaviours among variables in this set of countries.

¹⁶. The period covered is 1966 to 1995.

¹⁷. The t-ratios are in parentheses.

Diagnostic Tests

AR 1-2F (2,24) = .82159 [0.4517]; χ^2 F(6,19) = 1.9645 [0.1219];
ARCH 1 F (1, 24) = 0.12942 [0.7222]; χ^2 F(9,16) = 1.5213 [0.2223];
Normality $\chi^2(2)$ = 0.42382 [0.8090]; RESET F(1,25) = 0.043002 [0.8374]

Feder's Formulation

GRGDP = -2.99+0.31IGDP**+0.18GPOP+0.29XSHGRX**
(-0.888) (2.080) (0.758) (2.240)

$R^2=0.29$; $F(3,26)=3.5115[0.0292]$; $DW=1.44$

Diagnostic Tests

AR 1-2F (2,24) = 1.0229 [0.3747]; χ^2 F(6,19) = 1.8048 [0.1518];
ARCH 1 F (1, 24) = 0.16914 [0.6845]; χ^2 F(9,16) = 1.707 [0.1681];
Normality $\chi^2(2)$ = 0.48062 [0.7864]; RESET F(1,25) = 0.15731 [0.6950]

Both models are estimated using the ordinary least squares (OLS) estimation method¹⁸. The F-tests (the null of which is all the slope coefficients are zero) indicate that all the explanatory variables jointly explain the dependent variable [confirmed at 5% level of significance] in both models. The R^2 figures (32% and 29%) seem to be low for a time series analysis but when variables are expressed in growth rates such figures are not unusual. Also, the figures are comparable with Ram's findings where he obtained even lower R^2 figures (11% in both models). The plots of actual and fitted values are presented in annex 9.

The AR (a Breusch-Godfrey LM) test for serial correlation indicates the absence of serial correlation. The presence of heteroscedasticity is rejected by the ARCH test. The White's test also shows no heteroscedasticity. The Jarque Bera test for normality confirms the absence of outliers in the data. No functional form problem is observed in both

¹⁸. OLS is used for all countries under investigation.

formulations as tested by Ramsey's Regression Specification Error Test (RESET) as well as by White's functional misspecification test. For all tests the significance levels for rejecting the null hypothesis are given in brackets.

Moreover, we estimated the two models by Recursive Least Squares (RLS) so that we can perform structural break and stability tests using sequential one-step ahead Chow-tests and one-step ahead residuals. The tests confirm the absence of structural break and stability problems. The forecast period 1986-1995 is chosen to indicate the stabilization measures undertaken by the Kenyan government. The absence of stability problem means that the parameter coefficients are constant overtime and that the models can be used for forecasting. Plots of these Chow tests and residuals are given in Annex 10. As Hendry (1995) pointed out, parameters in an empirical modelling should be constant in order to be used for forecasting and analysing economic policy.

Test of the hypothesis

The hypothesis that exports significantly and positively affect economic growth is confirmed for Kenya when both formulations are employed, with Feder's formulation resulting in a higher export coefficient than that obtained with the conventional model. Furthermore, while the export variable in the conventional formulation is significant at 1% level, Feder's export variable is significant at 5% level. In any case both are positive and show that the result is robust to the definition of the export variable.

A significant and positive coefficient of the export variable, especially in Feder's formulation, supports the idea that exports, besides helping the country's growth performance, also create positive externalities to the rest of the economy. With a per capita income level of \$260 and export composition dominated by primary products (though tourism accounts for

22% of total export earnings), a positive association of exports and growth in the case of Kenya, casts doubt on the argument that a higher level of threshold income and a higher proportion of manufactured exports are required to reveal such a positive association. The relative openness of the Kenyan economy may explain such a positive association.

Since finding a positive correlation between GDP growth and exports does not tell us the direction of causation, we conducted Granger-NonCausality tests. The results are presented in annex 11.

We use the F-statistics given as:

$$\frac{(RRSS-URSS) / r}{URSS / n-k} \sim F(r, n-k)$$

Where RRSS is the restricted residual sum of squares;
 URSS is the unrestricted residual sum of squares;
 r is the number of restrictions;
 n is the number of observations;
 and k is the number of parameters.

For two variables X and Y, the null hypotheses is that X does not Granger cause Y and/or Y does not Granger cause X (see Chapter 4)¹⁹. Since the computed F-statistic of 3.58 exceeds the critical F value at 5% significant level, there is a Granger causality running from exports to GDP growth. On the other hand, the computed F-statistic of 0.56, which is less than the critical F value, indicates that the other direction causality does not exist. That is, GDP growth does not Granger cause export Growth. The above tests confirm the viability of export promotion in the economy of Kenya.

¹⁹. The lag length is determined using the Schwartz Criteria.

The investment variable is also found to be a significant and positive determinant of growth in the Kenyan context. This means that whenever a large share of the economy's GDP is allotted to investment, the result is likely to be a better growth performance. On the other hand, though the coefficient of the growth rate of population is positive, it is not found to be significant. When we look at the relative importance of the variables in the models, we observe the dominance of the export variable in both formulations. While the export variable in the conventional framework has a partial R^2 of 0.2022, 0.1617 is the corresponding figure in the Feder's formulation. The corresponding figures for the investment variable are .1689 and .1427 respectively.

5.2.2. Tanzania²⁰

The results of the ADF tests show that all variables are stationary in levels for Tanzania as in Kenya. Accordingly, the two models can be specified in levels of the variables and the following results are obtained.²¹

Conventional Formulation

$$\text{GRGDP} = 3.3095 + 0.03 \text{ IGDP} - 0.18 \text{ GPOP} + 0.01 \text{ GRXS}$$

$$(0.849) \quad (0.235) \quad (-0.262) \quad (0.716)$$

$$R^2 = 0.03; F(3,25) = 0.22219[0.8801] \quad DW = 1.62$$

Diagnostic Tests

AR 1-2F (2,23) = 0.93217 [0.4081];	$\chi^2 f(6,18) = 0.35738 [0.8962];$
ARCH 1 F (1, 23) = 0.006171 [0.9381];	$\chi^2 X_j F(9,15) = 0.66166 [0.7305];$
Normality $\chi^2(2) = 3.0471 [0.2179];$	RESET F(1,25) = 1.0474 [0.3163]

²⁰. The period covered is 1967 to 1995.

²¹. The t-ratios are in parentheses.

Feder's Formulation

$$\text{GRGDP} = 3.1671 + 0.04 \text{IGDP} - 0.19 \text{GPOP} + 0.07 \text{XSHGRX}$$

(0.817) (0.294) (-0.279) (0.803)

$$R^2 = 0.03; F(3,25) = 0.26668 [0.292]; DW = 1.56$$

Diagnostic Tests

AR 1-2F (2,23) = 1.1602 [0.3311]; $\text{Xi}^* \text{X}_j \text{F}(9,15) = 0.69525 [0.7041]$;
ARCH 1 F (1, 23) = 0.034571 [0.8541]; $\text{Xi}^2 \text{F}(6, 18) = 0.42024 [0.8559]$
Normality $\text{Chi}^2(2) = 3.1597 [0.2060]$; RESET F(1,24) = 0.22298 [0.6410]

Though the diagnostic tests reveal that there are no major econometric problems with the models estimated for Tanzania, the F statistics, the R^2 figures (though lower figures are expected these are very low), and the plots of actual and fitted values (given in annex 12) show that the formulations do not fit the data of Tanzania well. However, since we are in a way comparing the results of our hypothesis tests across countries using similar models, we state the results as they are instead of looking for alternative specifications. Furthermore we do not go further to estimate the models recursively as we are not interested in the parameter estimates. Nonetheless, we re-estimated the models (the results are not reported) by including dummies (for the 1970's oil shock and the period of reform (1986 onwards)) and also by including a trend but none was found to be significant. Furthermore, we included the growth of imports and growth of government expenditure separately in the conventional framework but both were not significant.

Test of the Hypothesis

The hypothesis of a positive association between exports and economic growth is therefore not confirmed in the Tanzanian case for the period under investigation. But the coefficients of the export variable in the two formulations have the right sign. The inward



looking strategy of the Tanzanian government for a long time might explain the lack of a significant association between exports growth and economic growth. Moreover, the high debt obligation which absorbs about half of export earnings (WB, 1996) may prevent the positive impact of export to be transmitted to economic growth.

5.2.3 Mauritius²²

Based on the unit root tests results, the models are specified in levels of the variables GRGDP, GPOP, GRXS or XSHGRX. However, IGDP is differenced as it is an I(1) variable. The results of the two formulations are presented below.²³

The Conventional Formulation

$$\text{GRGDP} = 6.0594 + 0.41 \text{ DIGDP}^{**} - 1.3350 \text{ GPOP} + 0.13 \text{ GRXS}^{**}$$

(4.381) (2.557) (-0.765) (2.285)

$$R^2 = 0.4; F(3,27) = 5.969 [0.0029]; DW = 2.05$$

Diagnostic Tests

AR 1-2F (2,25) = 0.20633 [0.8149];	X ² F(6,20) = 1.6518 [0.1849];
ARCH 1 F (1, 25) = 0.16216 [0.6906];	Xi*X _j F(9,17) = 1.794 [0.1431];
Normality Chi ² (2) = 5.6418 [0.5096];	RESET F(1,26) = 0.93851 [0.3416]

Feder's Formulation

$$\text{GRGDP} = 6.1700 + 0.38 \text{ DIGDP}^{**} - 1.39 \text{ GPOP} + 0.28 \text{ XSHGRX}^{**}$$

(4.372) (2.350) (-0.805) (1.954)

$$R^2 = 0.37; F(3,27) = [0.0052]; DW = 2.04$$

²². The period covered in 1965 to 1995.

²³. The t-ratios are in parentheses.

Diagnostic Tests

AR 1-2F (2,25) = 0.15378 [0.8583]; χ^2 F(6,20) = 1.7153 [0.1692];
ARCH 1 F (1, 25) = 0.11222 [0.7404]; χ^2 * χ^2 F(9,17) = 1.7869 [0.1447]
Normality χ^2 (2) = 5.7252 [0.571]; RESET F(1,26) = 0.91194 [0.3484]

Looking at the results of the two formulations, the F-tests show that the line is a good fit in both cases at 1% level. The R^2 figures 0.4 and 0.37 imply that about 40% of the variation in GRGDP can be explained by the regressors. The plot of actual and fitted values are presented in annex 13. None of the diagnostic tests reported above are significant at the 95 per cent or 90 per cent critical value, therefore there are no problems with misspecification, serial correlation, heteroscedasticity or normality.

We further estimated the models by RLS. The sequential one step ahead Chow-tests and one-step ahead residuals confirm the absence of structural break and stability problems. Hence, as the parameter coefficients are constant overtime and we can use the models for forecasting purposes. The diagrammatic representation is given in annex 14.

Test of the hypothesis

The hypothesis of a positive and significant association between exports growth and GDP growth is confirmed in the case of Mauritius. The result is robust to the use of the different export variables as both are found to be significant²⁴. The coefficient of the export variable in the Feder's formulation is bigger than the one in the conventional formulation. For countries like Mauritius where manufacturing exports account for more than 56% of total exports, the beneficiary effects of exports on growth in terms of higher productivity and positive externality are in accordance with our prior expectations. Mauritius's strong performance in the above respect has been made possible by a liberal economic environment

²⁴. Ram(1987) also found significant coefficients.

including an open exchange and trade regime augmented by other prudent government policies, though, Mauritius has also benefited from preferential arrangements with the European union for its sugar exports and duty free entry of textile exports (World Bank, 1996).

Along with the positive association between exports growth and GDP growth established above, we further tested the direction of causality. Granger-Non-Causality results are presented in annex 15. The results of the F test statistic reveal that the direction of causality is from exports growth to GDP growth but not the other way around.

The investment variable (the difference in the investment share in GDP) is also positive and significant in both formulations. This implies that in the short run an increase in the growth of investment in GDP has a positive impact on the growth of real GDP. On the other hand, the negative sign of the population variable in both formulations was unexpected in a country like Mauritius with about 1.1 million people growing at 1 percent a year. In any case though it carried unexpected sign the coefficients of the population variable in the two formulations are not significant. We cannot compare the relative importance of the exports and investment variables as they have been formulated in different ways, the former in levels while the latter in difference.

