AN ECONOMETRIC MODEL FOR THE FOREIGN TRADE SECTOR OF THE SUDAN 1960-2009

A thesis submitted for Ph.D Degree in Econometrics and Social Statistics

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Abstract
The performance of Sudan’s foreign trade sector in the period 1960-2009 was very poor. Sudan had been losing its share of total world exports. During 1960s and 1970s, the economy of Sudan was protected as a result of the adoption of import substitution policies and excessive government intervention in economic activities. Since 1978, when a structural adjustment program and later in 1990 the national economic salvation program were adopted Sudan has striven to liberalize its market with the aim of strengthening export competitiveness and enhancing economic growth. This period witnessed a strong shift in economic policy towards export-led growth stance.

The thesis analyses the determinants of Sudan’s foreign trade performance during the period 1960-2009. Data used are mainly of secondary nature.

The assumptions of the study are:

- The continuous devaluation of the national currency under different exchange rate system has failed to improve the balance of trade position.
- Devaluation of the national currency with the purpose of improving the performance of the foreign trade sector should be accompanied by monetary and fiscal measures.
- Liberalization of the foreign trade policy provides the mechanism to enhance productivity.

The study used a simultaneous equation framework where three-stage least square (3SLS) estimation techniques is employed. Tests for identification and stationarity had been carried out. The result showed that Sudan exports are largely determined by demand side factors.
Among them the world demand, exchange rate, relative prices. Oil
discovery and its export since 1999 has favorable impact on the foreign
trade sector of the Sudan. Specifically, the nature of external demand has
a significant impact on the prospects of Sudan’s exports performance.
On the other hand, imports are determined by gross domestic products,
exchange rate and relative prices. The policy implication of low-income
elasticity of imports is that policies of aggregate demand or stabilization
may not improve the balance of payment position. However, the
exchange rate determinants are the general price level and previous year
exchange rate price, but the rate of growth of domestic income has no
effect on exchange rate.
The interaction among the exchange rate (the local price of foreign
exchange), inflation (the change in domestic prices), and economic
growth (the change in real income) are especially important. Sudan
economic problem was created by high and rising inflation (due to
widening budget deficits in 1970s) within the context of a sluggishly
adjusting nominal exchange rate, which was "managed" by the central
bank in order to "maintain price stability". The resulting real over-
valuation of the exchange rate impedes export growth and creates
uncertainty about potential future movements in the exchange rate.
The adjustment programs implemented in Sudan during the period 1978-
1993 failed to achieve their targets of improved price incentives and
promotion of Sudan’s exports.
Our conclusion is that improvements in exchange rate management alone
are not adequate to achieve favorable balance of payment position in
Sudan, but have to be part of a broader program of economic reform.
Keywords: Foreign trade, Exports, Imports, Exchange rate.
والإجراءات الحمائية بغرض إحلال الواردات، ولإقرار مبدأ السوق الحر من أجل ترقية وزيادة القدرة التنافسية للصادرات السودانية كأولى لدفع النمو الاقتصادي، تم تطبيق برنامج إعادة الهيكلة الاقتصادية في نهاية السبعينات وبرنامج القومي للإنقاذ الاقتصادي في بداية التسعينات وشهدت هذه الفترة تحولات كبيرة في السياسات الاقتصادية بالاعتماد على الصادرات مصدرًا للنمو.

تناولت الدراسة بالتحليل محددات أداء قطاع التجارة الخارجية بالسودان في الفترة من 1960 وحتى 2009. وبحث الدراسة في هذا السياق أثر سياسات سعر الصرف والتحرير الاقتصادي على أداء الميزان التجاري. وتمثلت فرصات الدراسة في الآتي:

- إتباع نظام سعر الصرف الثابت وسعر الصرف المدار لم يؤدي إلى تحسن في موقف الميزان التجاري.
- إخفاء سعر العمل الوطني بغرض زيادة الصادرات يجب أن تضاف عليه مالية ونقديه فاعل.
- الانتفاع الاقتصادي يؤدي إلى تحقيق الإنتاج والإنجذاب.

لقد تم استخدام نموذج المعاملات الآنية وطريقة المربعات الصغرى ذات الثلاث مراحل لتقدير المعاملات، كما تم اختيار مكانتها التمييزية والسكون. و أوضحت النتائج أن الصادرات السودانية تتأثر بعوامل الطلب على الصادرات (الطلب العالمي، سعر الصرف والأسعار النسبية) كما أن اكتشاف البترول وتصديره منذ العام 1999 كان له أثر إيجابي على حجم الصادرات السودانية. وتحديدًا، إن طبيعة الطلب الخارجي ذو آثر هام على مستقبل أداء الصادرات السودانية.

وعلى الجانب الآخر، فإن الطلب المحلي، سعر الصرف ومعدلات التضخم من العوامل المحددة للواردات السودانية. ويشير انخفاض مرونة الدخل للواردات إلى عدم جودة سياسات الطلب الكلي وبرنامج التثبيت الاقتصادي في تحسين موقف ميزان المدفوعات.

كما أوضحت النتائج أن أسعار الصرف للسنوات السابقة ومعدلات التضخم تعتبر من محددات سعر الصرف، إلا أن نمو الناتج المحلي الإجمالي ليس له آثر على معدلات سعر الصرف.

إن تفاعل معدلات سعر الصرف، التضخم ونحو الاقتصادي ذات أهمية قصوى. ويرجع التدهر الاقتصادي في السودان إلى زيادة معدلات التضخم الناتجة عن ارتفاع العجز في سبعينات القرن الماضي وذلك في إطار تدهر سعر الصرف المدار بواسطة البنك المركزي.
بغرض إستقرار معدلات الأسعار، إلا أن إحتفاظ الجنيه بقيمة أعلى أدى إلى تدهور نمو الصادرات وخلق نوع من عدم الثقة فيم يختص بمستقبل إتجاه أسعار الصرف. وتشير الدراسة إلى فشل برامج الإصلاح الاقتصادي الهيكلي في الفترة 1978-1993 في تحقيق دفع وزيادة نمو الصادرات السودانية. كما وخلصت الدراسة إلى أن إدارة سعر الصرف فقط ليست كافية لتحقيق التوازن في ميزان المدفوعات، وإنما يجب أن تكون جزءا من عملية إصلاح اقتصادي كبير.
CHAPTER ONE
INTRODUCTION

1.1 Preamble:

International trade is the system by which countries exchange goods and services. Countries trade with each other to obtain things that are better quality, less expensive or simply different goods and services not produced at home. One of the most significant trends in the world economy since the end of the World War II has been the rapid increase in international trade. In 1950, total world merchandise exports amounted to $58 billion. In 2008, the world merchandise exports were $13.87 trillion.

In today’s economically integrated world, trade matters more than ever before. Countries that have intensified their links with the global economy through trade and investment have usually grown more rapidly over a sustained period and have consequently experienced larger reductions in poverty. Prior studies have found a positive relationship between foreign trade growth and economic growth. Studies by Balassa (1978, 1985), Feder (1983), Ram (1987) and Edwards (1992) are based on cross-sectional data covering various groups of developing countries, while studies by Krueger (1978) and Ram (1987) are based on time series data. These studies suggest that development strategies should be based on trade liberalization, including reduction of trade barriers. They focused on three kinds of feasible gains from trade in developing countries: a) static comparative advantage, b) increased capacity utilization, and c) improved productivity growth. Among these three, the gain associated with capacity utilization is the most important one.
Higher exports will make foreign exchange available for financing imports of capital goods, which are critically important to achieve higher capacity utilization. Likewise, increased capital inflows can produce similar effects on capacity utilization. Other economists argued that trade expansion may not always be a good policy for all countries at all times see, for example, Kavoussi (1985), Gray and Singer (1988), Saches (1987, 1989) and Taylor (1991)).

Unfortunately, many low-income countries have been hindered in their effort to integrate into the global economy due to inadequate policies, institutions, and infrastructure. Moreover by a verity of rich country protectionist measures and other policies debilitate low-income countries exports.

While attention in development economies in recent years has focused increasingly on international trade issues, there is no clear consensus as to whether or not trade is beneficial to developing economies. Many economists have asserted that increased levels of trade on the part of developing economies is not only desirable but necessary if sustained economy’s growth and development are to occur. A smaller but equally vociferous group insist that trade only deepens the dependency of developing countries on the developed world and, in so doing, ensures continued underdevelopment (For example, see, Myrdal (1975), H.W. Singer (1964) and Raul Prebish (1964)).

The trend of the Sudanese major exports during the last ten years changed from the European to the non-Arab Asian countries, while Arab countries represented the major source of Sudanese imports during the same period.
Over the period 1970-1999 Sudan’s exports showed a drastic change in their commodity composition. The most noticeable feature is the persistent fall in the share of cotton. In spite of this, cotton maintains the leading position in exports for the entire period. At the same time, exports of groundnut, one of the most important export commodity in 1970s (22%), became an insignificant commodity in the 1980s. Exports of livestock are resuming an increasing share in 1970-1999 period. The shares of other export commodities witnessed wide fluctuations.

Sudan international trade has been growing rapidly in recent years. In (2009) imports of goods and services from abroad totaled US $ (7.8) billion, compared to US $ (1.8) billion in 2000. Exports have grown as well, from US $ (1.6) billion in 2000 to US $(8.5) billion in (2009).

Substantial amounts of manufactured goods, machinery and equipment are imported. The major exports of Sudan are composed of oil and petroleum products, agricultural and animal products.

The debate on the relationship between export expansion and economic growth has exhibited considerable interest in the field of development economics. Several empirical studies have been conducted to assess the role of exports in the economic growth of developing countries from various aspects (see Michaely [1977], Tyler [1981], Feder [1982], Balassa [1985], Chow [1987], Krueger [1990], Ram [1985, 1987], and Sengupta and Espana [1994]). Most of the studies have pointed to the beneficial effects of export performance on economic growth such as:
Increasing specialization and the spillover effects of the export sector's growth;
Greater capacity utilization;
The externality effect of exports in the diffusion of modern technology across other sectors and industries; and
The increasing effects of economies of scale, industrialization, and import of capital goods.

1.2 Statement of the Problem:
Due to the prevailing rapid globalization, no country can be regarded as closed system. This statement is especially true for Sudan, so, the analysis of foreign trade is of great importance. The Sudan economy has gone through various experiences with foreign trade policies. The performance of the foreign trade sector bears strongly on the overall performance of the Sudan economy. Trends in this sector can determine whether the country is keeping pace with productivity and technological change in the rest of the world, or is being progressively left behind. This explains why the low level and the slow growth of non oil-export have caused concern about the strength and flexibility of the economy. It also explains why the present performance is considered to be one of the major obstacles to future growth.
Foreign trade has become more important to the Sudan economy in recent years. Exports and imports of goods and services have grown rapidly. A growing trade volume benefits the standard of living in several ways, e.g., increase GDP, employment, exchange rate… etc.
The positive impact of imports on economic development does not receive enough attention in many reports on economic policies for less developed countries. The available empirical evidence shows that imports usually contribute to the improvement of industry which is essential for development.