5.2.4. Malawi²⁵

The ADF results reveal that all variables are stationary in levels except IGDP which is I(1). Therefore, like in the case of Mauritius, the two models are specified in levels of

²⁵. The period covered is 1966 to 1995.

GRGDP, GPOP, GRX or XSHGRX and the difference of IGDP. The results are presented as follows.²⁶

The Conventional Formulation

$$\text{GRGDP} = 0.64 + 0.19 \text{ DIGDP} + 0.08 \text{ GPOP}^* + 0.12 \text{ GRXS}$$

$$(0.325) \quad (0.940) \quad (1.833) \quad (1.622)$$

$$R^2 = 0.17; F(3,26) = 1.7932 \quad DW = 1.73$$

Diagnostic Tests

$$\text{AR 1-2F (2,27)} = 1.1772 [0.3246]; \quad X^2 F(6,19) = 0.20374 [0.9716];$$

$$\text{ARCH 1 F (1, 27)} = 0.072889 [0.7894]; \quad X_i^* X_j F(9,16) = 0.24224 [0.9822];$$

$$\text{Normality Chi}^2(2) = 0.65781 [0.7197]; \quad \text{RESET F(1,25)} = 2.7546 [0.1090]$$

Feder's Formulation

$$\text{GRGDP} = 0.62773 + 0.23826 \text{ DIGDP} + 0.07 \text{ GPOP}^* + 0.08 \text{ XSHGRX}^{**}$$

$$(0.337) \quad (1.177) \quad (1.741) \quad (2.047)$$

$$R^2 = 0.21; F(3,26) = 2.36; \quad DW = 1.84$$

Diagnostic Tests

$$\text{AR 1-2F (2,24)} = 1.2282 [0.3099]; \quad X_i^2 F(6,19) = 0.23855 [0.9585];$$

$$\text{ARCH 1 F (1, 24)} = 0.056346 [0.8143]; \quad X_i^* x_j F(9,16) = 0.32621 [0.9543]$$

$$\text{Normality Chi}^2(2) = 0.28832 [0.8657]; \quad \text{RESET F(1,25)} = 2.2444 [0.1461]$$

The F-test indicates that the line is a good fit at 10% level in Feder's formulation and only at 17% in the conventional formulation. The R^2 figures are similar to those obtained by Ram (he found 0.24 in the conventional framework and 0.21 in feder's framework). The plot of actual and fitted value is presented in annex 16. None of the diagnostic tests reported above are significant at 95 per cent critical value. Our RLS results suggest no serious problem of stability or structural break. The diagrammatic representations are in annex 17.

²⁶. t-statistics are in parentheses.

Test of the Hypothesis

The positive and significant association between exports and GDP growth is confirmed only when the Feder's formulation is used. In the conventional formulation the export variable is not found to be significant until the 10% level. This shows lack of robustness and the sensitivity of the results to the use of different export variables. The Granger non-causality test on the other hand shows the existence of causality running from GDP growth to exports not the other way around so the positive correlation we have found for Malawi cannot be interpreted to support the export-led growth hypothesis. The results of the Granger non-causality tests are given in annex 18.

Regarding the other two variables, while the differenced investment variable is not significant (although it has the right sign) the growth rate of population is found to be positive and significant with coefficients 0.081 and 0.07 in the conventional and Feder's formulation, respectively.

5.2.5 Zambia²⁷

Like Mauritius and Malawi, the ADF unit root tests results shows that all variables are stationary in levels except IGDP. Therefore, the models for Zambia are formulated in levels of the variables GRGDP, GPOP, GRXS or XSHGRX and the first difference of IGDP (DIGDP). The results are presented as follows.²⁸

²⁷. The period covered is 1965 to 1995.

²⁸. t-values are in parentheses.

The Conventional Framework

$$\text{GRGDP} = 5.29 + 0.11 \text{ DIGDP} - 1.11 \text{ GOP} + 0.02 \text{ GRXS}$$

(1.147) (.547) (-0.805) (0.273)

$$R^2 = 0.04; F(3,26) = 0.33846[0.7977]; \quad \text{DW} = 1.89$$

Diagnostic Tests

AR 1-2F (2,24) = 0.84581 [0.4416];	χ^2 F(6,19) = 0.44979 [0.8362];
ARCH 1 F (1, 24) = 2.8576 [0.1039];	$\chi_i^2 \chi_j$ F(9,16) = 0.35722 [0.9395];
Normality $\chi^2(2) = 15.99$ [0.0003];	RESET F(1,25) = 0.16129 [0.6914]

Feder's Framework

$$\text{GRGDP} = 5.12 + 0.11 \text{ DIGDP} - 1.08 \text{ GOP} + 0.09 \text{ XSHGRX}$$

(1.113) (0.604) (-0.786) (0.604)

$$R^2 = 0.05; F(3,26) = 0.43861[0.7273]; \quad \text{DW} = 1.96$$

Diagnostic Tests

AR 1-2F (2,24) = 1.0583 [0.3627];	χ^2 F(6,19) = 0.49977 [0.8007];
ARCH 1 F (1, 24) = 3.8628 [0.0610];	$\chi_i^2 \chi_j$ F(9,16) = 0.36272 [0.9368]
Normality $\chi^2(2) = 15.005$ [0.0006];	RESET F(1,25) = 0.0039302[0.9505]

The F-tests from the two models reject the joint significance of the variables. Moreover, the R^2 figures here are extremely low (Ram got .19 and .21). However, as we argued earlier, we stuck to the two formulations so that our results are comparable across countries. The plots of actual and fitted values are shown in annex 21. The diagnostic tests show that, apart from normality test that is significant at the 95% level, the other tests are not significant.

Test of the Hypothesis

Our hypothesis of a positive and significant link between exports and economic growth is not confirmed in the case of Zambia. But the coefficients of the export variables in the two formulations are still positive in line with our a-priori expectations. One possible

explanation of this result is Zambia's external debt. It is very large, nearly twice as high as annual GDP and absorbs the bulk of Zambia's export revenue, which may hide the links between exports and growth. Our results also show that both the investment and population variables in the two formulations are insignificant. While the investment variable has positive coefficients, the population variable carries negative coefficients in both formulations.

We run additional regressions, dropping first the investment variable which is $I(1)$. Our results (not reported here) were not affected by such an attempt. That is, the export variables were still positive and insignificant and the population variable negative and insignificant. We then included investment growth (an $I(0)$ variable) instead of investment as a share of GDP (as used by Tyler (1981)) but the results remain the same for all variables (all were insignificant). Finally, our attempt to include the growth rate of imports and growth rate of government expenditure in the conventional framework did not affect the above results. Our hypothesis is clearly not supported in the case of Zambia. Our results are also very much similar to those obtained by Ram (1987) in both formulations.

5.2.6 Ethiopia²⁹

According to the results of the ADF tests, while the variables GRGDP and GRXS (XSHGRX) are stationary in levels, IGDP and GPOP are not. Thus, this gives us a third kind of specification where the two models are specified in levels of GRGDP and GRXS (XSHGRX) but in the first difference of GPOP and IGDP. The results are presented as follows.³⁰

²⁹. The period covered is 1967 to 1994.

³⁰. t-ratios are in parentheses.



The Conventional Formulation

$$\text{GRGDP} = 2.22 + .13 \text{ DIGDP} + 0.41 \text{ DGPOP} + 0.09 \text{ GRXS}^{**}$$

(3.133) (0.417) (0.205) (2.500)

$$R^2 = 0.29; F(3,24) = 3.1903[0.0418]; \quad DW = 1.83$$

Diagnostic Tests

AR 1-2F (2,22) = 2.0094 [0.1579];	X ² F(6,17) = 0.25658 [0.9497];
ARCH 1 F (1, 22) = 1.9692 [0.1745];	Xi*Xj F(9,14) = 0.33629 [0.9474];
Normality Chi ² (2) = 0.60323 [0.7396];	RESET F(1,23) = 2.4195 [0.1335]

Feder's Formulation

$$\text{GRGDP} = 2.19 + 0.22 \text{ DIGDP} + 0.26 \text{ DGPOP} + 0.08 \text{ XSHGRX}$$

(2.965) (0.719) (0.128) (2.083)

$$R^2 = 0.24; F(3,24) = 2.4829[0.0852]; \quad DW = 1.83$$

Diagnostic Tests

AR 1-2F (2,22) = 1.6253 [0.2196];	Xi ² F(6,17) = 0.2932 [0.9313];
ARCH 1 F (1, 22) = 1.2416 [0.2772];	Xi*xj F(9,14) = 0.29075 [0.9659]
Normality Chi ² (2) = 0.68835 [0.7088];	RESET F(1,23) = 0.48843 [0.4916]

The F-tests indicate that the explanatory variables jointly explain the dependent variable, the line is a good fit at 5% in the conventional framework and at 10% in the Feder's framework. The plots of actual and fitted values are given in annex 20. None of the diagnostic tests reported are significant, therefore there are no problems of serial correlation, heteroscedasticity, normality and misspecification.

We further estimated the two models by RLS, and the one-step ahead Chow-tests and one step ahead residuals confirm the presence of structural break and stability problems. These suggest that the parameter coefficients are not constant and therefore that the models can not be used for forecasting. One possible explanation for such parameter inconsistency may be the regime shifts that the Ethiopian economy has experienced. Plots of the tests are given in annex 21.



Test of the hypothesis

The hypothesis that exports significantly and positively affect economic growth is confirmed for Ethiopia when both formulations are used. This shows the robustness of the results to the use of different kinds of the export variable. With per capita income of \$100 and two primary commodities (Coffee and Hides & Skins) accounting for about 65% of exports, the positive association of exports and growth in the Ethiopian case also casts some doubt on the argument that there is a need for some higher threshold level of per capita income and higher proportion of manufactured exports to reveal such an association. The Granger non-causality tests also confirm that positive association runs from exports to growth not the other way around. These results are presented in annex 22.

On the other hand, the investment and population variables (in their first difference form) were not found to be significant in the two formulations though they both carry positive signs.

5.2.7 Uganda³¹

The ADF unit root results for Uganda give us a fourth type of combination of variables where GRGDP and IGDP are I(1) but GPOP and GRXS (or XSHGRX) are I(0). Here since the dependent variable is I(1) we have to test for cointegration between GRGDP and its determinants. However, (GRXS or XSHGRX) is I(0) which, in principle, should not be included in the cointegrating equation (Harris 1995). That is, in a strict sense, all variables should be of the same order of integration to proceed to cointegration analysis.

Test for Cointegration

Although the above is true, the export variable (GRXS or XSHGRX) is kept in our

³¹. The period covered is 1965 to 1995.

cointegration test as it is an important variable. However, we dropped the population variable. We use both the Engle-Granger Two-Step procedure and the Johansen Multivariate test.³² Beginning with the former, we saved the residual from the cointegration regression then conducted a unit root test on the saved residual (Res 1). Res 1 is found to be stationary as presented in the following table. The null hypothesis of no cointegration is therefore rejected.

Table 5.4

Unit Root Test for Variable Res1		
Statistic	Computed	critical value
ADF	-4.2197	-3.82

95% critical values are from Engle and Yoo (1987).

Due to the limitations associated with the Two-step procedure, we also conducted the Johansen’s multivariate test. By setting the lag length to two, the result showed that there is one cointegrating vector, which confirms cointegration. The following tables present Johansen Multivariate test results.

³². Though we have done the analysis using both formulations, we obtained similar results. Thus we only reported the results obtained using the conventional framework.

Table 5.5: Johansen's Maximum Likelihood Procedure (Cointegration Analysis)

Eigenvalues	0.532275	0.32336	0.0282085
Hypothesis	$P = 0$	$P \leq 1$	$P \leq 2$
λ max	21.28**	10.94	0.8012
95% critical value	21.0	14.1	3.8
λ trace	33.01**	11.74	0.8012
95% critical value	29.7	15.4	3.8

Note: The λ max and λ trace statistics are maximal eigenvalue and trace eigenvalue statistics for testing cointegration (See Chapter 4).

The null hypothesis is given in terms of the cointegrating rank, P .

** Shows the rejection of the null hypothesis at 5% significance level.

Standardized β' eigenvectors

Table 5.6

GRGDP	IGDP	GRXS
1	-0.5834	0.03820
-0.8602	1	0.03314
-111.9	-534.2	1

From the above table, both the λ max and λ trace reject the null hypothesis of no cointegrating vector ($P=0$). But the null hypothesis of at most one cointegrating vector is not rejected. Therefore, we have one cointegrating vector and we can establish a longrun equilibrium relationship among the variables. From the above table, the long run equation can be written as:

$$\text{GRGDP} = 0.5834 \text{ IGDP} - 0.0382 \text{ GRXS}$$

we went further to test the significance of the coefficients in the longrun relationship using the Chi² test (given in PC Give). The results suggest that while the coefficient of IGDP is

significant that of the export variable is not. Meaning, in the long run, while the share of investment contributes positively to the growth of GDP, export growth will not affect growth significantly.

We then constructed the following Error Correction Model using the lag of the residual (RE-1) from Johansen's cointegration relationship.³³

$$\text{DGRGDP} = -0.01 + 0.18 \text{DIGDP} - 0.003 \text{DGRXS} - 0.91 \text{RE-1}^{**}$$

$$\begin{matrix} & (-0.010) & (.481) & (-0.750) & (-3.320) \end{matrix}$$

$$R^2 = .36; F(3,24) = 4.5335 [0.0118]; \quad DW = 1.54$$

Diagnostic Tests

$$\begin{array}{ll} \text{AR 1-2F (2,22)} = 2.3033 [0.1235]; & X^2 F(6,17) = 0.38417 [0.8790]; \\ \text{ARCH 1 F (1, 22)} = 0.31252 [0.5818]; & \text{XiX}_j F(9, 14) = 0.47286 [0.8697]; \\ \text{Normality Chi}^2(2) = 0.81928 [0.6639]; & \text{RESET F(1,23)} = 0.17893 [0.6762] \end{array}$$

The model results in insignificant coefficients for both DGRXS and DIGDP implying the insignificant role of the two variables, in the short run, in explaining the growth of real GDP. The negative and significant lagged residual is the Error Correction Term. It gives us the speed of adjustment to the equilibrium level of growth of real GDP. The coefficient 0.91 tells us that about 90% of the short run disturbances will be corrected in a year. Regarding our hypothesis, both the long run and short run regressions do not support a significant and positive association between exports growth and economic growth in the case of Uganda. Although Uganda embarked on an adjustment program in 1987 and liberalized foreign trade and exchange since then, which has increased the incentives for export diversification, it is argued that there is still a high level of effective protection which encourages import substitution [World Bank, 1996]. This might explain the lack of a

³³. t-values are in parentheses.

positive association between exports and growth. Moreover, high debt service requirements (equivalent to 28% of exports of goods and services in 1995, for example) may also obscure the positive association between exports and growth.

A Summary of Time Series Results

Exports are found to be positive and significant in four out of the seven countries in our sample. But when we look at the direction of causation, only three countries (Kenya, Mauritius and Ethiopia) are found to have causality running from exports to growth.

The investment variable, on the other hand, though expected to be positive and significant, it is only in three cases that our prior expectations are met. This result could be explained along the lines developed by Salvatore and Hatcher (1990). They argued that, "A higher percentage of investment to GDP can be expected, *ceteris paribus*, to lead to higher real per capita income (PCI). In view of the real capital shortage in most developing countries, the contribution of new investments to their growth can be expected to be even greater than for developed countries. One force that might counteract the tendency for higher investments (as percent of GDP (I/Y)) to be associated with higher levels of real PCI is a contemporaneous increase in incremental capital-output ratio (ICOR). Conceivably, an increase in I/Y might be more than neutralised by a simultaneous increase in the ICOR, so that the net effect would be equivalent to a reduction in I/Y and, therefore, to result in statistically insignificant or even negative correlation between I/Y and GDP growth. "

(pp 12-13) Possible explanations for an increase in the ICOR, according to Salvatore and Hatcher, include inefficiencies associated with the inward-orientation strategy and developing countries' needs to overcome bottlenecks in the areas of education, transportation and communication systems.

The population variable has shown mixed results with respect to its sign and was found to be statistically significant in only one case (Malawi). The following two tables summarize our estimation results³⁴

Table 5.7: Regression Results with Conventional Formulation.

Country	IGDP	GPOP	GRXS
Kenya	0.331 (2.298)	0.18 (0.797)	0.10 (2.567)
Tanzania	0.03 (0.235)	-0.18 (-0.262)	0.01 (0.716)
Mauritius	0.41 (2.557)	-1.3350 (-0.765)	0.13 (2.285)
Malawi	0.19 (0.940)	0.08 (1.833)	0.12 (1.622)
Zambia	0.11 (0.547)	-1.11 (-0.805)	0.02 (0.273)
Ethiopia	0.13 (0.417)	0.41 (0.205)	0.09 (2.5)
Uganda	0.58(8.386)	-	-0.04(1.537)

Note: For Uganda figures in parentheses are χ^2 -statistics with one degree of freedom.

³⁴. t-values are in parentheses.

Table 5.8: Regression Results with Feder's Formulation

Feder's Formulation			
	IGDP	GPOP	XSHGRX
Kenya	0.31 (2.080)	0.18 (0.758)	0.29 (2.240)
Tanzania	0.04 (0.294)	-0.19 (-0.279)	0.07 (0.803)
Mauritius	0.38 (2.350)	-1.39 (-0.805)	0.28 (1.954)
Malawi	0.24 (1.177)	0.07 (1.741)	0.08 (2.047)
Zambia	0.11 (0.604)	-1.08 (-0.786)	0.09 (0.604)
Ethiopia	0.22 (0.719)	0.26 (0.128)	0.08 (2.083)

The results should be seen in the context of the way we have formulated the mechanisms through which exports can affect growth. That is, if the links were formulated in a different manner (for example relaxing foreign exchange constraint) the results may have been different. This is considered as a limitation of this thesis, as it does not consider such alternatives, and future research is called for in this regard. However, the two formulations we have used are widely adopted in the existing literature and our results are directly comparable with those studies.

5.3 Cross Country Results³⁵

Though we emphasize the use of time series, in the following we report the results obtained by using cross sectional data for 17 countries in COMESA (see chapter 4 for the list). We apply OLS to the same two models we have used in the time series analysis.³⁶

The Conventional Formulation

$$\text{GRGDP} = -1.12 + 0.16\text{IGDP}^{**} + 0.05\text{GPOP} + 0.16\text{GRXS}^{**}$$

$$(-.581) \quad (3.386) \quad (.680) \quad (2.546)$$

$$R^2 = 0.58; \quad F(3,13) = 5.8944[.009]; \quad \text{DW} = 2.26$$

Diagnostic Tests		
Test Statistics	LM Version	F Version
Serial Correlation	CHI-SQ(1) = .45098 [.502]	F(1,12) = .32702 [.578]
Functional Form	CHI-SQ(1) = .92582 [.336]	F(1,12) = .69116 [.422]
Normality	CHI-SQ(2) = 1.1667 [.558]	Not applicable
Heteroscedasticity	CHI-SQ(1) = .16742 [.682]	F(1, 15) = .14919 [.705]

Feder's Formulation

$$\text{GRGDP} = .85 + 0.11\text{IGDP}^{**} - 0.14\text{GPOP} + 0.002\text{XSHGRX}^{**}$$

$$(.498) \quad (2.192) \quad (-.307) \quad (2.276)$$

$$R^2 = .54; \quad F(3,13) = 5.2625[.014]; \quad \text{DW} = 2.23$$

Diagnostic Tests		
Test Statistics	LM Version	F Version
Serial Correlation	CHI-SQ(1) = .70400 [.401]	F(1,12) = .51841 [.485]
Functional Form	CHI-SQ(1) = .48843 [.485]	F(1,12) = .35497 [.562]
Normality	CHI-SQ(2) = 2.9805 [.225]	Not applicable
Heteroscedasticity	CHI-SQ(1) = .095725 [.757]	F(1, 15) = .084942 [.775]

³⁵. 1970-1990 averages.

³⁶. t-values are in parentheses.

The diagnostic tests which are represented in two versions [LM and F except for normality where only the LM version is applicable] show that there are no problems of serial correlation, functional form, normality and heteroscedasticity in the two formulations. Moreover, the F-test statistic for the two models shows that the explanatory variables jointly explain the dependent variable. The R^2 figures indicate that about 55 percent of the variation in the dependent variable is explained by the regressors. However, it is worth pointing out that our results are based on too few observations. As we have mentioned earlier, we are reporting the cross sectional results so that they are comparable with the existing literature where most studies are cross sectional.

Our cross sectional results show that our hypothesis of the positive and significant link between exports and growth is confirmed and the result is robust to alternative definitions of the export variables although the significance of the export variable in Feder's Formulation is small. A robust result is also obtained in the case of the investment variable which is persistently significant. On the other hand, the population variable is found to be sensitive to the kind of specification employed. In any case, it is not found to be significant.

As far as the cross sectional analysis is concerned, our results are similar to most previous studies (See for example, Balassa (1985), Ram(1987), Fosu(1990a),and Obedokun(1991)). In his study of low-income LDCs which include all the countries in our sample Ram(1987), for example, found similar results though the magnitudes of the estimated coefficients are larger, especially when Feder's formulation is employed. On the other hand, Obedekun's results are very similar to ours when the conventional formulation is employed.

As in the existing literature, the hypothesis of a positive and significant link between exports and growth is supported in some cases and not in others. Comparing our results with

that of Ram, for instance, while similar results are obtained for Malawi, Mauritius, Uganda, and Zambia, the results on Ethiopia ,Kenya and Tanzania are different. That is, while Ram got significant impacts of exports for Tanzania but not for Ethiopia and Kenya,our results reveal the opposite.



VI. CONCLUSIONS

In recent years, within the framework of structural adjustment programmes, African countries have paid increasing attention to export promotion activities and are liberalizing their economies. This strategy is becoming popular on the grounds that exports help economic growth by increasing efficiency from specialization along the lines of comparative advantage, encouraging the utilization of idle resources, yielding positive externality effects, through greater economies of scale, and higher productivity.

Most of the previous empirical works that tested the link between exports and economic growth focused on cross country regression analysis. This approach, however, suffers from an over simplified assumption of uniform production functions across countries which obscure intercountry differences; the studies use period averages which are misleading if the time series are non-stationary; and it is difficult to associate the results obtained with any particular country in the group.

In trying to deal with these weaknesses, this study has employed individual country time series data to test the relationship between exports and GDP growth as well as to establish the direction of causality between them. In doing so we have paid considerable attention to the issues of spurious regression, stationarity and cointegration. The mixture of model specifications based on the unit root results enhances the reliability of our results.

Our time series results reveal a positive and significant association between exports and growth in four out of the seven countries investigated. Regarding the direction of causation, only in three countries (Kenya, Mauritius and Ethiopia) did we find causality running from exports to growth. For the fourth case (Malawi), however, though positive correlation is obtained in the regression equations, the Granger non-causality tests reveal that

the causation is from growth to exports but not the other way around. These mixed results support our view of conducting the analysis on an individual country basis and investigating the issue of causality along with regression analyses. The results on the other variables (investment and population) are also mixed and often these variables are found to be insignificant.

The cross sectional results, which were undertaken to make our results comparable with the existing literature and previous empirical studies, show a positive and significant association between exports and growth when these countries are taken as a group. Moreover, the notion that, in order to benefit from exports, countries should have a minimum threshold income and a higher proportion of manufactured exports is contradicted in our study as shown by the time series evidence from the cases of Kenya and Ethiopia as well as the cross sectional results.

Whereas the cross sectional results suggest that exports have a positive impact on growth, the time series results do not unambiguously support the hypothesis. That is, as in the existing literature, the hypothesis that exports stimulate economic growth does not hold for all countries in our sample.