In this regard, the analysis of the determinants of foreign trade flows, in particular, the crucial variables become a meaningful objective. Thereby, the purpose has not exclusively been to test certain theoretical hypothesis but also to help decision makers to improve the evaluation of potential policy options.

1.3 The objectives of the Study:

The objectives that the study intends to achieve are categorized into:

1.3.1 Main objective:
To evaluate the Sudan foreign trade sector performance (1960-2009).

1.3.2 Specific objectives:
To measure the impact of different policies on foreign trade (Exports/Imports) and the consequent effect on income, employment, general price level, exchange rate and economic growth.

1.4 Assumptions of the study:
Concerning Sudan foreign trade performance during the period of the study, we could assume the following:

- The continuous devaluation of the national currency for the period 1978-1991 and floating exchange rate regime period 1992-2009 failed to:
– Encourage and promote exports.
– Deter the imports trend.

Devaluation of the national currency with the purpose of improving the performance of foreign trade sector should be accompanied by monetary and fiscal measures and disaggregated policy.

Liberalization of foreign trade policy provides the mechanism to enhance productivity.

1.5 Importance of the study:
Foreign trade is essential for the prosperity of the trading nations because:

Every country lacks some vital resources and capital goods that it can get only by trading with others.

Each country’s labor force and other endowments make in a relatively efficient producer of some goods and inefficient producers of other goods.

Specialization permits larger outputs and can therefore offer economies of large scale production.

In Sudan economy, different economic policy (free market, planned economy, structural adjustment program and market oriented economy) and different exchange rates arrangements to manipulate the balance of payments deficit, often in the context of International Monetary Fund and World Bank supported programs affects foreign trade sector trend. Accordingly, the performance of foreign trade sector has shown respectful amount of variability. In late 1990’s, the oil discoveries altered the situation in a dramatic way, and for the next ten years, the economy experienced a new era
of prosperity.
Therefore, the importance of the study stems from the fact that the analysis of macro-variables which affect the foreign trade time-series would help the policy makers to quantify the results of alternative economic policies, and to improve the evaluation of potential policy alternatives.

1.6 Methodology:

Model
In order to carry out this research, simultaneous equation model will be used to identify the endogeneous and exogeneous macro-variables which affect the foreign trade sector in Sudan. Time series data of secondary nature will be used, and thus the stationarity or presence of unit root will be tested. In this context, we use Dickey Fuller and Augmented Dickey Fuller (ADF) test.

Broadly speaking, econometrics methodology proceeds along the following line:

- Specification of the model with which one will attempt the measurement of the phenomenon being analyzed (known also as the formulation of the maintained hypothesis).
- Estimation of the model by means of the appropriate econometric method. This stage is known as the testing of the manipulated hypothesis.
- Evaluation of the estimates, that is to say, to decide on the basis of certain criteria whether the estimates are satisfactory and reliable.
- The final stage is concerned with the evaluation of the forecasting validity of the model.
1.7 Source of data:
The sources of data are of secondary nature extending over the period 1960-2009. The choice of the period is justified by the fact that, the year 1960 coincide with the establishment of the Central Bank of Sudan and the year 2009 is the last year one can obtain actual data. Data are used to examine the foreign trade performance in Sudan. The data were obtained from different sources. It is important to use specific sources for different kinds of data in order to guarantee consistency and comparability among the data. However, there is no adequate and consistent data. Therefore, we have used different sources of data. The domestic sources are the Annual and Quarterly Bulletin of the Central Bank of Sudan, Statistical Abstract published by Central Bureau of Statistics, and Ministry of Finance and National Economy. Other sources are IMF’s International Financial Statistics and Direction of Trade Statistics and World Bank Annual Reports.

In evaluating the quality of data, the domestic data are plagued by a number of problems. For example, there is a discrepancy of GDP data reported by Central Bureau of Statistics yearbook and the Ministry of Finance and Economic Development and Central Bank of Sudan year book and Customs Administrations Reports. In addition to this, different currency names {1960-1990 (pound), 1990-2005 (dinar), 2005-onward (pound)} and the value assigned to the currency ( in 1991 one dinar equal 10 pound and in 2005 one pound equal 10 dinar) made confusion and difficulties.
1.8 Organization of the study:
The rest of the thesis is organized as follows: Chapter two critically displays the theories that explain the flow of foreign trade. Chapter three reviews the theoretical and empirical literature regarding Sudan’s export and imports trends and their effects on GDP growth. Chapter four present the structure and foreign trade policies in Sudan. Chapter five is devoted to the pre-specification of the model. Having identified the main macro-economics variables, stationarity tests are carried. The analysis and discussion of the results are given in chapter six. The conclusion and recommendations of the study are provided in the last chapter.
CHAPTER TWO

THEORETICAL AND CONCEPTUAL FRAMEWORK

2.1 Introduction:

This chapter is mainly concerned with the discussion of the main theories of foreign trade. The historical evolution of the theories will be outlined. Their main features and underlying assumptions will be highlighted. In addition, the underlying causes of international trade will be identified.

2.2 Mercantilism:

Mercantilism was a sixteenth century economic philosophy that maintained that a country's wealth was measured by its holdings of gold and silver. This required the countries to maximize the differences between its exports and imports by promoting exports and discouraging imports. The logic was transparent to sixteenth century policy makers if foreigners buy more goods from you than you buy from them, then the foreigners have to pay you the difference in gold and silver, enabling you to a mass more treasure. With the treasure acquired the realm could build greater armies and navies and hence expand the nation's global influence. Politically, mercantilism was popular with many manufactures and their workers. Export-oriented manufacturers favored mercantilist trade policies, such as those giving subsidies or tax rebates, which stimulated their sales to foreigners. Domestic manufacturers threatened by foreign imports endorsed mercantilist trade policies, such as those imposing tariffs or quotas, which protected them from foreign competition. Most members of society are hurt by such policies. Government subsidies of exports for selected industries are paid for by tax-
payers. Mercantilist policies are still politically attractive to some firms and their workers, as mercantilism benefits certain members of society. Modern supporters of these policies are known as neo-mercantilist, or protectionists (Mahoney, Trigg, Griffin, & Pustay, 1998). The mercantilists were a group of economists who preceded Adam Smith. They judged the success of trade by the size of the trade balance (Lipsey, & Chrystal, 1996).

2.3 Absolute Advantage:
The theory of absolute advantage suggests that a country should export those goods and services for which it is more productive than other countries, and import those goods and services for which other countries are more productive than it is. Adam Smith was the first to come up with the theory of absolute advantage. According to Adam Smith, mercantilism's basic problem is that it confuses the acquisition of treasure with the acquisition of wealth. In an “inquiry into the nature and causes of the wealth of nations (1776),” Smith attacked the intellectual basis of mercantilism and demonstrated that mercantilism actually weakens a country. Smith maintained that a country's true wealth is measured by the wealth of all its citizens, not just that of its monarch (Mahoney, Trigg, Giffin, & Pustay, 1998). A country is said to be more productive than another country, if it can produce more output (goods) for a given quantity of input, such as labor or energy inputs. The producer that requires a smaller quantity of inputs to produce a good is said to have an absolute advantage in producing that good (Gans , King, & Mankiw, 1999).

2.4 Comparative Advantage:
The theory of comparative advantage states that a country should produce and export those goods and services for which it is relatively more
productive than are other countries and import those goods and services for which other countries are relatively more productive than it is. David Ricardo, the early nineteenth century British economist solved the problem of the theory of absolute advantage, by developing the theory of comparative advantage. Absolute advantage suggests that no trade would occur if one country has an absolute advantage over both products. The differences between absolute and comparative advantage theories are subtle. Absolute advantage looks at absolute productivity differences, comparative advantage look at relative productivity differences. Economists use the term comparative advantage when describing the opportunity cost of two producers. The producer who has the smaller opportunity cost of producing a good is said to have a comparative advantage in producing that good (Haberler, 1936).

The formulation of the "theory of comparative costs" in international trade is based on the classical assumptions that:

- Foreign trade takes place between two different countries in isolation from the world.
- Two commodities and two factors of production (assuming mobility of factors of production inside the country and between the countries). The mobility of factors of production leads to equalization of returns on all industries, while immobility of factors of production leads to possibility of differences in productivity from country to another.
- Exclusion of transportation cost and insurance or other obstructions, this implies that specialization in production proceeds until relative commodity prices are the same in both nations.
- Perfect competition between firms and industries inside the country frontier, but outside the frontier there is no perfect competition. The
assumption of perfect competition in both commodities means that producers, consumers, and traders of the two commodities in both nations are too small to affect the price of these commodities.

The labor theory of value, i.e. the value or price of a commodity depends exclusively on the amount of labor going into the production of the commodity or the amount of labor embodied in the production of the commodity, (Salvatore, D. 1990).

The last assumption has been rejected by many economists, for example; Samuelson, P (1989) and Todaro, M (1994), they argued that the assumption of labor theory of value is basically wrong and should not be used in explaining comparative advantage. Their argument can be simply illustrated by noting that, if the value of the commodity is determined by the labor embodied in its production, this implies that either labor is the only factor of production or labor is used in the same fixed proportion in the production of all commodities and that labor is homogeneous (i.e., of only one type). In reality both of these assumptions are not applicable, labor is neither the only factor of production nor is it homogeneous, and labor is not used in the same fixed proportion in the production of all commodities. Accordingly, the labor theory of value must be rejected. Therefore, the law of comparative advantage can be explained on the basis of the opportunity cost.

The opportunity cost is defined as the amount of a second commodity that must be given up to release just enough resources to produce one additional unit of the first commodity. Consequently, the nation with the lower opportunity cost in the production of a commodity has a comparative advantage in the production of that commodity.

The classical theory of foreign trade (The Comparative Advantage) is based on division of labor, in the sense that division of labor increases the gains
from trade for both of the two nations. The concept of division of labor was largely interpreted by classical economists, J. S, Mil (1848) added the use of the machinery and imported technology. Moreover, after considering the direct effect of trade, which are the comparative advantages, he talked about the (indirect benefits), actually, he was aware of the indirect effect that results from foreign trade. He stated clearly the potential role that foreign trade might give to indigenous people if they were linked with other people in a different country, this will lead to a consequent change in attitudes, ambitions and wills of the people, i.e., the nation's gain from trade can be broken into two components: The gains from exchange and the gains from specialization. The inclusion of technology and machinery in the production process will improve productivity, and through foreign trade and division of labor, this will lead to economic growth and perfection of all nations.

Comparative advantage may not allow strong generalization under more realistic assumptions, but it may allow weak generalization. Indeed, instead of indicating whether any particular good will be exported or imported by any particular country, comparative advantage can provide average relationships such as, for instance, that the trade-weighted average of the country’s autarky prices of goods it exports, relative to world prices, is less than the trade-weighted average of the relative prices of its imports (Deardorff, 2005b). Along the same lines, Deardorff (1980) formalizes such average relations in the form of correlations. For instance, he derives a negative correlation between autarky prices and quantities of net exports across all goods and countries.

Having derived the more general correlations, it is interesting to examine how robust they are. Deardoff (2005b) discusses a number of assumptions,
distinguishing between those that are consistent with comparative advantage correlations, including gains from trade, and those that are not. Starting with the ones that are consistent, he notes that both the gains from trade and the average relationships continue to hold in the presence of restrictive trade policies as well as with transport and other real trade costs. The correlations also hold for all types of goods (final, intermediate or both) and even for services. Differentiated products can be accommodated as long as markets are perfectly competitive. Also the correlations remain valid for all sorts of preferences. The two main assumptions on the hand that cause problems for the theory of comparative advantage, both as a source of gains from trade and as a predictor of patterns of trade, are domestic distortions caused by externalities or market power, for instance, an increasing returns. These assumptions do not reverse the story but rather complicate it.

2.4.1 Do trade in services conform to Comparative Advantage Theory?

Hindley and Smith (1984) consider the question of the application of the normative theory of comparative advantage cost to the services sector. They discuss two potential difficulties in applying this theory to trade in services: the pervasiveness of regulations and licensing in services industries and the fact that services can be traded in different modes. They argue that none of these potential difficulties appears to yield any prior reason to suppose that the theory does not apply. In their words, “services are different from goods in ways that are significant and that deserve careful attention, but the powerful logic of the theory of comparative advantage transcends these differences”. In other words, there is no reason to have any doubt on the potential for countries to gain from free trade in services.
Deardorff (1985) focuses on the positive issue of whether trade in services conforms to a pattern that is explainable by comparative advantage. He looks at three different characteristics of trade in services and considers in each case what they suggest for the validity of the principle of comparative advantage. The first of these characteristics is that traded services often arise as a by-product of trade in goods. The second is that trade in services frequently requires or is accompanied by international direct investment. The third is that while goods can be produced elsewhere from where they are consumed, services cannot. He argues that while the first two of those characteristics do not undermine the usefulness of the law of comparative advantage in explaining trade, the third raises a number of issues. In the third case, he uses a model that is like the standard H-O model except that one of the two goods is a service that must be produced where it is consumed and one of the factors is “management” which can contribute to services production “in absentia”. In this case, no version of the principle of comparative advantage is generally valid. Depending on the specific assumptions, weak version of the law may apply.

Deardorff (2001) argues that for many services, the benefits from liberalization extend beyond the traditional gains from trade liberalization. Many services play a critical role of facilitating international trade in goods and other services. Trade liberalization for those services can yield benefits by facilitating trade in goods that are larger than might be expected from analysis of the services trade alone. Deardorff’s paper explores this idea using simple theoretical models to specify the relationships between services trade and goods trade. Services industries, such as transportation, insurance and finance, provide inputs needed to complete and facilitate international
transactions in goods. Measures that restrict trade in those services create costs that limit the international flow of trade in goods.

Supportive evidence is provided by Blyde and Sinyavskaya (2007). They match goods data from the United Nations Commodity Trade Statistics Database (COMTRADE) with International Monetary Fund (IMF) Balance of payments services data to investigate empirically the relationship between trade in services and trade in goods. They find that trade in services is important to facilitate trade in goods in all the 2-digit SITC goods categories. Investigating which types of trade in services are more important for international trade in goods, they find that trade in transportation and communication services generate the largest impact on trade in goods. Insurance, business and travel services are found to generate positive impact on the international trade of only certain type of goods. Lenon (2006) finds some evidence of complementarities between trade in goods and trade in services. Bilateral trade in goods explains bilateral trade in services: the resulting estimated elasticity is close to unity. Likewise, bilateral trade in services has a positive effect on bilateral trade in goods.

2.4.2 Trade in tasks and fragmentation:

Revolutionary advances in transportation and communications technology have enabled an historic breakup of the production process by making it increasingly viable and profitable for firms to undertake different production stages in disparate location. This has resulted in off-shoring of both services and manufacturing sector jobs and rapidly growing trade in intermediate products or tasks. This phenomenon has variously been called
fracturation, unbundling, off-shoring, vertical specialization, slicing up of the value-added chain or trade in tasks.

Two main approaches to the modeling of fragmentation can be distinguished. The first approach is to model fragmentation as trade in intermediates based on comparative advantage. The main insight is that off-shoring is similar to technical progress in the production of final goods. Consider a world with two nations, Home (H) and foreign (F), one final good (x) and one single production factor (labor). The production of x involves two tasks, 1 and 2, which are produced with labor. Assume H has a comparative advantage in task 1 and F has a comparative advantage in task 2. With free trade in tasks, H specializes in the production of task 1, F specializes in the production of task 2. Specialization allows more of the final good to be produced (and consumed) in both countries (standard static gains from production and consumption efficiency). Since more of the final good can be produced with the same amount of primary factors, fragmentation is a kin to technological progress in the final good. In other words, off-shoring increases labor productivity, expressed as output of the final good per hour worked, in both nations.

Deardorff (2005a) examines in more detail the effect of fragmentation on traditional gains from trade in this first approach. He models fragmentation as the possibility to split a productive activity into parts that can be performed in different locations, much like a new technological possibility that becomes available to a country or to the world. Fragmentation, as he understands it, involves off-shoring and thus trade of services. His conclusions about the gains from fragmentation are similar to the conclusions of trade theory about the gains from trade. Cases can be
identified where fragmentation lowers the welfare of particular countries. If, for instance, fragmentation causes a change in relative world prices, it is possible that one country’s terms of trade worsen to such an extent that it is made worse off, despite the new technological ability that fragmentation represents. Similarly, if fragmentation interacts negatively with existing distortions, such as tariffs, it can lower the welfare of particular countries and even of the world as a whole. However, on average, fragmentation is likely to expand world welfare because it will systematically expand what the world is able to do potentially with its given resources.

The second approach to fragmentation has been introduced recently by Grossman and Rossi-Hansberg (2006b). They present a theory of off-shoring, or trade in tasks, which they refer to as a “new paradigm”. Because their main contribution relates to the effect of fragmentation/off-shoring on wages and distribution. The main result of the theory is that, in addition to comparative advantage gains from trade, fragmentation has a welfare-enhancing productivity effect on wages in the off-shoring country, according to Grossman and Rossi-Hansberg. A main difference between their approach and the first approach of fragmentation is that a firm with better technology can use this technology abroad. There are also task-specific off-shoring costs that are best understood as the communication and organizational costs that a firm pays when it sources the performance of a task abroad. The advantage of off-shoring a task is that the firm combines its superior technology with cheap foreign labor when the task is performed abroad.

To understand the thinking behind the model, consider two countries, North and South. Firms in North have superior technology. Wages are higher in North than in South because they are tied to technologies. North firms are
interested in combining their superior technology with cheap labor in South. They will off-shore a task if the initial wage gap is larger than the off-shoring costs. The wage in South is assumed to remain constant. The reason for this is that South firms are assumed to continue producing the final good using South technology which keeps the wage at the low level. The wage in the North will increase because productivity increases. Productivity increases because off-shoring releases domestic workers who can focus on the tasks where they have a trade-cost-adjusted comparative advantage. This productivity effect is independent of comparative advantage based on tasks. For the off-shoring country, it comes in addition to the Richardian gains from trade that existed in the first approach.

2.4.3 The gains from international trade according to Comparative Advantage Theory:

Very little is known about the empirical magnitudes of the gains from international trade and the mechanisms that generate these gains. In particular, very limited evidence is available on how much specialization according to comparative advantage can contribute to an economy’s overall income.

A relatively recent study by Brenhoften and Brown (2005) provide the first piece of hard evidence on the magnitude of the static gains from trade resulting from comparative advantage. The specificity of Bernhoften and Brown’s study is that it embeds the analysis of the gains from trade within a theoretical framework that also identifies the underlying causes of international trade. They use Japan’s 19th century trade liberalization as a natural experiment to estimate the effects of trade on national income. They first provide supportive evidence that Japan’s trading pattern after its
opening up was governed by law of comparative advantage and then take the next step and estimate the gains from the trade resulting from comparative advantage. They estimate that at most the gain in real income was 8 to 9 percent of GDP.

Irwin (2001) uses another of the few historical examples where a country has moved from self-sufficiency or -autarky- to free trade or vice versa. He calculates that the welfare cost to the united states of the nearly complete embargo imposed by the US Congress on international trade between December 1807 and March 1809 was some 5 percent of GDP. This cost, however, does not represent the total gains from trade because trade was restricted in the pre-embargo situation.

Bernhofen and Brown’s work on Japan is remarkable because it provides the first and to our knowledge only direct test of the theory of comparative advantage. Direct testing of the theory of comparative advantage is notoriously difficult because it involves relating trade flows and specialization patterns to autarky prices which, by their nature, are almost always unobservable. Bernhofen and Brown (2004) test a weak formulation of the law of comparative advantage using the natural experiment of Japan’s opening up to trade in the 1860s. They carefully verify that Japan in the mid 19th century met the requirements needed to apply the theory. In particular, they show that before 1854 Japan was completely closed to trade while by the late 1860s it had fairly free trade and no export subsidies. Their results provide a strong empirical case for the prediction of the theory.

If direct tests of the law of comparative advantage are so difficult, what about testing the theories that explain comparative advantage? The Ricardian model attributes comparative advantage entirely to differences in labor requirements of production. Unfortunately, testing the Ricardian model turns
to be as problematic as testing the law of comparative advantage. The main problem is that the Ricardian link between trade patterns and relative labor costs is much too sharp to be found in any real data set. Because of the complete specialization that the model implies, for instance relative labor requirements ought to be unobservable. Deardorff (1984) discusses tests of a weaker link and concludes that they are deficient. Overall, while the Ricardian model can be seen as an important reminder that technological differences can be a source of comparative advantage, the one factor model is too simple to study the impact of technologies on trade flows (Leamer and Levinsohn, 1995).