The absence of a statistically significant relationship between exports and growth should, however, not be taken to imply that exports are not important for growth. Recent experience has shown that countries with a more liberalized external sector and policies that do not discriminate against exports recorded a stronger growth performance compared to countries which imposed considerable barriers to outside competition. The countries with rapid economic growth also tended to have a relatively stable macroeconomic environment characterized by low and stable inflation, fiscal deficits which are manageable, competitive

real exchange rates, and a sustainable balance of payments position. In these countries, exports have played an important role in stimulating long run economic growth.

Partly for these reasons, removing controls on access to world market and foreign exchange is a key feature of the reform programmes that most of the countries in our sample are currently undertaking. The presumption here is that liberalization leads an economy to a higher growth path. However, the dynamic effects of trade liberalization are still controversial as trade liberalization does not necessarily lead to a better economic performance. Rational and selective protection may also bring about a superior growth performance than non-selective liberalization.

Though our study produced sensible results, it has several important limitations. First, this study, following Feder, tries to identify two channels (higher productivity and positive externality effects) through which exports can affect growth. But, there are also other channels (like alleviating import constraints) that are not clearly shown (though implicitly contained in the conventional framework) and the paper suffers from such a weakness. Future works, therefore, need to investigate, in a greater detail, additional channels through which exports may affect growth.

Second, practically, all empirical studies to date have used a single equation model and we have also followed this trend. On theoretical grounds, however, the relationship between exports and growth may better be explained in a simultaneous equation model. That is, our results may suffer from a simultaneity bias problem, although our causality tests seem to suggest unidirectional causality.

Third, as argued by Sachs and Warner (1997), the lack of openness to international trade is one of the sources of slow growth of the economies of most SSA countries. How openness to international trade affects the steady state level of income as well as "the speed of

convergence to the steady state " are important factors that this paper does not address.

Fourth, the growing literature on endogenous growth suggest the importance of variables like research and development and education as possible explanations for productivity growth which could not be empirically examined in our study. Finally, since aggregate data is used, the study does not consider commodity specific effects.

In the above light, a comprehensive study is needed, which includes the above and takes into account the notions of increasing returns and imperfect competition as well as the structural constraints these countries face, to adequately model the link between exports and growth. Despite the above limitations, however, the study has made some contribution to the existing literature on the exports-economic growth nexus by considering a region that has been neglected by the empirical literature.

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Annex 1: Structure of the Economies, 1994 (1985)

(%) of GDP	Ethiopia	Kenya	Tanzania	Uganda	Malawi	Zambia	Zimbabwe	Angola	Burundi	Comoros	Lesotho	Mauritius	Mozambique	Rwanda	Seychelles
Agriculture	57.3 (53.5)	29.1 (32.5)	56.9 (52.1)	49.4 (52.7)	37.7 (42.9)	24.7 (13.1)	16.3 (20.2)	11.9 (13.5)	53.1 ((61.5)	37.6 (36.1)	13.7 (21.5)	9.1 (15.3)	32.8 (47.5)	42.3 (45.7)	3.6 (5.8)
Industry	10.2 (12.8)	17.4 (19.1)	16.8 (12.0)	13.9 (9.8)	28.4 (21.9)	37.5 (42.0)	35.4 (30.2)	56.1 (43.3)	18.2 (13.0)	13.6 (14.1)	45.8 (29.6)	32.6 (29.2)	12.3 (10.4)	18.2 (25.4)	15.0 (18.4)
Manufacturing	3.3 (4.9)	10.5 (11.7)	7.8 (7.9)	6.5 (5.8)	18.6 (14.5)	22.6 (22.9)	26.4 (22.9)	3.4 (9.7)	11.7 (8.1)	6.0 (3.7)	16.6 (11.1)	22.4 (20.6)	—	2.3 (15.0)	- (9.7)
Services	32.5 (33.9)	53.5 (48.4)	26.3 (35.9)	36.6 (37.4)	33.9 (35.2)	37.8 (44.9)	48.3 (49.5)	32.0 (43.2)	28.7 (25.5)	48.8 (49.8)	40.5 (48.9)	58.4 (55.5)	54.9 (42.1)	39.5 (28.9)	81.4 (759)
Private consumption	85.5 (84.6)	61.5 (57.6)	88.4 (74.9)	85.4 (78.4)	77.6 (69.4)	87.2 (62.0)	63.0 (50.1)	33.8 (39.3)	98.6 (88.1)	86.4 (72.7)	56.1 (74.7)	64.2 (68.2)	75.3 (75.3)	120.8 (80.5)	44.5 (37.5)
General government Consumption	11.6 (14.4)	14.7 (17.5)	8.3 (16.4)	10.5 (14.5)	22.9 (17.7)	9.8 (23.9)	18.6 (28.6)	33.9 (32.4)	11.3 (7.8)	21.6 (27.5)	18.4 (17.1)	12.9 (10.2)	20.0 (21.0)	28.6 (11.3)	37.4 (34.6)
Imports of goods and non-factor services	24.9 (16.2)	35.7 (26.4)	51.8 (16.8)	18.6 (15.7)	44.0 (29.9)	35.5 (37.2)	39.9 (27.1)	48.0 (25.3)	33.5 (20.8)	43.8 (50.5)	75.3 (72.2)	67.8 (55.4)	79.1 (18.8)	64.3 (19.9)	63.5 (63.8)
Gross domestic investment	5.4 (9.0)	20.9 (26.0)	31.3 (7.7)	14.5 (9.0)	13.2 (18.6)	6.9 (14.9)	18.4 (17.2)	14.2 (18.2)	9.3 (13.9)	16.9 (32.8)	56.3 (25.6)	31.9 (23.5)	60.4 (17.0)	9.1 (17.3)	26.0 (22.7)

Source: World Bank (1996), Trends in Developing Economies

Figures in parentheses are corresponding figures for 1985.

Annex 2A: Some external sector variables, 1994 (1985)

	Ethiopia	Kenya	Tanzania	Uganda	Malawi	Zambia	Zimbabwe	Angola	Burundi	Comoros	Lesotho	Mauritius	Mozambique	Rwanda	Seychelles
Trade(millions \$us)															
Total exports (fob)	280(359)	1,482(940)	486(326)	254(383)	372(250)	1,067(..)	1,891(..)	3002(2301)	124(114)	11(15)	136(22)	1311(430)	150(77)	32(119)	26(5)
Total imports (cif)	915(975)	2,044(1,486)	1,589(999)	672(404)	555(287)	964(715)	1,065(..)	1633(1401)	239(189)	52(40)	1045(335)	1720(526)	1018(381)	458(274)	228(100)
<u>Balance of Payments</u>															
Exports of goods and non factor services	556(549)	2,645(1,552)	855(445)	333(408)	389(276)	1,173 (950)	2,305(1,229)	3113(2430)	138(127)	38(20)	174(39)	2032(576)	341(143)	44(154)	272(116)
Imports of goods non factor services	1,101(1,082)	2,448(1,850)	2,068(1016)	841(484)	591(331)	1,315(969)	2,311(1,211)	3258(1724)	325(239)	88(64)	1055(343)	2236(557)	1155(481)	482(328)	283(108)
Resource balance	-545(-533)	197(-297)	-1,213(-571)	-508(-76)	-202(-54)	-144(-19)	-6(18)	855(706)	-187(-112)	-50(-44)	(-881)(-304)	-204(-21)	-814(339)	-438(-174)	-11(9)
Net factor income	-81(-33)	-374(-213)	-154(-93)	-61(-53)	-46(-53)	-240(-267)	-309(-126)	-1896(-531)	-12(-18)	0(-1)	435(249)	-22(-45)	-218(-117)	-6(-6)	-7(-6)
Net current transfers	308(193)	148(81)	465(148)	304(40)	18(10)	-19(-38)	56(-45)	169(21)	24(10)	7(-1)	15(62)	100(22)	138(16)	45(4)	-7(0)
Current account balance, before official transfer	-317(-373)	-30(-429)	-902(-516)	-265(-89)	-230(-97)	-403(-324)	-259(-153)	-872(195)	-175(-121)	-42(-46)	-431(7)	-126(-44)	-894(-440)	-400(-175)	-25(3)
Financing items (net)	547(420)	134(697)	892(531)	354(128)	201(57)	557(-132)	-421(253)	858(-174)	198(147)	32(52)	850(14)	71(63)	947(420)	340(190)	19(-3)
Changes in net reserves	-229(-48)	-104(33)	10(-14)	-90(-39)	29(40)	-155(456)	-162(-100)	14(-21)	-23(-27)	10(-6)	-419(-21)	55(-19)	-52(21)	61(-14)	6(0)
<u>External debt</u>															
Total debt outstanding and disbursed (Millions US\$)	5058(2,013)	7,273(4,178)	7,442(4,206)	3,473(1,246)	2,015(1,018)	6,409(4,576)	4,368(2415)	19608(2993)	1123(455)	189(134)	600(175)	1411(629)	5491(2677)	954(367)	170(98)
Ratios(% of GDP)															
Exports of goods and non-factor services/GDP	12.4(8.2)	38.6(25.3)	23.8(7.7)	8.2(13.8)	30.3(24.2)	31.6(36.4)	39.8(31.2)	66.1(35.7)	14.2(11.0)	18.4(17.0)	10(6.6)	58.9(53.5)	23.3(5.6)	5.8(10.8)	60.7(68.9)
Current account balance/GDP	20.9(26.0)	-0.4(-7.0)	-26.7(-9.3)	-6.6(-2.5)	-17.9(-8.5)	-10.9(-14.4)	-4.5(-3.4)	-18.5(2.9)	-17.5(-10.5)	-21.2(-40.2)	32.9(1.4)	-3.7(-4.1)	-60.9(-17.2)	-53.3(-10.2)	-5.1(1.5)
Total Debt/GDP	43(2.7)	106(68.1)	220.3(76.1)	86.8(35.5)	156.1(90.0)	173.2(203.1)	75.4(53.4)	225.3(44.0)	112.1(39.6)	94.2(117.2)	45.8(36.7)	41.7(58.4)	374.3(104.5)	127.1(21.4)	34.9(58.0)
Total debt service/exports	11.4(22.5)	33.3(39.2)	31.3(17.7)	14.5(9.0)	13.2(18.6)	6.9(14.9)	18.4(17.2)	2.3(6.4)	27.4(20.5)	5.1(8.9)	4.5(5.2)	7.2(24.3)	23(29)	13.7(10.8)	6.2(7.9)

Source: World Bank (1996), Trends in Developing Economies
 Figures in parentheses are corresponding figures for 1985.

Annex 2B: Structure of Exports of COMESA countries*

Country	Total Exports	Primary Commodities	Fuel	Manufacture	Main Exports
	US\$ Mill	%	%		%
Angola	3833.0	7.0			crude oil (89.3) diamond (7) refined petro & gas (2.2)
Burundi	75.0	54.5			coffee (40.1) tea (12.3) hides (2.1)
Comoro	22.1	99.1			vanilla (66.5) ylang ylang (20.4)
Djibouti					
Ethiopia	276.0	63.4			Coffee (47) Hides (16.3)
Kenya	1744	37.1	6.7		Tea (8.5) Coffee (10.9) Horticulture (7.7) Petro-prod (6.7) cement (1.3)
Lesotho	67.0	14.0		70.7	manufactures(70.7) food & live anim(9.6) wool & mohair (4.5)
Madagascar	292.0	50.0			shellfish (18)vanilla (15.8) coffee (9.6) cloves (7.9)
Malawi	311.0	84.6			tobacco (67.2)tea(11.3)sugar(6.1)
Mauritius	1332.7	25.4		56.5	clothing & textile (56.5) sugar(24.5) tea(0.4)
Mozambique	48.1	68.6			prawns (52.1) cotton (8.4) cashewnuts(6.2)
Namibia	1293.0	83.8			diamonds(35.6)other minerals(19.8) fish(12.99)meat&meat prod. (7.3) Live animal (5.9)
Rwanda	111.7	52.8			coffee (31.3) tea(18.8) tin ore (3)
Seychelles	48.7	37.7	60.6	4.0	petroleum production(60.6) preserved fish(24.8) fresh & frozen fish(6.9)
Somalia	120.0	42.5			livestock(21.7) Banana(20.8)
Sudan	374.0	85.8			cotton(47.9)sesame(14.4) gumarabic(12)sheep(6.4)
Swaziland	611.0	44.0		17.7	sugar(24.4)soft drink concentr(17.7) fruit & veg.(6.4)
Tanzania	420.0	53.6		15.3	cotton(23.2) manufactures (15.3) coffee(14.2) Minerals(9.7)
Uganda	237.0	63.3			coffee(44.9) maize(8) beans(5.3) tea(4.7)
Zambia	1013.0	89.5			copper(81.9)cobalt(7.3)
Zimbabwe	1249	54.4			Tobacco(35) Gold(7.6) Fe-alloys(9)

* Figures for years ranging between 1989-93.
Source: UNECA (1995): Trade Liberalization of Domestically produced Goods (Eastern and Southern African Subregion).

Annex 3 Trade creation and Trade Diversion in a Customs Union: A partial Equilibrium Analysis.³⁷

Consider three countries: Country A (home country), country B (partner country) and country C (rest of the world). First, take the case of trade of creation illustrated by figure 1.

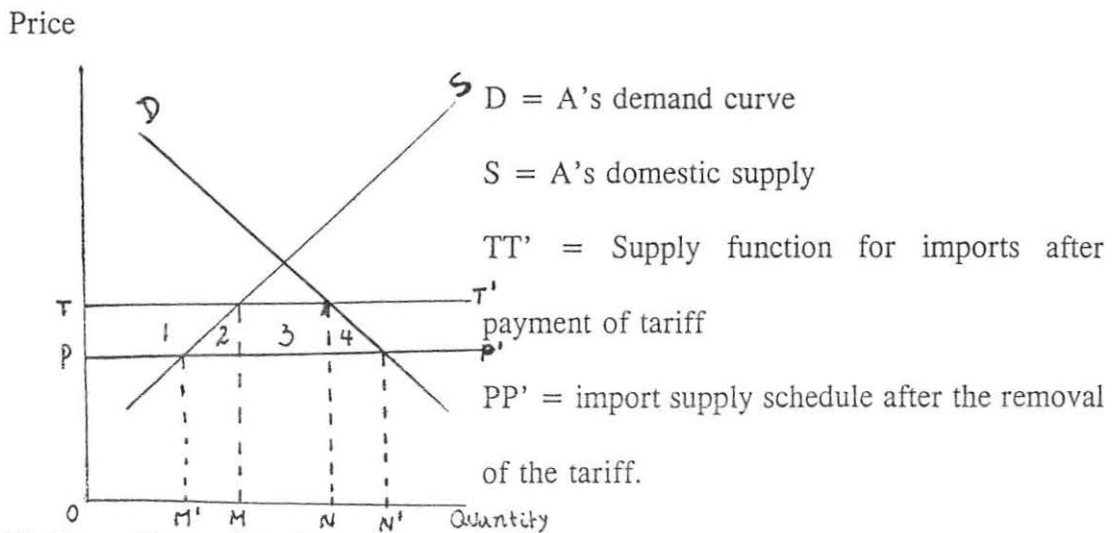


Fig.1: Welfare effects of trade creation.

In country A, before the formation of a customs union with B, the presence of a tariff wall led it inefficiently produce part of its requirements of good X (production = OM), consumes ON, and imports an amount represented by MN. When a customs union is formed between A and B, hence A abolishes tariffs, the most efficient producer B expand its export to A. The new import-supply schedule is given by PP'. This leads to an increase in the amount of imports in A to M'N' and to a reduction in home production OM' whereas total consumption in A increases to ON. That is, trade has been created. The welfare gain measured from such a move is given by the total area depicted by 1+2+3+4. However, 1 and 3 are not net gains since they formerly represented profits to A's protected producers and government's tariff revenue respectively. The net gains, are, therefore, given by 2+4.

³⁷. This diagrammatical discussion is taken from Caves et al, 1996.

on the other hand, the formation of a customs union may lead to trade diversion as illustrated by Figure 2.

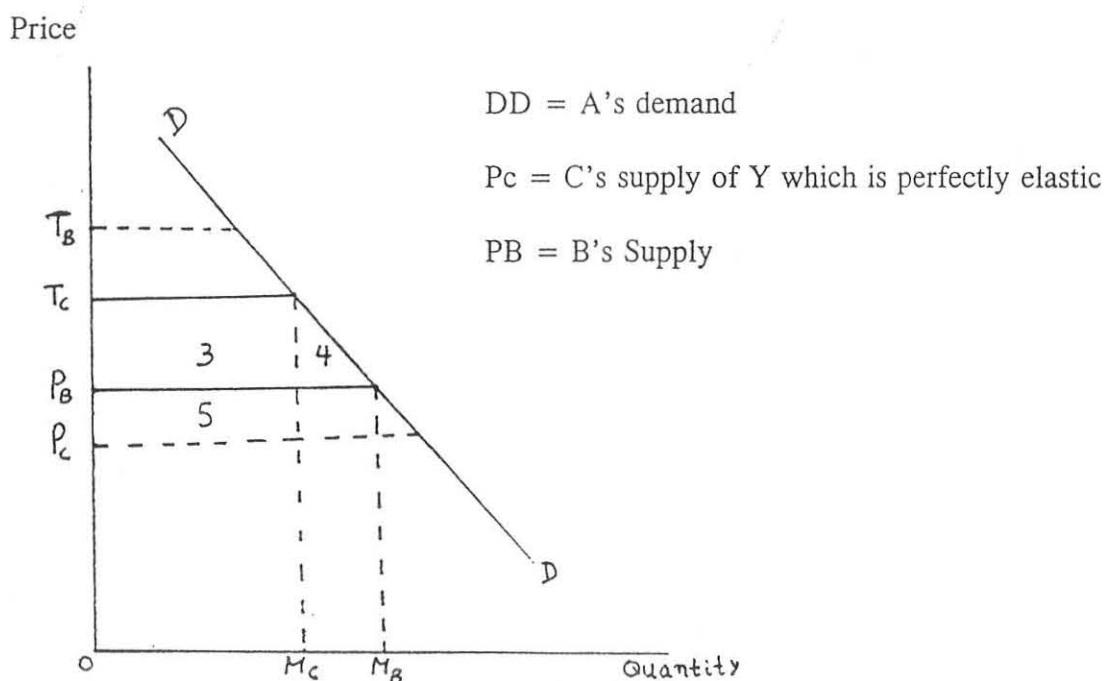


Fig. 2: Welfare effects of trade diversion.

$$\frac{P_c T_c}{O P_c} \text{ or } \frac{P_B T_B}{O P_B} = \text{ad valorem tariff on imports of } y$$

Before the formation of the customs union, A used to buy y from the most efficient supplier C and import OM_c at price OT_c . When the customs union is formed, supply is shifted to B as its exports of y inter duty-free while C still faces the tariff wall. This makes A's consumption to expand to OM_B . The gain by A's consumers equals to areas 3+4 among which 4 is the pure gain as 3 formerly represents revenue collected from imports. Area 5, on the other hand, represents a pure social loss. The net welfare gain/loss therefore, depends on the size of 4 and 5. From the above, what we notice is that, the formation of a customs union may lead to a trade diversion whose net welfare impact can not unambiguously determined.

Annex 4: PTA EXTERNAL TRADE INDICATORS
 Item 1 to 12 Million of US Dollars
 - Items 13 to 21 in %

TYPE OF INDICATORS	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1. Total World Exports	1,720,200	1,686,200	1,789,500	1,812,700	1,984,600	2,352,400	2,690,100	2,909,300	3,329,800	3,448,700	3,687,000
2. Total World Imports	1,793,400	1,736,400	1,848,100	1,890,400	2,063,500	2,420,000	2,771,600	3,001,300	3,436,400	3,570,800	3,846,100
3. Total World Trade	3,513,600	3,422,600	3,637,600	3,703,100	4,048,100	4,772,400	5,461,700	5,610,700	6,766,200	7,019,500	7,533,100
4. Total PTA Exports	7,894	7,790	8,299	7,614	7,977	8,800	10,081	10,112	12,102	11,734	12,453
5. Total PTA Imports	11,732	10,732	10,504	10,751	10,657	12,430	13,183	14,805	16,682	16,528	17,496
6. Total PTA Trade	19,626	18,523	18,803	18,365	18,634	21,230	23,264	24,917	28,784	28,262	29,949
7. Intra-PTA Exports	554	489	478	425	472	522	613	610	701	777	826
8. Intra-PTA Imports	554	489	478	425	472	522	613	610	701	777	826
9. Total Intra-PTA Trade	1,108	978	956	851	944	1,043	1,226	1,221	1,403	1,554	1,651
10. PTA Exports to Third Countries	7,340	7,301	7,821	7,189	7,505	8,278	9,468	9,502	11,401	10,957	11,628
11. PTA Imports from Third Countries	11,178	10,243	10,026	10,325	10,185	11,908	12,570	14,195	15,981	15,751	16,670
12. Total PTA Trade with Third Countries	18,518	17,544	17,847	17,514	17,690	20,187	22,038	23,697	27,381	26,708	28,298
13. Intra-PTA Exp. as a % of Tot. PTA Exp.	7.02	6.28	5.76	5.59	5.92	5.93	6.08	6.03	5.80	6.62	6.63
14. Intra-PTA Imp. as a % of Tot. PTA Imp.	4.72	4.56	4.55	3.96	4.43	4.20	4.65	4.12	4.20	4.70	4.72
15. Tot. Intra-PTA Tde as a % of Tot. PTA Tde	5.65	5.28	5.08	4.63	5.07	4.91	5.27	4.90	4.87	5.50	5.51
16. Intra-PTA Exp. as a % of PTA Exp. to 3rd Countries	7.55	6.70	6.11	5.92	6.29	6.30	6.47	6.42	6.15	7.09	7.10
17. Intra-PTA Imp. as a % of PTA Imp. from 3rd Countries	4.96	4.78	4.77	4.12	4.64	4.38	4.88	4.30	4.39	4.93	4.95

Annex 4: Contd'

18. Tot. Intra-PTA Tde as a % of Tot PTA Tde with 3rd Countries	5.98	5.58	5.36	4.86	5.34	5.17	5.56	5.15	5.12	5.82	5.84
19. Tot. PTA Exp. as a % of Tot. PTA Imp.	67.29	72.59	79.01	70.82	74.85	70.79	76.47	68.30	72.54	71.00	71.18
20. Tot. PTA Tde with 3rd Countries as a % of Tot. PTA Tde	94.35	94.72	94.92	95.37	94.93	95.09	94.73	95.10	95.13	94.50	94.49
21. Tot. PTA Tde as a % of Tot. World Tde	0.56	0.54	0.52	0.50	0.46	0.44	0.43	0.42	0.43	0.40	0.40

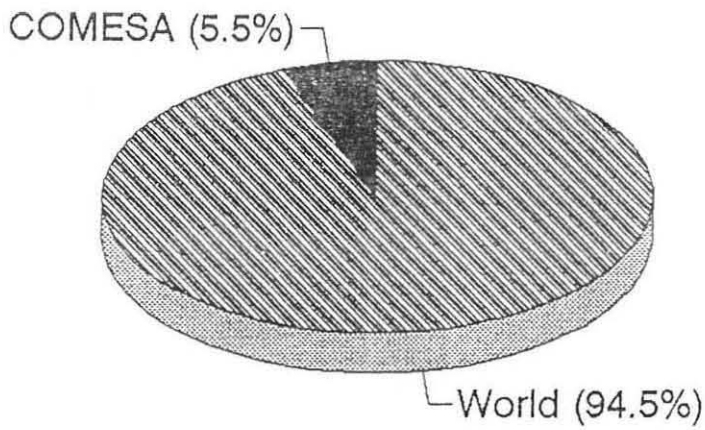
NB: This table is for the 22 PTA members States that includes Seychelles, Namibia and Madagascar. Source COMESA, Intra PTA/COMESA Potential, 1994, Lusaka, Zambia.

Source: UN-ECA (1995): Trade Liberalization of Domestically Produced Goods (Eastern and Southern African Subregion).



Annex 5:

Chart 1. DIRECTION OF COMESA TRADE 1992
(Percentages)



Source: UNECA (1995), Trade Liberalization of Domestically Produced Goods (Eastern and Southern African Subregion).