2.5 The Heckscher-Ohlin theory of factor endowment:
It has been previously stated that the difference in relative commodity prices between two nations is evidence of their comparative advantage and forms the basis for mutually beneficial trade. Factor endowments and the Heckscher-Ohlin theory take this one step further by analyzing the effect that international trade has on the earnings of factors of production in the two trading nations (Salvatore, 1999). The Heckscher-Ohlin theory presents the issue that international and interregional differences in production costs occur because of the differences in the supply of production factors (Ball, Mc Culloch, 1999). Those goods that require a large amount of the abundant, thus less costly factor will have lower production costs, enabling them to be sold for less in international markets (Salvatore 1995). There are exceptions to the Heckscher-Ohlin theory which are to do with the assumptions that Ohlin drew. One assumption was that the prices of the factor depended only on the factor endowment. This is however untrue as factor prices are not set in a perfect market. These are such factors to consider such as legislated minimum wages and benefits force the cost of
labor to rise to a point greater than the value of the product than many workers can produce (Ball, McCulloch, 1999). Deardorff (1979) examines the role of relative factor endowment in H-O model with intermediate inputs. He finds that, the gains from trade, however, are unambiguous in these H-O models, with imported inputs actually providing an additional source of gain from trade. Deardorff also shows that, with intermediate inputs, a trade barrier on an input that raises its price can make production of the corresponding final good too costly to survive, even though the country might otherwise be a relatively low-cost producer of the final good. Kempt (1964) shows that the Stolper-Samuelson and the Rybczynski theorems still hold in the presence of traded intermediate products. In a model where each final good can be used as an intermediate input in the production of the other final good, Schweinberger (1957) shows the conditions under which the Heckscher-Ohlin theorem hold.

Under the standard version of the H-O model assumption, four core propositions can be derived:

1. The H-O theorem states that a country has a production bias towards, and hence tends to export, the good which uses intensively the factor with which it is relatively well endowed.

2. The Stolper-Samuelson theorem states that an increase in the relative price of one of the two goods raises the real return of the factor used intensively in producing that good and lowers the real return of the other factors.

3. The Rybczynski theorem states that if goods prices are kept constant, an increase in the endowment of one factor causes a more than proportionate increase in the output of the commodity which uses that factors relatively intensively and an absolute decline in the output of
the other commodity.

§ The factor-price equalization theorem states that, under certain conditions, free trade in final goods is sufficient to bring about complete international equalization of factor prices.

Again the question arises whether the core propositions that have been derived in the standard basic model can be generalized. This question is important because together with the law of comparative advantage, the four core propositions can be seen as the central body of international trade theory.

Economists have analyzed all possible cases: including the general case with N goods and M factors. Their conclusions are relatively nuanced. In general, dimensionality matters in the sense that many of the results from the basic 2x2 model are lost with higher dimensions. Generalizations run into difficulties in all cases, even or uneven. Ethier (1984) nevertheless optimistically concludes that the basic messages of elementary theory still come through to a relatively large extent. Like the law of comparative advantage, the Heckscher-Ohlin theorem survives as a correlation or in an average sense, while the Stolper-Samuelson and Rybczynski theorems survive in undiluted strength but they only apply to some factors or goods but not necessarily to all.

Many economists attempted to disprove the Heckscher-Ohlin theory. The literature on testing and estimating H-O models is both voluminous and complex. The most notable effort was by a man named Wassily Leontief. His paradox was self named (Leontief paradox) and disputed the theory as a predictor of the direction of trade, this paradox failed to empirically validate the country based Heckscher-Ohlin theory (Mankiw, 1997).

Leontief (1953) is the earliest and probable the best known attempt to
confront the H-O model with data. Given the United States’ relatively high capital-labor endowments ratio compared with other countries, in particular in the late 1940s, the H-O model would predict that the United States exported capital-intensive goods and imported labor-intensive goods. Surprisingly however, comparing the amount of factors of production used to produce US$1 million worth of exports with the amount used to produce the same value of US imports, Leontief found that US exports were less capital intensive than US imports. This result, which contradicted the Heckscher-Ohlin theorem, came to be known as the Leontief paradox. A wide range of explanations were offered for this paradox, of which several concerned the fact that Leontief focused only on two factors of production, ignoring land and human capital. In the following years, a number of studies redid the analysis, taking into account those factors.

Another possible explanation of the Leontief Paradox (see a similar exposition by E. K Choi):

崟 U.S demand for K-intensive products outstripped its capacity to provide them domestically. [No.]
崟 “Factor-intensity reversal” Leontief had no idea of the input mix for manufacturing in other countries; he measured the K-intensity of US production in import competing industries, not of U.S imports. If L is expensive in the U.S industries facing import competition would have to reduce their use of L, by substituting K. However, this would mean that production function (i.e., input mix; technology) vary for the same products in different places, which render the H-O theorem nearly useless. [This is a powerful argument].
崟 Perhaps international trade flows were not rationalized according to comparative advantage in 1947, immediately after the destruction and
disruption of World War II. After all, comparative advantage is a normative concept. [Empirically, partial explanation, when nations’ import restrictions were considered].

The U.S imported natural-resource commodities whose extraction is capital-intensive, but in which other nations have an absolute advantage. [Empirically, a partial explanation, the paradox was more apparent in U.S bilateral trade with resources-rich countries (e.g., Canada), and was less strong when natural-resource sectors were excluded].

“Human-skills theory” labor is a heterogeneous factor, and should be analyzed as separate factors according to skills levels. Perhaps the U.S is actually skilled-and technical-labor rich, and therefore has a comparative advantage in production that requires much skilled or technical labor. H-O formulations should be expanded to allow for more than one labor factor. [Difficult to test, but can be added to the H-O theorem].

Technology itself is a nation-specific factor of production, rather than being a universal attribute of production. Furthermore, technology is a factor that is produced within a given nation (much like a commodity), but is not perfectly mobile or tradable. This kind of thinking has led to “neo-technology theories of trade”.

The U.S government and private companies lent (or otherwise invested) so much capital in particular sectors of particular foreign economies, that these enclaves became, essentially, capital rich. [Empirically, it probably doesn’t play an important role in Leontief’s 1947 data, but it (a) does conceptual damage to the factor proportions theory because it implies that capital, a factor, is mobile, and (b) it
presages the model of the international product life cycle].

Reviewing the data from the earlier decades, the paradox seems to have disappeared since the early 1970s (Deardorff, 1984), Leamer (1980) provided the definitive critique of the Leontief paradox. He showed that Leontief had performed the wrong test. Even if the Heckscher-Ohlin model is true, the capital/labor ratios in exports and imports need bear no particular relationship to relative factor endowments if trade is unbalanced.

Leontief (1953) may be interpreted as an application of the so-called “factor content” version of the H-O theorem. Empirical application of the theorem has been of two forms, corresponding roughly to two versions of the theorem. The “commodity version” says that countries tend to export those goods which use relatively intensively their relatively abundant factors of production. The “factor content” version developed by Vanek (1968) (also termed the Heckscher_Ohlin_Vanek Theorem), says that countries will tend to export the services of their abundant factors, embodied as factor content in the goods they trade. The test performed by Leontief was a partial test of the “factor content” version (Feenstra, 2004).

The first complete test of the “factor content” version of the H-O theorem was by Bowen et al. (1987). For a sample of 27 countries and 12 factors of production, they showed that the test failed. Their negative result was confirmed by other authors. Researchers then began to examine which parts of the theory were causing the problems. Building on this work, Davis and Weinstein (2001) with a few simple modifications. The Heckscher-Ohlin-Vanek model is consistent with data from ten OECD countries and a rest of the world aggregate. These modifications include, in particular, the introduction of cross country differences in technology, a breakdown of factor price equalization, the existence of non-traded goods, and costs of
trade.
A number of issues have been left unresolved by Davis and Weinstein (2001). First, researchers are currently looking into extending the range of countries used for the tests (Freenstra, 2004). Second, trade in intermediate products needs to be adequately distinguished from trade in final goods. Third, technological differences have been shown to be a major determinant of trade patterns and their underlying causes should be identified. Fourth, researchers are investigating the role of the integrated equilibrium assumption and factor price equalization (Davis and Weinstein, 2000).

In summary, most of the empirical work that attempted to test or estimate Heckscher-Ohlin models used inappropriate methods and is therefore largely irrelevant. Complete tests failed under the conventional assumptions of identical tastes and identical technologies with factor price equalization across countries. In recent years, however, studies using appropriate methods have shown that if technological differences and home bias are included in the model and if the assumption of an integrated world is relaxed, there appears to be a substantial effect of relative factor abundance on the commodity composition of trade. As pointed out by Feenstra (2004), recent work has been more about accounting for global trade flows than about testing hypothesis related to trade but it certainly has the merit to highlight the fact that there are multiple causes for trade.

2.5.1 International factor mobility:
From an economic point of view, trade in factors is much like trade in goods. It is driven by international differences in resources and is beneficial in the sense that it increases world production. The focus here, however, is not on explaining factor movements but rather on the interactions between trade in goods and factor mobility. A major and strong assumption in the
models discussed so far is that factors of production cannot move between countries. If this assumption is relaxed and consideration is given to how this affects the law of comparative advantage and the validity of some of the main trade theorems. Trade literature has focused on capital movements, probably because labor is considered less mobile at least in the short term. However, some of the results would in principle apply to any factor.

The idea that trade is a substitute for factor movements dates back to the early 20th century and has been expressed by a number of eminent economists. This idea is based on the factor endowment theory of international trade elaborated by H-O. According to this theory, trade in goods is caused by differences in factor endowments between countries. Thus, on the one hand, movements of factors between countries that tend to equalize resources reduce incentives to trade. On the other hand, as already mentioned, exports of goods can be viewed as indirect exports of factor services. Trade in goods tends to equalize factor prices and thus to reduce incentives for factors to move.

Mundell (1957) laid out the argument that trade and factor movement can substitute for each other in a model where both trading countries share the same technology. When factor-price equalization holds, free trade implies commodity price equalization and a tendency towards factor price equalization even when factors are immobile while perfect factor mobility implies factor price equalization and a tendency towards commodity price equalization even when trade in goods is not allowed. When factor prices are not equalized, goods trade and factor movement are nevertheless substitutes but in a weaker sense (Wong, 1995).

Wong (1995) shows how the law of comparative advantage can be generalized to cover the movements of goods and capital. The general law of
comparative advantage, however, is so general that it cannot be used to predict the direction of movement of a particular good or capital even if all the autarkic prices are known. Wong thus discusses the conditions under which patterns of trade and direction of international capital movements are predictable. He shows that perfect capital mobility between countries preserves most of the core trade theorems in a H-O setting with two goods, two immobile factors and internationally mobile capital. He also shows that without the assumption of identical technologies, the analysis can become quite complicated. Comparative advantage and absolute advantage, defined in terms of price ratios in the countries, are no longer a fixed concept. In the presence of capital movement, they depend on the direction of and level of capital movement. Reversal of comparative advantage and the transformation of absolute into comparative advantages are possible.