Annex 6:

INTRA-PTA EXPORTS IN 1992
(US\$ MILLION)

	Ang	Brd	Com	Dji	Eth	Ken	Les	Mad	Mwi	Mau	Moz	Nmb	Rwa	Sey	Som	Sud	Swz	Tzn	Uga	Zmb	Zwe	Tot.	
Angola																							
Burundi						4.36							3.35							0.02	0.57	8.30	
Comoros								0.03		0.04													0.07
Djibouti		0.20			1.9	0.1									25.6								227.8
Ethiopia				21.54		1.13				0.01						9.03		0.12	0.34		0.05	32.22	
Kenya	1.3	6.6	0.60	1.2	8.2			1.0	3.2	15.9	11.7		25.5	1.4	9	28.1	1.8	31.4	108.2	6.2	8.2	269.7	
Lesotho										0.03										0.2	0.7	0.93	
Madagascar																							
Malawi		0.08				0.08				0.17	17.39							0.91		7.11	4.35	30.09	
Mauritius			2.01	0.03	0.01	1.42	0.02	10.93	0.14					4.06		0.01	0.26	0.20	0.05	0.39	7.75	27.28	
Mozambique	0.11					1.66		0.97	1.35	0.05					0.42			1.72		0.03	4.73	11.04	
Namibia						0.09				0.01										0.6	0.2	0.9	
Rwanda		0.2				0.04											0.01					0.25	
Seychelles																							
Somalia				0.45		0.1													0.14			0.69	
Sudan						0.3				0.2					0.10			0.10				0.7	
Swaziland						7.0				1.63					0.05					9.6	13.1	31.38	
Tanzania		18.0		0.3	0.2	6.8			0.5	0.5			21							1.1	2.7	51.1	
Uganda					0.02	1.83							0.61		0.01	0.10				0.16	0.29	3.02	
Zambia	1.0	5.8			0.09	8.5			4.8	0.02	0.1	0.3	0.01					3.5	0.01		14.0	38.13	
Zimbabwe	7.9	1.9		0.09	0.20	14.9	1.5	1.1	52.3	1.17	40.4	3.0		0.6		2	0.7	6.2	0.7	56.2		189.86	

Source: UN-ECA (95): Trade Liberalization of Domestically Produced Goods (Eastern and Southern African Subregion).

ANNEX 7: Cluster of Trading Partners in COMESA

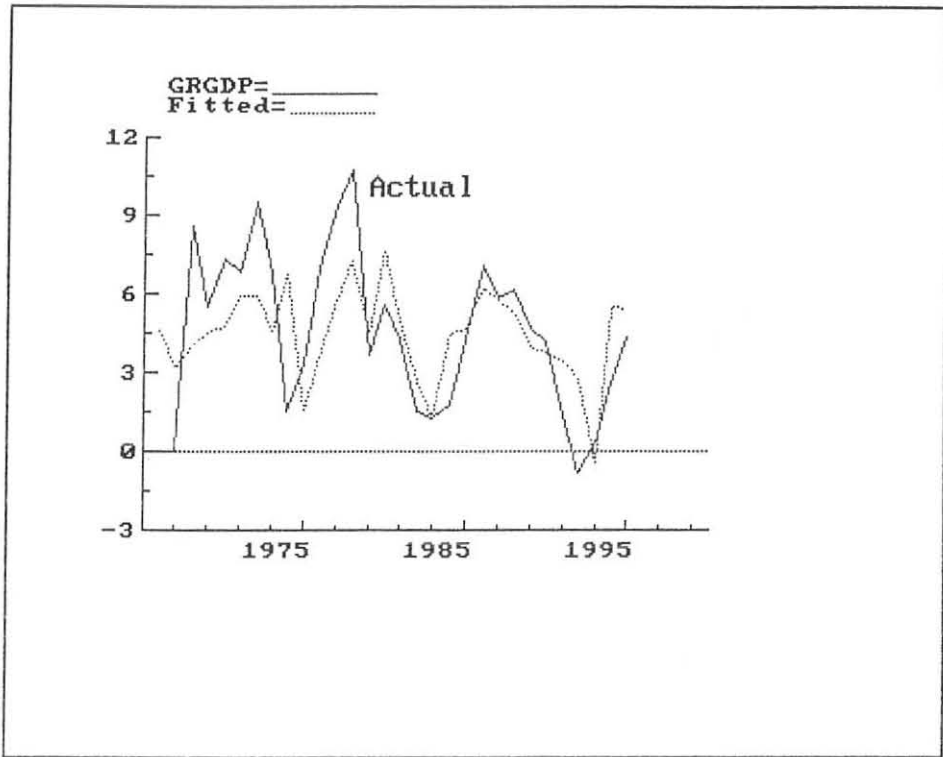
Angola-	Zimbabwe
Burundi-	Kenya, Rwanda, Tanzania, Zimbabwe
Comoros-	Mauritius, Madagascar
Djibouti-	Somalia, Ethiopia
Ethiopia-	Djibouti, Sudan, Kenya, Uganda
Kenya-	Uganda, Rwanda, Sudan, Burundi, Tanzania, Mozambique, Mauritius, Somalia, Ethiopia, Comoros, Djibouti, Zimbabwe, Zambia.
Lesotho-	Zimbabwe, Zambia
Malawi-	Mozambique, Zambia, Zimbabwe, Tanzania, Burundi
Mauritius-	Madagascar, Zimbabwe, Seychelles, Comoros, Kenya.
Mozambique-	Zimbabwe, Tanzania, Kenya, Malawi,
Namibia-	Zambia, Zimbabwe.
Rwanda-	Kenya, Burundi, Uganda, Tanzania
Somalia-	Djibouti, Kenya, Uganda.
Sudan-	Ethiopia, Tanzania, Mauritius, Somalia.
Swaziland-	Zimbabwe, Zambia, Kenya.
Tanzania-	Rwanda, Burundi, Kenya, Zimbabwe, Zambia, Malawi, Mozambique.
Uganda-	Kenya, Tanzania, Rwanda
Zambia-	Zimbabwe, Kenya, Burundi, Malawi, Tanzania
Zimbabwe-	Zambia, Malawi, Mozambique, Kenya, Angola, Tanzania, Namibia, Burundi.

Annex 8: Selected products of Intra-COMESA Export Potential

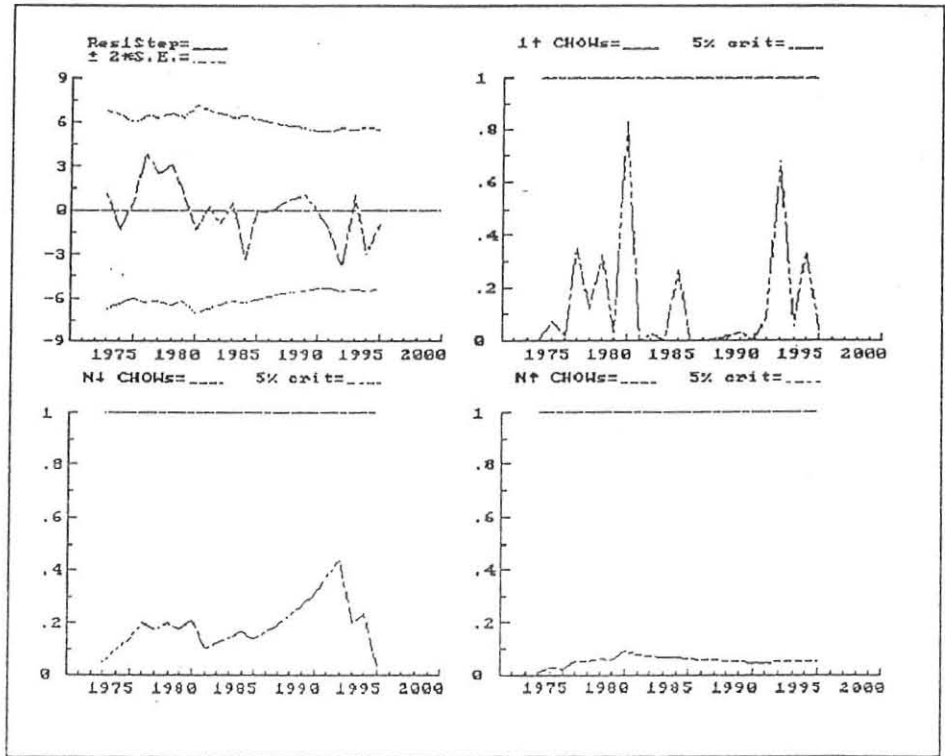
Country	Potential Export item
Angola	Fish frozen, excl. fillets; shell fish fresh, frozen Coffee green roasted PTSNES of equipment of 76
Burundi	Coffee green, roasted, sub Tea
Comoros	Spices Essentials oil, resinoid etc.
Djibouti	Other animal materials NES
Ethiopia	Leguminous vegetables dry, other fresh vegetables fruits fresh or dried NES Leather bovine NES, tquine, leather from sheep, lambs; leather of other hide, skin. underwear, cotton,
Kenya	Fish frozen fish salted, dried, smocked; shell fish fresh, frozen Leguminous veg. dry; other fresh vegetables Nuts edible fresh, dried Leather bovine NES, Equine, leather from sheep lamb Leather of other hides, skin Cotton yarn Knit underwear nonel Means trousers outwear
Madagascar	Fish frozen, shell fish, fresh, frozen, fish prepared preserved Leguminous vegetable dry spices Ex pepper pimento Refractory Minerals Knitted wear
Malawi	Tobacco not stripped Tea Raw beet and cane sugar Raw cotton excl. Linters
Mauritius	Fish frozen, salted dried, smoked prepared preserved Raw beets, cane sugar, refined sugar Men's wear Knitted pullover jersey Watches movement cases
Mozambique	Fish frozen; shell fish fresh, frozen Nots edible fresh dried Iron steel products Wire, cables, ropes etc.
Rwanda	Coffee green, roasted Tea Bovine, equine hides raw
Seychelles	Fish, fresh, chilled, frozen, salted, direct etc. Spices
Somalia	Fish, frozen, salted, dried Bovine, equine hides raw
Sudan	Oil cakes and other residues Raw cotton excl. linters Nat. gums, resins, lacs Cotton yarn Veg. used in pharmacy
Tanzania	Fish salted, dried, shell fish fresh frozen Nuts edible fresh dried Raw cotton Excl. linters Cordage, and manufactures Cooper NES alloys unwrought
Uganda	Coffee green roasted sub Bovine, equine hides raw Raw cotton Excl. linters
Zambia	Other fresh vegetables Raw cotton excl. linters Cotton yarn Prec. semi-prec. stones NES Copper, alloys worked
Zimbabwe	Bovine meat fresh, frozen Tobacco not stripped Cotton products (Yarn, woven, linen etc.) Iron steel products Lighting equip. Footwear

Source: UNECA (1995), Trade Liberalization of Domestically produced Goods (Eastern and Southern African Subregion)

Annex 9: Actual and Fitted Values (Kenya)



Annex 10: One-step residuals and Chow "break point" statistics (Kenya)



Kenya: Granger non-causality Tests³⁸

A.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	-5.6782	-1.006[0.3244]
GRGDP-1	-0.17589	-0.906[.3738]
GRGDP-2	0.27275	1.338[.1934]
GRXS-1	2.4263	2.540[0.180]
GRXS-2	-1.7727	-1.865[0.744]
F(4,24) = 2.3421 [0.08137]		
RSS = 3774.323742		

B.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	-2.3700	-0.877[.3883]
GRGDP-1	-0.069370	-0.369[.7152]
GRGDP-2	0.24346	1.245[.2241]
F(2, 26)=0.92261 (0.4101)		
RSS = 4899.906513		

The computed F-statistic from the above two tables is 3.58.

C.	Ordinary Least Square	
Dependent Variable is GRXS		
Regressor	Coefficient	T-ratio [prob]
Constant	3.4557	2.848 [0.0089]
GRXS-1	0.56219	2.738 [0.0115]
GRXS-2	-0.25033	-1.225 [0.2324]
GRGDP-1	0.024421	0.585 [0.5638]
GRGDP-2	0.044678	1.019 [0.3182]
F[4 24] = [0.0410]		
RSS = 174.4733294		

³⁸. Lag lengths are determined using Schwartz criterion.

D. Ordinary Least Square

Dependent Variable is GRXS

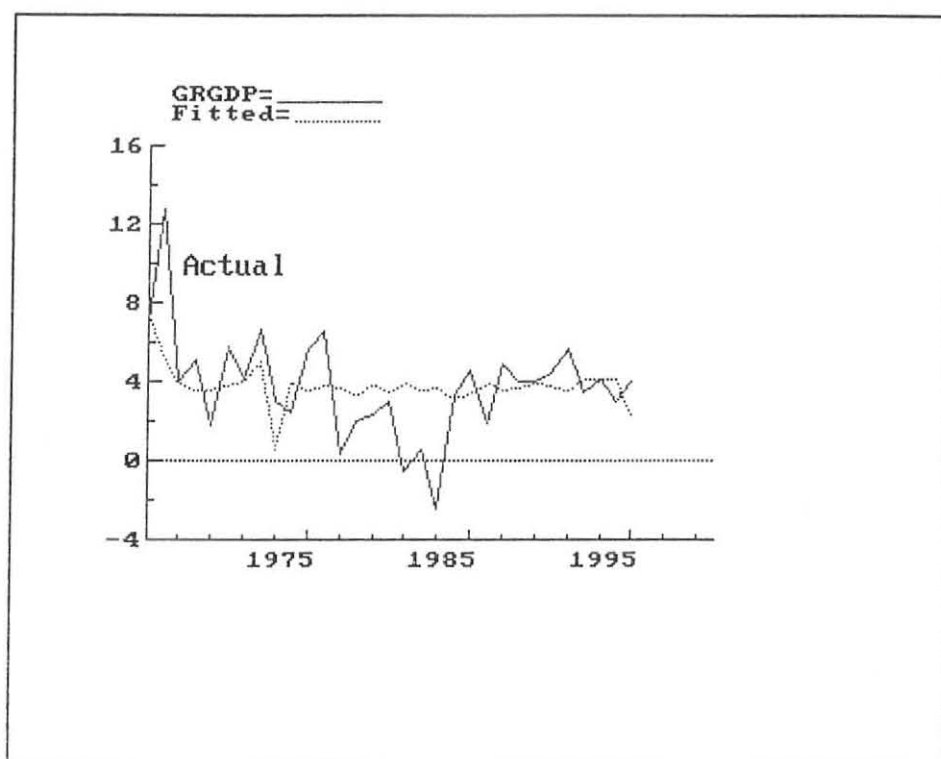
Regressor	Coefficient	T-ratio [prob]
Constant	2.6940	2.894 [0.0076]
GRXS-1	0.60201	3.154 [0.0040]
GRXS-2	-0.16814	-0.906 [0.3731]

F(2, 26) = 5.5155 [0.0101]

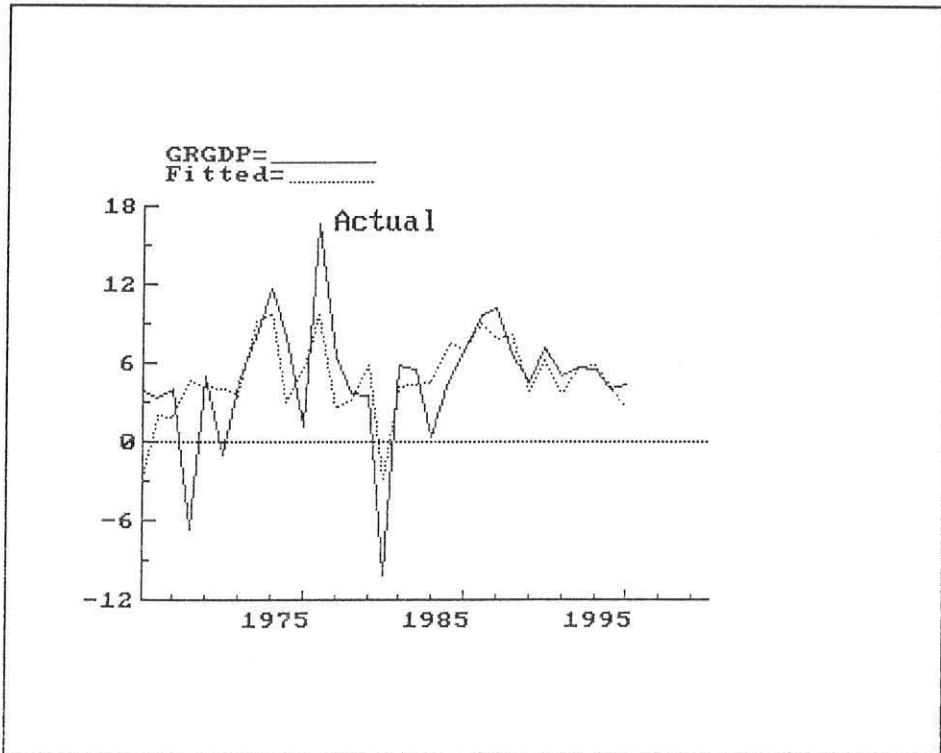
RSS = 182.6777226

The computed F-statistic from tables C and D is 0.56.

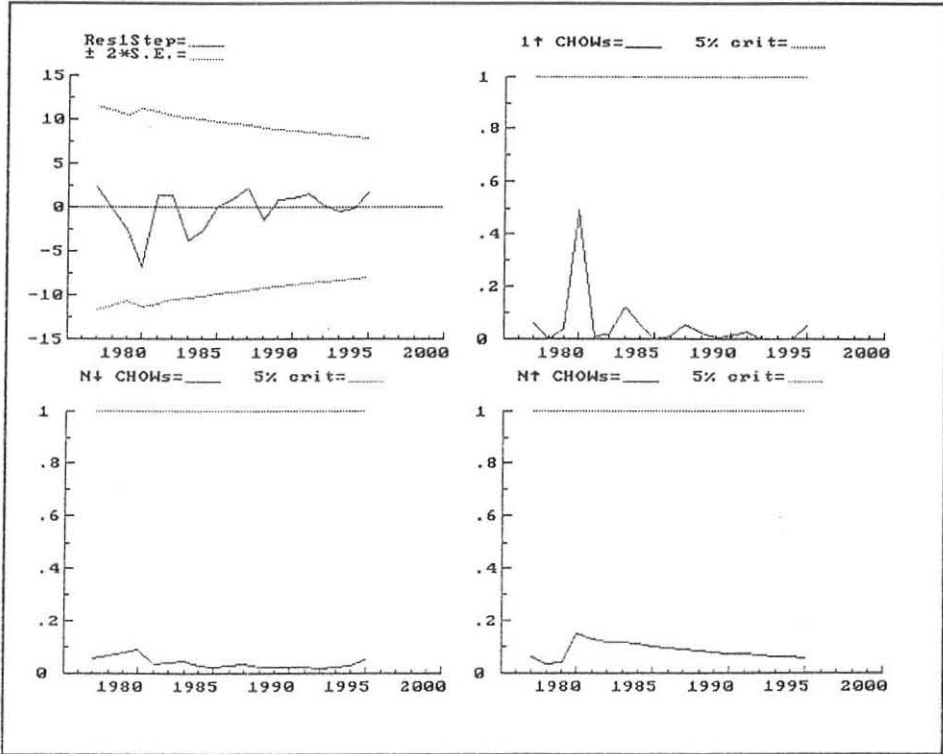
Annex 12: Actual and Fitted Values. (Tanzania)



Annex 13: Actual and Fitted Values. (Mauritius)



Annex 14: One-step residuals and Chow" break point " statistics. (Mauritius)



Annex 15

Mauritius: Granger non-Causality Tests³⁹

A.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	1.9634	0.669 [0.5087]
GRGDP-1	-0.24276	-1.310 [.2010]
GRXS-1	0.85034	1.890 [0.0692]
F (2, 28) = 2.0635 [0.1459]		
RSS = 4284.387491		

B.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	5.2629	2.140 [0.0409]
GRGDP-1	-0.13106	-0.715 [0.4804]
F(1, 29) = 0.51112 [0.4804]		
RSS = 4830, 733254		

The computed statistics from the above two tables is 3.57.

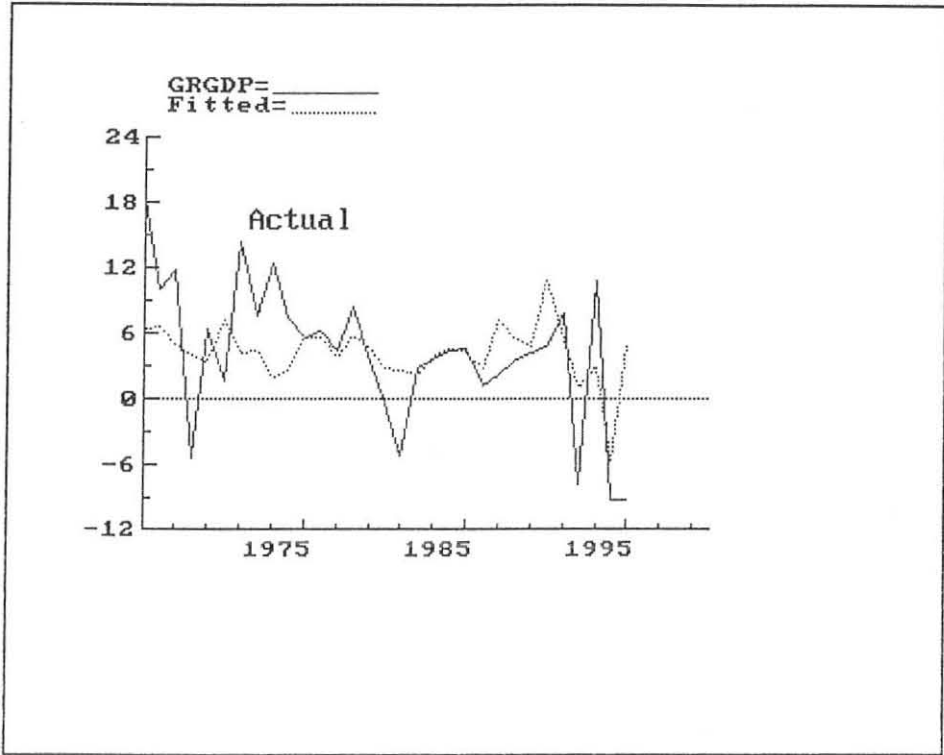
C.	Ordinary Least Square	
Dependent Variable is GRXS		
Regressor	Coefficient	T-ratio [prob]
Constant	4.3696	3.703 [0.0009]
GRXS-1	0.064255	0.355 [0.7253]
GRGDP-1	0.039255	0.526 [0.6028]
F(2, 28) = 0.29065 [0.7500]		
RSS = 693. 373028		

D.	Ordinary Least Square	
Dependent Variable is GRXS		
Regressor	Coefficient	T-ratio [prob]
Constant	4.4094	3.792 [0.0007]
GRXS-1	0.094640	0.559 [0.5807]
F(1, 29) = 0.312 [.5807]		
RSS = 700. 234201		

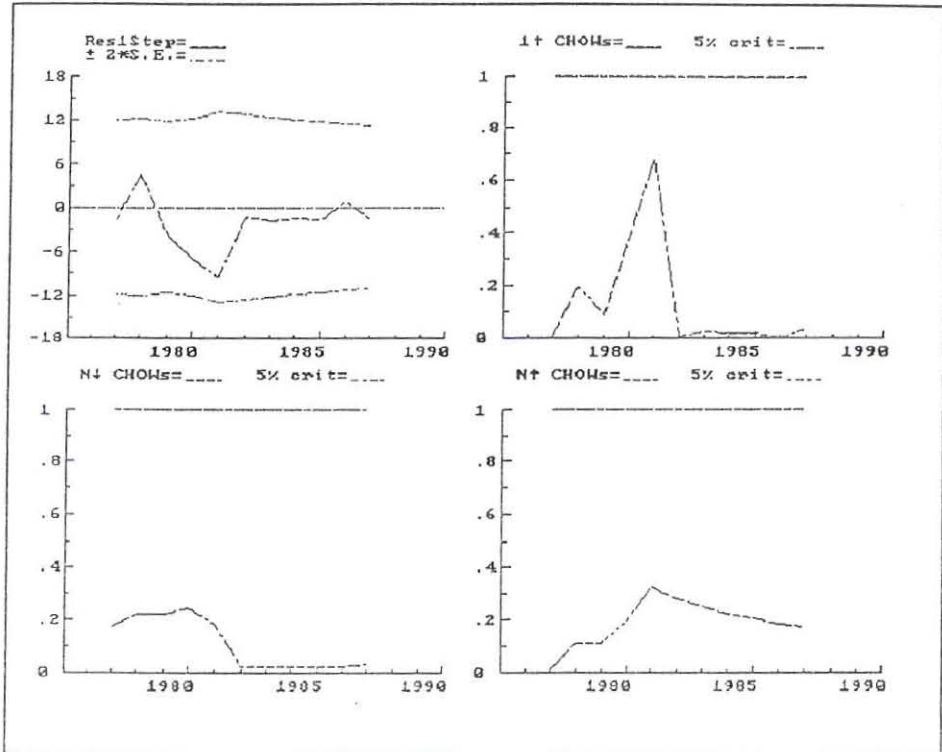
The computed statistic from tables C and D is .28.