Norman and Venables (1995) investigate both the direction of trade and the question of which goods or factors are traded. They let goods be tradable and factors of production be internationally mobile. Since goods trade alone does not equalize factor prices, there is an incentive for international factor mobility. From this general model, they are able to derive conditions on factor endowments and trade costs with the result that the equilibrium has no trade; has trade in goods only; has factor movements only; or has both trade in goods and factor movements.

The substitutability relationship between trade and factor movements is closely associated with the Hecksher-Ohlin endowments driven trade theory. Markusen (1983) demonstrates that factor movements and trade in goods can be complements in models where trade is driven by differences in technologies or by other factors. To do this, he uses a simple model with two factors and assumes that both countries have the same factor endowments.
but that one of the countries is more efficient in the production of one of the goods. In this setting, the more efficient country exports the good that it produces more efficiently. In the initial trading equilibrium, factor prices are not equalized and if factors are allowed to move, there will be an inflow of the factor used intensively in the production of the export good. This will add a factor proportions basis for trade that will complement the differences in technology basis. Factor mobility will thus lead to an increase in the volume of trade.

Another interesting effect of international factor mobility is that it makes it important to distinguish between domestic and national welfare. Bhagwati and Brecher (1980) show that in the traditional Hecksher-Ohlin model of trade theory, a shift from autarky to free trade may reduce national welfare while it increases domestic welfare. Assume for instance that the importable good is Labor intensive, Labor is wholly national but capital is all foreign. A change from autarky to free trade will lead to exports of the capital-intensive good, which will reduce the real income of capital. Free trade in this case would reduce national welfare.

2.6 Country Similarity Theory:
Country similarity theory was developed by Swedish economist named Stefan Linder. However before the country similarity theory can be analyzed it is essential to understand the concept of intra-industry trade. Intra-industry trade is trade between two countries of goods produced by the same industry. Linder believed that international trade of manufactured goods occurred between countries at the same stage of economic development that shared the same consumer preferences. Therefore, the country similarity theory consists of the value that most trade in manufactured goods should be between nation with similar per capita income, and that intra-industry trade
in manufactured goods should be common.

2.7 International Product Life Cycle Theory (IPLC):
The IPLC theory is a valuable instrument in analyzing the effects of product evolution on the global scale. The IPLC generally applies to established companies in industrialized countries who expand their product range. The theory is broken up into five major areas; Release: As competition in industrialized countries tends to be fierce, manufacturers are therefore forced to search constantly, for better ways to satisfy their customer needs (Ball et al., 1999). The core elements in new product design are gained from customer feedback from previous models. Once the product enters the domestic market and begins to create a positive reputation, the demand increases and hence we come to an end of the first stage of the IPLC; Exports: As the product receives positive customer response, the international demand for the product begins. The manufacturer begins exporting to increase its market share; Foreign production begins: As demand increase with the new global market, it becomes economically feasible to begin local production in various nations. By sharing technology on the manufacturing of the product, the company has lost an advantage. The end of this stage signifies the highest point in the International Product Life Cycle Theory; Foreign competition in exports markets: This is a threatening stage for the company. Local manufacturers have gained experience in producing and selling their product, hence their costs have fallen. As they have saturated their initial market, they may begin to look elsewhere (i.e., other nations) to promote their product. The reason that this is threatening for our company is that this other nation may have a competitive advantage and this places stress on our market share; Import competition in home market: If the competitors have a competitive
advantage, or they reach the economies of scale needed, they will enter the original home market. At this stage the competitors will have a quality product which will be able to undersell the original manufactures. Eventually they will be pushed out from the market and imports will supply the home nation. Eventually, as the product's technology becomes more renowned, developing nations will enter the market: This will begin the International Product Life Cycle again, as these nations have a competitive edge with their low labor costs. With future innovations and new products and services the eventuality is that it's value and hence its price is likely to diminish (Lendrum, 1995). The IPLC theory does have its disadvantages. Perhaps the most recognizable is the assumption that products are released initially in domestic markets. Many globalized companies tend to release their new products lines internationally, not domestically; hence this theory cannot be applied to many of today’s products.

2.8 Porter's Theory of National Competitive Advantage:
Porter's book “The Competitive Advantage of Nations”, published in 1990 was based on a study of 100 firms in developed nations. Porter develops a new theory of how nations, states and regions compete and their sources of economic prosperity. Porter outline a number of factors that go beyond natural resources, among these are; a sizeable demand from sophisticated consumers, an educated and skilled workforce, intense competition in industry, and the existence of related and supporting suppliers and firms strategy and structural rivalry. Porter also discusses external influences such as government and chance; Demand Conditions: Porter argues that companies should be participating in national markets with the strongest rivals and most demanding customers, in order to build international competitiveness (Yip, 1995). A company faced to more competitive forces
will strive to make themselves more efficient in order to have an edge over their competitors and maximize profits. Factor Conditions: Each nation possesses what economists have termed factors of production. The factors most important to competitive advantage in most industries, especially in the industries most vital to productivity growth in advanced economies, are not inherited but are created within a nation, through processes that differ widely across nations and among industries; Related and Supporting Industries: There has been an unexplained trend on why companies, suppliers, competitors and supporting industries tend to congregate in close proximity to each other. This focuses on competition within the domestic market. In other words, when a new industry emerges in one country, domestic suppliers start competing for business. Thus through this competition, quality is bound to increase and prices will decrease which in turn reinforces and gives the industry a competitive advantage in international market; Firms Strategy, Structure and Rivalry: The fourth broad determinant is the context in which firms are created, organized and managed as well as the nature of domestic rivalry. The pattern of rivalry at home also has a profound role to play in the process of innovation and the ultimate prospects for international success. A firm strategy and competition in domestic market shapes its performance in the international market. In some cases strategies used in the domestic market can be applied internationally with little or no modifications. However, sometime it is not so easy.

2.9 Global Strategic Rivalry Theory:
The Global Strategic Rivalry Theory was developed in the 1980s as a means to examine the impact on trade flows arising from global strategic rivalry between Multinational corporations (Mahoney, et-al 1998). It explores the notion that in order to stay viable, firms should exploit their competitive
advantage globally and try to keep it sustainable. There are many ways in which a firm can hold a competitive advantage, these include:

- Owing intellectual property rights.
- Investing in research and development.
- Achieving economies of scale or scope.
- Exploiting the experience curve.

2.10 The Strategic Trade Theory:

“New” trade theory, motivated to a large extent by the observed importance of intra-industry trade and of trade between similar countries (in terms of technology or resources) that traditional models had difficulties in explaining. Even in the absence of differences, countries gain from trade, since consumers have a wider choice of products at lower prices and firms can exploit economies of scale when having access to a larger market. Of course, the rationalization of production also implies that some firms go out of business. The size and relative importance of these effects have been subject to empirical investigation of pre- and post-liberalization episodes in a range of countries.

The five assumptions underlaid the strategic trade theory are:

- Technology is an explicit factor of production, but one that is itself produced with inputs of capital and labor (and thus endogenous to the model of growth).
- However, the production of new technology reflects decreasing return to the application of capital and labor (doubling the resources allocated to new technology does not immediately double the rate of technological advance).
- The production of new technology creates externalities (all the benefits of new technology can't be appropriated by the entity that
invest the resources to create the technology).

- There are increasing returns to scale in the use of technology (a little technology goes along way can be used to improve quality or reduce cost of infinite number of units).

- While technology is mobile (across companies and countries), there is imperfect mobility of the ability to use technology, based on localized investment in infrastructure, and labor.

Results:

- To the extent that individual companies cannot appropriate all the returns to their investment in new technology.
  - Companies may under-invest in technology and
  - Are very likely to under-invest in "technology infrastructure" (e.g., education and communications).

- A country may gain comparative advantage in a product because it was quick to gain economies of scale in that product. As a result, it can produce the product more efficiently, relative to other products, than can its trading partner, not because of factor endowment, but because of the skilled labor, specialized infrastructure, networks of supplies, and localized technology that have developed to support that industry.

Thus, there may be a role in government support of technology, via measures such as:

- Trade policy to support key, technology improving sectors.
- Technology infrastructure.

Krugman indicates:

"The new approaches open up the possibility that there may be "strategic" sector after all. Because of the important roles now being given to
economies of scale, advantages of experience, and innovation as explanations of trading patterns, it seems more likely that labor or capital will sometimes earn significantly high returns in some industries than in others. Because of the increased role of technological competition, it has become more plausible to argue that certain sectors yield important, so producers are not in fact paid the full social value of their production. "

2.10.1 Imperfect competition and trade:
This sub-section introduces Krugman’s monopolistic competition model as the best-known way of explaining the gains from intra-industry trade and from trade between similar countries. It also mentions the reciprocal dumping model, which highlights that, under certain conditions, even trade in identical products may be beneficial.

2.10.1.1 Monopolistic competition:
Since traditional trade models seemed unable to explain the above phenomena, a “new” trade theory was needed. Krugman’s monopolistic competition model (Krugman’s), 1979) is perhaps the best known approach, providing a simple but convincing theory of why similar (in terms of technology, endowments) countries gain from trading with each other and why a significant part of that trade may take place within the same industries. Two basic assumptions, both of which can readily be observed in the real world, are fundamental to Krugman’s model: “increasing returns to scale” and “consumers’ love of variety”.

In the presence of increasing returns to scale (also called “economies of scale”), firms that double their inputs more than double their output. Such situations are quite common. In order to start a business (or maintain operations), firms typically face so-called “fixed” costs, i.e. they have to pay for certain goods or services independently of how much they ultimately
produce. In addition, a firm incurs variable costs that increase proportionally to the level of output - for instance, a worker can only produce a given number of units per hour and any increase in production requires the hiring of additional workers at the going wage rate. Marginal costs, i.e. the costs of producing an additional unit of output, are therefore constant, but when the overall level of output rises, the fixed costs get distributed over a larger number of units, and, hence, the firm’s average costs of production decline.

Since goods can be produced more and more cheaply (i.e. for the same costs, more output can be produced), it is certainly economically efficient to produce at a larger scale. The reason why, at the extreme, there is not only one firm product is that consumers prefer to choose from different varieties for each product they buy rather than buy the same one each time, i.e. they have a “love of variety”. Consumers’ love of variety favors the existence of many small firms, each producing a somewhat differentiated product, while the exploitation of economies of scale makes it worthwhile to organize production in large firms.

Krugman has built these two opposite tendencies into a simple framework of “monopolistic competition”. With large firms having a cost advantage over smaller ones, the market may cease to be perfectly competitive. In order to abstract away from the complex issue of firm interaction in such a setting, the “monopolistic competition” market structure assumes that each firm produces a product “variety “that is “differentiated” from the varieties produced by other firms. Therefore, each firm has some leeway to set prices without having to fear that consumers immediately switch to a competing supplier for small differences in price. Since a firm has a “monopoly” in its particular variety within the industry, it can set its own price, and since each firm is small compared with the entire market, it price on the prices of other
firms. At the same time, while these varieties are not exactly the same, they are substitutes for one another producers in the industry. In fact, the more varieties that exist (i.e. the lower each firm’s market share), the lower the price that a firm can charge. By the same token, the more firms there are, the less each firm sells (for a given size of the market) and the higher a firm’s average cost. In market equilibrium, price must equal average costs, which, in turn, determines the total number of firms. If price exceeds average costs, new firms would enter the industry as long as profits can be made; costs, some firms would exit the market.

What happens if two (identical) countries, each with a monopolistically competitive industry, open up to trade? According to traditional models on country difference, there would not be any trade. By contrast, with differentiated goods and increasing returns to scale, trade opening enables firms to serve a larger market (and reduce their average costs) and gives consumers access to an increased range of product varieties. However, as consumers can choose among more varieties, they also become more price-sensitive. Hence, while each firm can produce a large quantity than before (selling to both the domestic and the foreign market), they can do so only at a lower price. As total sales in the integrated market stay the same, and any individual firm is larger, some firms will go out business.

It may be that each country specializes in producing a narrower range of product varieties under free trade than before (while, of course, all varieties are traded and available for consumption in both countries). Yet, firms may also decide to locate predominantly in one market. For instance, if trade is costly, production may concentrate in the larger domestic market (Krugman, 1980), even if there is some demand abroad. By producing near its largest markets, firms can realize economies of scale, while minimizing transport
and other trade costs. Thus, the larger country will produce more varieties and be a net exporter in that industry (the so-called “home market effect”).

More about the expected trade patterns following liberalization can be gleaned if the basic Krugman model is combined with the traditional approaches concerning country differences (Helpman and Krugman, 1985). As in Heckscher-Ohlin model, one country may be relatively abundant in labor and the other country may be capital-abundant, and one of the two goods may be labor-intensive (e.g. food) and the other capital-intensive (e.g. manufacturing). However, unlike in the Heckscher-Ohlin model, one of the industries, manufacturing, has economies of scale, with firms producing differentiated varieties in a monopolistically competitive market.

As stated earlier, in the absence of increasing returns to scale, the capital-rich country would export manufactured goods import food, and vice-versa for the Labor-rich country. If manufacturing is a monopolistically competitive sector, the capital-abundant country will still be an importer of food and a net exporter of manufactured goods. The other country, with a comparative advantage in food production, will export both food and manufactured goods, since it produce different varieties of manufactured goods, which some consumers in the capital-abundant country will appreciate.

Ethier (1982) provides another approach to explain trade patterns on the basis of Krugman’s framework. His variant of the model focuses on trade in intermediate inputs, the producing the final product is lower the larger the bundle of intermediate varieties used. In turn, the larger the production of the final manufactured good, the larger the number and scale of production of the intermediate. If trade in intermediate inputs is free, it does not matter where in the world the production of manufactured goods is located in order
to realize these economies of scale. However, if trade in intermediate inputs is restricted, producers of final goods would still need to use all the intermediate varieties available in order to manufacture their products at the same cost. In the presence of trade costs, this will only be possible if all the intermediate and final good production is concentrated in the same country. Hence, this variant of the model can explain the existence of an industrial complex in certain countries. It implies that a reduction of trade costs reduces the need for a concentration of production in any one country.

2.10.1.2 Reciprocal dumping:
This model shows that, in view of certain market imperfections, trade may even be beneficial when countries exchange absolutely identical products. As described above, the monopolistic competition model highlights economies of scale as a rationale for trade in similar products and between similar countries. It recognizes that imperfect competition is a necessary consequence of increasing returns to scale at the level of the firm, but disregards most of its consequences. However, imperfect competition, notably the power of firms to price-discriminate between exported and domestically sold products, can itself give rise to international trade between similar countries.

Brander (1986) and Brander and Krugman (1983) describe a situation in which the same good is produced by a monopolist in each of two identical countries. In order to maximize profits, monopolists artificially restrict supply and set prices that are higher than under competitive conditions. While a monopolist could expand sales by reducing its price, it would receive a lower mark-up on all products sold and, therefore, make less profit than at the profit-maximizing price. If the monopolist firm in each country charges the same price, no international trade will take place. However, if
the foreign and domestic market can be segmented effectively, i.e. if a firm can charge a different price on the export than domestic market and domestic residents cannot easily buy good designated for export, each monopolist may decide to price-discriminate and enter the firm perceive to price reductions than in the domestic market. In the presence of trade costs, this is likely to be the case, as each firm is a lower cost producer at home (where it does not incur the transport costs to ship the good abroad, for example) and will have a lower market share abroad than in the domestic market.

With lower market shares, a firm may double its sales for a given price reduction, but it would need to cut its price much further to double its sales when it has a high market share; hence, a firm is likely to see itself as having less monopoly power abroad and has a higher incentive to keep price low for exports. If trade costs are not prohibitive, it market sense for both firms to “dump”, i.e. charge a lower price for exports than it charges domestically.

By selling in the foreign market, each firm makes additional sales and, hence, profits, even if the price is lower than domestically, while the negative effect on the price of existing sales are imparted on the other firm, not on itself.

In this model, reciprocal dumping leads to two-way trade in the same product, even though trade is costly and, initially, prices have been equal. With the monopoly being replaced by a duopoly situation, consumers in each country benefit from a large amount of the product in question at a lower average price. While the increased competition represents a benefit, it is, of course, wasteful to spend resource on the shipping of identical products (or close substitutes), and, depending on transport costs, the overall welfare may well be negative.
2.10.2 Empirical evidence:

While the “new” trade theory provides a persuasive account of why similar countries may find it beneficial to trade with each other, its usefulness ultimately depends on the actual evidence of the predicted gains from liberalization and its performance relative to competing explanations of trade flows. As far as the gains from intra-industry trade are concerned, most studies have focused on either one of the variety, scale or pro-competitive (price) effects of trade opening. Each effect will be discussed in turn before presenting some evidence about the explanatory power of the models compared with other approaches in regard to the observe patterns in international trade.

β Gains from increased variety:

Attempts to measure consumer gains from increased variety are quite recent (due to the detailed data and large computing power needed) and the few studies that now exist have found these gains to the few substantial. Broda and Weinstein (2004) compute the welfare gains to consumers as a reduction in the overall price index due to the availability of new varieties, a method developed by Feenstra (1994). The higher the share of total spending on a new variety, when it appears on the market, and the higher its degree of differentiation compare with existing varieties, the higher the reduction of the overall price index, i.e. the greater the gains to consumers.

In ranking US trading partners over time according to the number of exported products, Broda an Weinstein (2004) find evidence that countries do not simply export more of existing products but also supply a greater range of differentiated products as they develop and liberalize. In particular, during the time before 1990, the United State realized important gains from
increased variety in imported goods from East Asia, notably the Republic of Korea. More recently, following the North American Free Trade Agreement (NAFTA), the number of varieties imported from Canada and Mexico has risen sharply, and China has continued to play a more and important role as a supplier of differentiated products.

Feensra and Kee (2007) examine the effects of trade liberalization on export variety more thoroughly for Mexican and Chinese exports to the United States. Constructing sectoral export variety indices, they find some increased more in sectors where trade liberalization was more pronounced. For example, large tariff reductions by the United States vis-à-vis Mexico in the NAFTA context took place in the electronics sector, whereas reduction in agriculture were much smaller. Accordingly, the variety of Mexican exports increased most in electronics and least in agriculture. However, the authors also show that by 2001, China’s export variety exceeded Mexico’s in sectors such as electronics, where Mexico had an initial market access advantage. Estimating that every 1 per cent increase in the export variety of China reduces export variety of Mexico by 0.5 per cent, the authors find evidence that the expected gains from trade liberalization in terms of increased variety must take into account simultaneous liberalization with other trading partners.

Gains from increased competition:
A number of empirical studies (examining liberalization in goods and, to a lesser extent, services) have focused on the effect of foreign competition on firm’s pricing decisions. Overall, it appears that trade liberalization has indeed reduced mark-ups of price over costs, although it has proven difficult to disentangle the effects of other relevant factors. Herald (2007) examines
the effect of the creation of the European Union (EU) single market (announced in 1985 and implemented in 1993) on price over cost mark-ups using data on 10 EU member states and 18 sectors from 1981 to 1999. Taking cyclical and technological factors into account, he finds that mark-ups went down in manufacturing by 31 per cent following integration in particular in the chemicals, rubber and plastic products, metals and metal product sectors as well as parts of the machinery and equipment. Conversely, for services mark-ups have risen again slightly since the early 1990s despite the regime shift, which the author attributes to the comparatively weak state of the single market for services and the persistence of anti-competitive strategies in certain services sectors.

Evidence on the significant pro-competitive impact of trade liberalization is also available from developing country case studies. Krishna and Mitra (1998) find important decreases in price-cost margins for most industries in response to a range of liberalization measures undertaken by India in 1991. Harrison (1990) obtains similar results for Cote d’Ivoire following the implementation of a comprehensive trade reform in 1985. Both studies take other factors into account, such as the influence of technological progress and business cycles. Using data on almost 300 firms, Harrison even accounts for the possibility of variations in mark-ups not only across sectors but also across firms. Roberts an Tybout (1991) have put together a collection of developing country case studies (Chile, Colombia, Mexico, Morocco and Turkey), which examine the relationship between the exposure to trade and price-cost margins at both the industry and plant levels, taking the usual factors into account plus a measure existing domestic competition. Owing to the latter, it becomes apparent that the pro-competitive effects of increased
import penetration are particularly strong in highly concentrated industries, i.e. that the impact of trade liberalization is strongest where firms have a degree of market power prior to trade opening.

Finally, Hockman et al. (2004a) undertake a cross-country analysis of 42 developed and developing countries in order to examine to what extent country difference may explain why trade opening has a more pronounced effect on mark-ups in some countries, taking other difference into account, such as a country’s level of economic development or institutional environment. The authors find that both tariff cuts and reductions in other market entry barriers (proxied by the number of administrative procedures required to establish a new, domestic or foreign firm) have a negative effect on mark-ups, but that the effect of trade liberalization is less strong when administrative barriers are more significant, since these may acts as a substitute for lower tariffs. As an example, the authors estimate that Colombia could more than halve its average industry mark-up if it reformed its restrictive market entry regulations to the level found in Canada (least restrictive in the sample) and brought down its manufacturing tariff from the current 11 per cent to zero (like Hong Kong, China).