³⁹. Lag lengths are determined by Schwartz criterion.

Annex 16: Actual and Fitted Values. (Malawi)



Annex 17 : One-step Residuals and Chow "break-point" statistics
(Malawi)



Annex 18

Malawi: Granger non-Causality tests⁴⁰

A.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	3.3923	2.168 [0.0388]
GRGDP-1	0.13608	0.647 [0.5227]
XSHGRX-1	0.086937	0.208 [0.8371]
F(2, 28) = 0.29287 [0.7484]		
RSS = 1276. 415335		

B.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	3.4539	2.287 [0.0297]
GRGDP-1	0.14847	0.749 [0.4598]
F(1, 29) = 0.56118 [0.4598]		
RSS = 1278. 379241		

The Computed F-statistics from the above tables is 0.04.

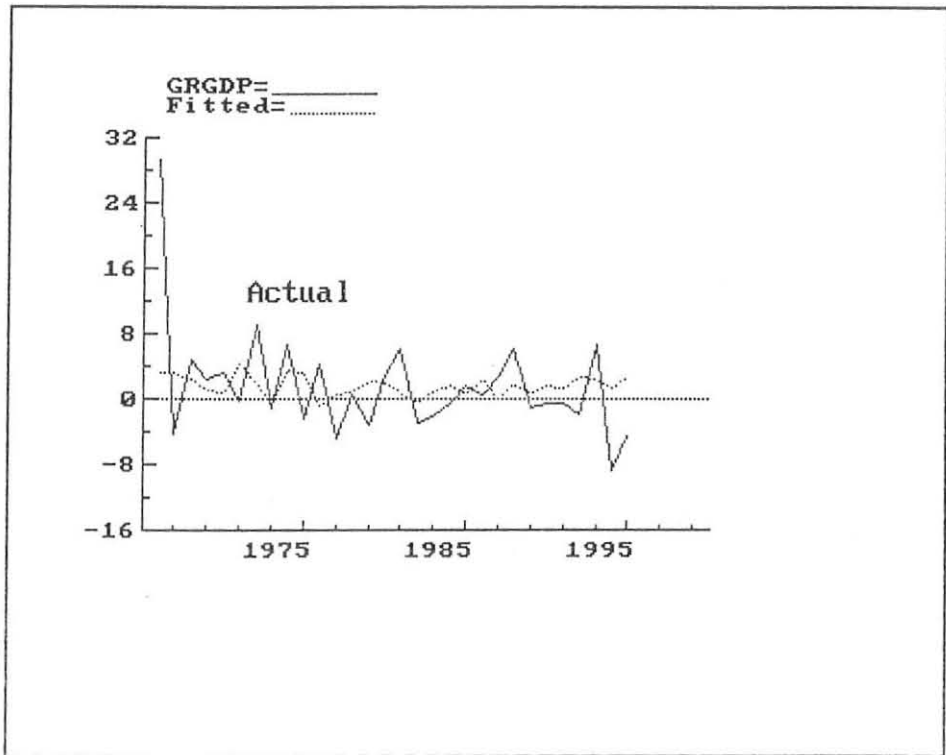
C.	Ordinary Least Square	
Dependent Variable is XSHGRX		
Regressor	Coefficient	T-ratio [prob]
Constant	1.1348	1.555 [0.1311]
XSHGRX-1	-0.058699	-0.300 [0.7660]
GRGDP-1	0.068639	1.700 [0.0896]
F(2, 28) = 0.25072 [0.4800]		
RSS = 277. 664266		

D.	Ordinary Least Square	
Dependent Variable is XSHGRX		
Regressor	Coefficient	T-ratio [prob]
Constant	1.402539	2.277 [0.0304]
XSHGRX-1	0.14847	-0.107 [0.9156]
F(1, 29) = 0.011441 [0.9156]		
RSS = 382. 5253284		

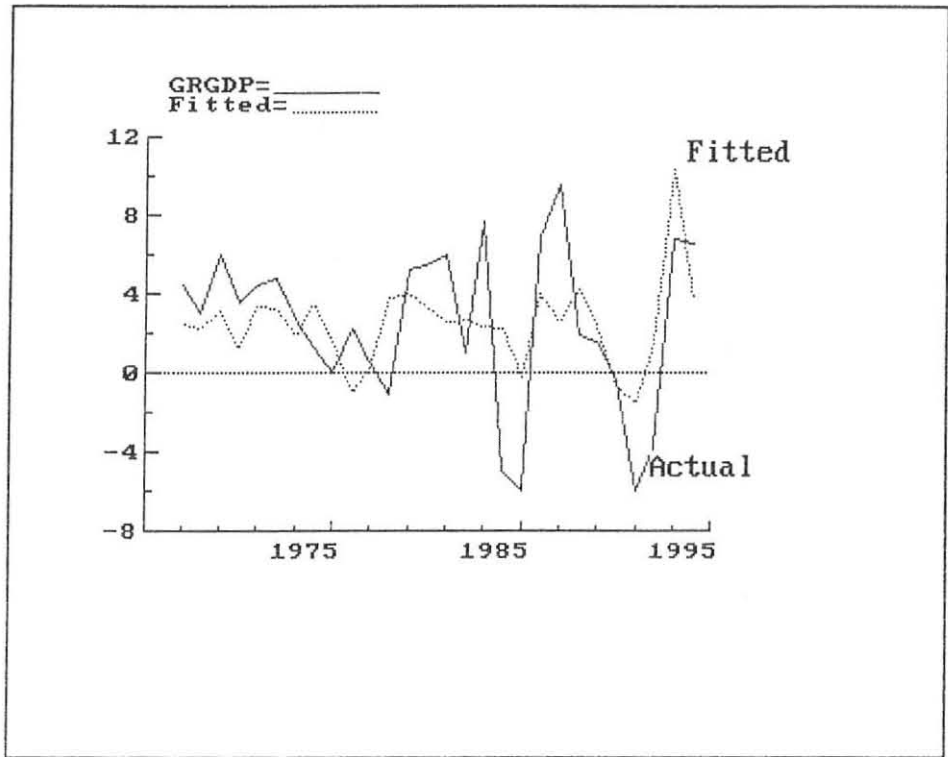
The Computed F-statistic from tables C and D is 10.5.

⁴⁰. Lag lengths are selected using Schwartz criterion.

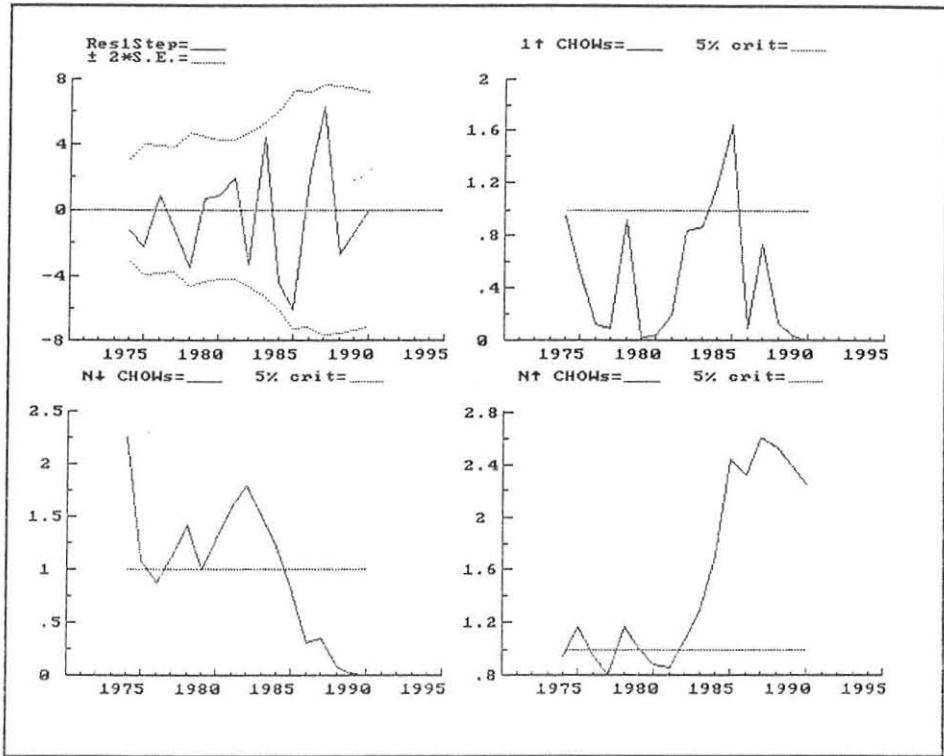
Annex 19: Actual and Fitted Values. (Zambia)



Annex 20: Actual and Fitted Values (Ethiopia)



Annex 21: One-step residuals and Chow "break point" statistics. (Ethiopia)



Annex 22

Ethiopia: Granger non-causality Tests⁴¹

A.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	3.8298	3.088 [0.0054]
GRGDP-1	-0.015852	-0.054 [0.9573]
GRGDP-2	-0.51698	-1.885 [0.0727]
GRXS-1	0.067997	1.371 [0.1841]
GRXS-2	0.14305	2.695 [0.0132]
F(4, 22) = 3.5203 [0.0229]		
RSS = 519.5988563		

B.	Ordinary Least Square	
Dependent Variable is GRGDP		
Regressor	Coefficient	T-ratio [prob]
Constant	2.5716	1.908 [0.0684]
GRGDP-1	0.46558	1.727 [0.0969]
GRGDP-2	-0.22597	-0.826 [0.4170]
F(2, 24) = 1.5864 [0.2254]		
RSS = 752.6660133		

The Computed F-statistic from the above two tables is 4.93.

C.	Ordinary Least Square	
Dependent Variable is GRXS		
Regressor	Coefficient	T-ratio [prob]
Constant	1.4733	0.224 [0.8251]
GRXS-1	-0.011316	-0.043 [0.9659]
GRXS-2	-0.29864	-1.303 [0.2074]
GRXS-3	-0.81491	-2.042 [0.545]
GRGDP-1	0.28594	0.214 [0.8324]
GRGDP-2	0.83091	0.664 [0.5142]
GRGDP-3	-0.077265	-0.060 [0.9526]
F(6, 20) = 2.1159 [0.0966]		
RSS = 8480.216846		

⁴¹. Lag lengths are determined by Schwartz criterion.

D. Ordinary Least Square

Dependent Variable is GRXS

Regressor	Coefficient	T-ratio [prob]
Constant	3.6671	0.966 [0.3442]
GRXS-1	0.028465	0.134 [0.8944]
GRXS-2	-0.21916	-1.168 [0.2549]
GRXS-3	-0.73422	-2.435 [0.0230]

F(3, 23) = 4.5456 [0.0121]

RSS = 8703.1753

The computed F-statistic from tables C and D is 0.18.

DECLARATION

I, the undersigned, declare that this thesis is my own original work and has not been presented in any University. All sources of materials for this thesis have been fully acknowledged.

Name: Elias Kedir Shukralla

Signature: 

Date: June, 1998

Place: Addis Ababa