The study also highlights that the impact of tariffs on mark-ups decreases with country size, whereas the impact of entry regulations increases. In other words, smaller countries (that are naturally more open) will see a relatively larger reduction of industry mark-ups when they liberalize their tariff regime while larger countries obtain comparatively better results from reforming their domestic market entry procedures.
Gains from increased economies of scale:

While the importance of variety and pro-competitive gains from trade have been established empirically, there is mixed evidence at best of net increases in scale following trade liberalization. Head and Ries (1999) analyze the impact of the Canada Free Trade Agreement (FTA) with the United States for 230 Canadian industries (at the 4-digit SITC Level). Following the conclusion of the FTA, almost all Canadian manufacturing industries exhibited substantial rationalization between 1988 and 1994, i.e. decline in the number of plants accompanied by increases in output per plant.

The authors find that the scale increases expressed by the average industry over that time period cannot be explained by trade liberalization. Their analysis shows that average US tariff reductions of 2.8 per cent caused a 4.6 per cent scale increase, which was more than offset by the scale decline of 6.1 per cent owing to Canada’s own tariff reductions of 5.4 per cent. These effects are similar but larger in imperfectly competitive industries and smaller in high turnover industries, where free market entry and exit of plants appear to dampen scale adjustments. Roberts and Tybout (1991) obtain similar results looking at a panel of Chilean and Colombian firms over the mid-1970s to mid 1980s.

They examine to what extent change in plant size can be explained by increased trade exposure, as measured by higher export and import shares or, alternatively, reductions in effective production. Exposure to foreign competition in the domestic market reduces average plant size, while increasing export shares, at least in the short term, have the opposite effect. Again, size adjustment occurs more in industries with low turnover of firms, i.e. where market entry/exit is more difficult.
From these studies, it becomes evident that factors other than scale appear to explain the overall efficiency gains at the sectoral level following trade opening, notably the observed reallocation of market shares towards more productive firms. Such difference between firms have not been modeled in the theoretical approaches above, and empirical results of that nature have certainly given a boost to the development of the “new-new” trade theory.

One study that has opposed the effects of liberalization on scale versus selection of firms and shifts in market share is the one by Tybout and Westbrok (1995) in Mexican manufacturing plants covering the 1985. The authors note significant improvements in productivity and average costs during this period. Improvements were largest in the more open sectors, measuring either import or export rates. A number of manufacturing sectors show modest increases in internal returns to scale, but these are only significant for the smallest plants, while the largest plants appear to have reached a minimum efficient scale. Thus, with large plants carrying more weight in sectoral aggregations, increases in openness \(^1\) are associated with relatively small-scale efficiency gains overall. More importantly, open sectors are characterized by some degree of market share shifting towards the more productive plants. However, for the most part, cost reductions and productivity gains are explained by a “residual” factor, which captures the effects from technological innovation, learning-by-doing and other phenomena that are difficult to quantify.

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\(^1\) Degree of openness is measured by the total values of exports plus imports divided by GDP and multiplied by 100.
Observed trade patterns and competing theoretical approaches:

In order to compare the “new” trade theory with established approaches, a number of studies have further developed the new models, notably the monopolistic competition model, to yield some empirically testable hypotheses. The question is whether the predictions by the model are consistent with the trade data, notably the results obtained from the gravity approach and the Grubel-Lloyd measures of intra-industry trade that traditional theories had difficulties to explain, or whether other approaches, both new and old, can better explain the observed relationship.

Hummels and Levinsohn (1995) test the positive association between trade volumes and similarity in size (if countries also have identical preference), as hypothesized by Helpman (1987) on the basis of a model of monopolistic competition and confirmed empirically by him for a group of OECD countries using a gravity set-up. Hummels and Levinsohn (1995) use instead a diverse sample of developing economies and find that the relationship between size dispersion and the variation in trade volume, as predicted by the monopolistic competition model, still holds. Since these countries cannot be described as having identical demand structures and as trading predominantly in differentiated products, i.e. as fulfilling the assumptions heightened by Helpman (1987), it is not clear that the monopolistic competition model necessarily provides the best rationale for such trade flows.

As an alternative test, the authors regress the Grubel-Lloyd indices on a range of measures of factor endowments in each country, such as income per worker or land-labor ratios. In so doing, they are able to confirm that the bilateral share of intra-industry trade is higher for countries that are more
similar in terms of factor composition, as in Helpman (1987) and predicted by the monopolistic competition model. However, when more sophisticated econometric methods are employed, the empirical support for the theory becomes mixed. Rather than being explained by factor similarities, much of intra-industry trade appears to be specific to country-pairs and not explained by a common factor.

A number of authors have made the attempt to differentiate explicitly between competing models by deriving mutually exclusive, empirically verifiable predictions from each model. Feenstra et al. (2001) hold that the gravity equation is consistent with several theoretical models of trade that, nevertheless, predict certain differences in key parameter values. The authors confirm the predictions of the monopolistic competition model and reciprocal dumping model with free market entry differentiated products, while trade in homogeneous goods (i.e. bulk commodities and the like) appears to be better described by alternative approaches.

Similarly, Eventt and Keller (2002) estimate a gravity equation to test the predictions of the monopolistic competition and Heckscher-Ohlin models. They split their sample of bilateral import data industry trade respectively. For the former, they expect trade to be based predominantly on product differentiation and increasing returns to scale and further subdivide the sample according to the level of intra-industry trade. The other subset is sorted according to each observation’s differences in factor proportions.

For the first sample, the authors find that a higher share of differentiated goods in GDP is indeed associated with a higher share of intra-industry trade in total bilateral trade. Likewise, when there is little intra-industry trade
(second sample), trade rise with increasing bilateral differences in factor proportions. From these results, it may be concluded that a monopolistic competition framework emphasizing economies of scale and product differentiation is well-suited to explaining trade among industrialized nations ("North-Southern" trade), which tends to focus more on the exchange of homogeneous goods.

Despite its obvious empirical relevance, the new trade theory must be seen as a complement to rather than substitute for traditional approaches which continue to play a role in the explanation of trade flow. At the same time, it has triggered further advances in trade theory addressing some unanswered questions, such as which firms will prosper and which ones decline under free trade and where production will take place.

2.11 Specific Factors Model:

The specific factor (SF) model was originally discussed by Jacob Viner and it is a variant of the Ricardian model. Hence the model is sometimes referred to as the Ricardo-Viner model. The model was later developed and formalized mathematically by Ronald Jones (1971) and Michael Mussa (1974). Jones referred to it as the 2 good-3 factor model. Mussa developed a simple graphical depiction of the equilibrium which can be used to portray some of the model results. It is this view that is presented in most textbooks.

The model’s name refers to its distinguishing feature; that one factor of production is assumed to be "specific" to a particular industry. A specific factor is one which is stuck in an industry or is immobile between industries in response to changes in market conditions. A factor may be immobile between industries for a number of reasons. Some factors may be
specifically designed (in the case of capital) or specifically trained (in the case of labor) for use in a particular production process. In these cases it may be impossible, or at least difficult or costly, to move these factors across industries.

The specific factor model is designed to demonstrate the effects of trade in an economy in which one factor of production is specific to an industry. The most interesting results pertain to the changes in the distribution of income that would arise as a country moves to free trade.

**Basic Assumptions**

The specific factor model assumes that an economy produces two goods using two factors of production, capital and labor, in a perfectly competitive market. One of the two factors of production, typically capital, is assumed to be specific to a particular industry. That is, it is completely immobile. The second factor, labor, is assumed to be freely and costless mobile between the two industries. Because capital is immobile, one could assume that the capital in the two industries are different, or differentiated, and thus are not substitutable in production. Under this interpretation, it makes sense to imagine that there are really three factors of production: labor, specific capital in industry one, and specific capital in industry two.

These assumptions place the specific factor model squarely between an immobile factor model and the Heckscher-Ohlin model. In an immobile factor model, all of the factors of production are specific to an industry and cannot be moved. In a Heckscher-Ohlin model, both factors are assumed to be freely mobile; that is, neither factor is specific to an industry. Since the
mobility of factors in response to any economic change is likely to rise over time, we can interpret the immobile factor model results as short-run effects, the specific factor model results as medium-run effects and the Heckscher-Ohlin model results as long-run effects.

Production of good one requires the input of labor and industry-one specific capital. Production of good two requires labor and industry-two specific capital. There is a fixed endowment of sector-specific capital in each industry as well as a fixed endowment of labor. Full employment of labor is assumed, which implies that the sum of the labor used in each industry equals the labor endowment. Full employment of sector-specific capital is also assumed, however, in this case the sum of the capital used in all of the firms within the industry must equal the endowment of sector-specific capital.

The model assumes that firms choose an output level to maximize profit, taking prices and wages as given. The equilibrium condition will have firms choosing an output level, and hence labor usage level, such that the market determined wage is equal to the value of the marginal product of the last unit of labor. The value of the marginal product is the increment to revenue that a firm will obtain by adding another unit of labor to its production process. Production is assumed to display diminishing returns because the fixed stock of capital means that each additional worker has less capital to work with in production. This means that each additional unit of labor will add a smaller increment to output, and since the output price is fixed, the value of the marginal product declines as labor usage rises. When all firms behave in this way, the allocation of labor between the two industries is uniquely determined.
The production possibilities frontier will exhibit increasing opportunity costs. This is because expansion of one industry is possible by transferring labor out of the other industry, which must therefore contract. Due to the diminishing returns to labor, each additional unit of labor switched will have a smaller effect on the expanding industry and a larger effect on the contracting industry. This means that the graph of the PPF in the specific factor model will look similar to the PPF in the variable proportion Heckscher-Ohlin model. However, in relation to a model in which both factors were freely mobile, the specific factor model PPF will lie on the interior. This is because the lack of mobility by one factor inhibits firms from taking full advantage of efficiency improvements that can arise when both factors can be freely reallocated.

**Specific Factor Model Results**

The specific factor model is used to demonstrate the effects of economic changes on labor allocation, output levels and factor returns. Many types of economic changes can be considered including a movement to free trade, the implementation of a tariff or quota, growth of the labor or capital endowment, or technological changes. This section will focus on effects that result from a change in prices. In an international trade context, prices might change when a country liberalizes trade or when it puts into place additional barriers to trade.

When the model is placed into an international trade context, differences between countries, of some sort, are needed to induce trade. The standard approach is to assume that countries differ in the amounts of the specific factors used in each industry relative to the total amount of labor. This
would be sufficient to cause the PPFs in the two countries to differ and could potentially generate trade. Under this assumption the specific factor model is a simple variant of the Heckscher-Ohlin model. However, the results of the model are not sensitive to this assumption. Trade may arise due to differences in endowments, differences in technology, differences in demands or some combination. The results derive as long as there is a price change, for whatever reason.

So suppose, in a two-good specific factor model, that the price of one good rises. If the price change is the result of trade liberalization, then the industry whose price rises is the export sector. The price increase would set off the following series of adjustments. First, higher export prices would initially raise profits in the export sector since wages and rents may take time to adjust. The value of the marginal product in exports would rise above the current wage and that will induce the firms to hire more workers and expand output. However, to induce the movement of labor, the export firms will have to raise the wage that they pay. Since all labor is alike (the model assumes labor is homogeneous) the import-competing sector will have to raise their wages in step so as not to lose all of its workers. The higher wages will induce the expansion of output in the export sector (the sector whose price rises) and a reduction in output in the import-competing sector. The adjustment will continue until the wage rises to a level that equalizes the value of marginal product in both industries.

The return to capital, in response to the price change, will vary across industries. In the import-competing industry, lower revenues and higher wages will combine to reduce the return to capital in that sector. However, in
the export sector, greater output and higher prices will combine to raise the return to capital in that sector.

The real effects of the price change on wages and rents are somewhat more difficult to explain but are decidedly more important. Remember that absolute increases in the wage, or the rental rate on capital, does not guarantee that the recipient of that income is better-off, since the price of one of the goods is also rising. Thus, the more relevant variables to consider are the real returns to capital (real rents) in each industry and the real return to labor (real wages).

Ronald Jones (1971) derived a magnification effect for prices in the specific factor model which demonstrated the effects on the real returns to capital and labor in response to changes in output prices. In the case of an increase in the price of an export good, and the decrease in the price of an import good, as when a country moves to free trade, the magnification effect predicts the following impacts:

1. the real return to capital in the export industry will rise with respect to purchases of both exports and imports,
2. the real return to capital in the import-competing industry will fall with respect to purchases of both exports and imports,
3. the real wage to workers in both industries will rise with respect to purchases of the import good and will fall with respect to purchases of the export good.

This result means that when a factor of production, like capital, is immobile between industries, a movement to free trade will cause a redistribution of
income. Some individuals, owners of capital in the export industry, will benefit from free trade. Other individuals, owners of capital in the import-competing industries, will lose from free trade. Workers, who are freely mobile between industries may gain or may lose since the real wage in terms of exports rises while the real wage in terms of imports falls. If workers preferences vary, then those individuals who have a relatively high demand for the export good will suffer a welfare loss, while those individuals who have a relatively strong demand for imports will experience a welfare gain.

Notice that the clear winners and losers in this model are distinguishable by industry. As in the immobile factor model, the factor specific to the export industry benefits while the factor specific to the import-competing industry loses.

2.11.1 Internal Factor Mobility:

The specific factors model assumes that an economy produces two goods using three factors of production in a perfectly competitive market. Two of the three factors of production, typically land and capital, are assumed to be sector specific, which means that they can be used only in the production of a particular good, while the third, typically labor is common to both sectors. Since mobility of factors in response to any economic change is likely to rise over time, The specific factors model can be interpreted as capturing medium-term effects and the models with perfect movement between industries as representing the long-term effects.

A number of interesting results- in particular, regarding the distributional effects of trade- can be derived from the specific factors model, which was used extensively prior to the ascendancy of the H-O model. Because there is only one factor that is used in both sectors, the allocation problem in the
specific factors model is relatively simple. The wage rate and the equilibrium allocation of labor can be found by setting the sum of labor demand in each sector equal to the available supply of labor. The wage rate can then be used to determine the rental rate of the two specific factors. While the gains from trade result remains valid in the specific factors model, there are some issues with the law of comparative advantage and the effect of changes in prices or endowments that are different here from what they are in the H-O model.

First, trade produces overall gains in the limited sense that those who gain could in principle compensate those who lose while still remaining better off than before. Second, as already mentioned, in a two-sector, multi-factor world, comparative advantage will not be an infallible predictor of a country’s trade pattern. As demonstrated by Falvey (1981), however, while the statement that “a country will export those commodities in which it has a comparative advantage” is no longer a theorem, it appears to be a useful presumption, even in a multi-factor world. Third, the implications of the specific factors model are quite different from those of the H-O model. In the specific factors model, an increase in the price of a good raises the real return to the specific factor in that sector, lowers that to the other specific factor, and has an ambiguous effect on the real return to the mobile factor. An increase in the endowment of a factor specific to a sector leads to a less than proportionate increase in the output of that sector and a decline in the output of the other sector. The return of the mobile factor rises, while those to sector specific factors decline. An increase in the endowment of the mobile factor lowers the return to that factor and increases those to specific factors. Outputs of both sectors rise.

The specific factors model has been much neglected empirically (Leamer

2.12 The Gravity Model:
The Gravity model of trade present a more empirical analysis of trading patterns rather than the more theoretical models discussed above. The gravity model, in its basic form, predicts trade based on the distance between countries and the interaction of the countries' economic size. The model mimics the Newtonian law of gravity which also considers distance and physical size between two objects. The model has been proven to be empirically strong through econometric analysis. Other factors such as income level, diplomatic relationships between countries, and trade policies are also included in expanded versions of the model.

2.12.1 The Gravity equation in explaining bilateral trade flows:
The gravity equation was developed by Tinbergen (1962) in an attempt to predict the pattern of international trade that would prevail in the absence of distortions. He postulated that the value of bilateral trade between two countries was an increasing function of the gross national product (GNP) of both the exporting country (reflecting the assumption that export supply capacity depend on a country’s economic size) and the importing country (assuming that import demand also increased with a country’s market size).
At the same time, he observed that trade flows were influenced negatively by the “distance” between two countries, as a measure of transportation costs or other obstacles, such as the cost of information on the export market.
Trade with a range of trading partners increases with both countries’ GDP
and decreases with the geographical distance. The relative “distance”
between trading partners is not confined to geography, but includes other
“barriers” that increase trading costs, such as language differences,
historical/cultural factors and, not least, trade barriers.

This so-called “gravity equation”, in reference to Newton’s law describing
the force of gravity as a function of the product of the masses of two objects
and the distance between them, has been extremely successful in explaining
the determinants of bilateral trade flows and the impact of trade policies,
such as the creation of free trade areas. Yet it did not appear to offer any role
to comparative advantage. The monopolistic competition model was the first
model that provided a complete theoretical basis for the gravity equation.
Previously, Anderson’s (1979) Armington model had provided a first, albeit
incomplete, theoretical foundation based on differentiation of goods by
country of origin. Later, others, e.g. Eaton and Kortum (2002), have been
able to derive the gravity equation from the Heckscher-Ohlin and Ricardian
model respectively. The former is characterized by complete or at least a
certain degree of specialization of countries in certain goods, while in the
latter modeling approach, countries are not specialized, but owing to
transport costs and particular good are only imported from the cheapest
producer.

2.13 Imitation-gap Theory:
This theory states that international trade can take place between two
countries having similar features (Factor endowments) and consumer tastes.
Trade arises between two countries as a result of gap between invention or
innovation of products and there imitation in these countries. There are two
lags in this theory. Demand lag and imitation lag. Demand lag is the time
gap between the introduction of a new product in one country and the point
when consumers in another country start demanding that product. Imitation lag is the time gap between the introduction of a new product in one country and the point when manufacturers in another country start producing that good. Trade occurs between the two countries when demand lag is shorter than imitation lag.

2.14 The Melitz Model:

The Melitz model is a dynamic industry model that incorporates firm productivity heterogeneity into the Krugman (1979) monopolistic competition framework, and focuses on steady state equilibrium only. The original Melitz (2003) model considers a world of symmetric countries, one factor (labor) and one industry, but it can be easily extended to the setting of asymmetric countries. In each country, the industry is populated by a continuum of firms differentiated by the varieties they produce and their productivity. Firms face uncertainties about their future productivity when making an irreversible costly investment decision to enter the domestic market. Following entry, firms produce with different productivity levels. In addition to the sunk entry costs, firms face fixed production costs, resulting in increasing returns to scale of production. The fixed production costs lead to the exit of inefficient firms whose productivities are lower than a threshold level, as they do not expect to earn positive profits in the future. On the demand side, the agents are assumed to have Dixit-Stiglitz preference over the continuum of varieties. As each firm is a monopolist for the variety it produces, it sets the price of its product at a constant markup over its marginal cost.

There are also fixed costs and variable costs associated with the exporting activities. However, the decision to export occurs after the firms observe
their productivity. A firm enters export markets if and only if the net profits generated from its exports in a given country are sufficient to cover the fixed exporting costs. The zero cutoff profit conditions in domestic and exporting markets define the productivity thresholds for firm’s entry into the domestic and exports markets, and in turn determine the equilibrium distribution of non-exporting firms and exporting firms, as well as their average productivities. Typically, the combination of fixed export costs and variable export costs ensures that the exporting productivity threshold is higher than that for production for the domestic market, i.e., only a small fraction of firms with high productivity engage in exports markets. These exporting firms supply both the domestic and export markets.
CHAPTER THREE
LITERATURE REVIEW

In this chapter, an attempt will be made to survey the literature related to the foreign trade sector of the Sudan.

3.1 Previous studies in Sudan:

Beshai (1969) analyzed the comparative position of the Sudanese exports in the world market with respect to the main export products (mainly cotton which is the biggest item in Sudan exports). Moreover, the model was developed in an attempt to sort out the main determinants of demand for Sudanese cotton in the major countries.

First, the model was estimated for the Italian market for the period (1956-1967). The results proved that import from the Sudan in the Italian market varies inversely with the Italian market price and Rayon competes with Sudanese cotton exports in Italian market. Second, the model was estimated for UK market, and then widened to include the French market as well as the Japanese and Indian markets in different periods.

The main determinants of the demand for Sudanese cotton appeared to be the prices of Sudanese cotton, prices of Egyptian cotton, the index of textile production and cotton stocks in importing industries.

He concludes, it seems that the problem of the Sudan is that, despite expansion in exports and increased capacity to import, the country was not able to realize more significant carry-over from external trade to internal development. The effects of the export stimulus on other sectors in the economy depended not only on the return of export growth, but on other factors which inhibited to growth.

The rural credit system constituted a serious market imperfection that precluded possible gains to producers from increased exports and higher
prices.

Some of the exports from the Sudan are potentially capable of modern processing techniques. Such processing raises supply requirements, increase employment, and creating income in other activities supporting the export sector such as the supplying of materials, tools, transportation, and construction. In so far as the output of the export industry becomes an input for other industries processing activities provide forward linkages. In most cases the growth in export output was achieved simply by bringing more land under cultivation, with the same agricultural methods as used in the subsistence sector. In this way, the stimulus to development was less than it would have been if the expansionary process had entailed the introduction of new skills and a more productive recombination of factors.

Only in the late sixties did the government begin to tackle the serious problem of drought in Western Sudan, which affects the production of a major export commodity (gum Arabic).

Exports from the Sudan in most cases were found to be income-elastic. Sudan's competitive position in world markets is strong. Furthermore, new export goods which the country is beginning to export such as livestock, skins, ..., etc are commodities for which world demand is strong. In the light of the foregoing analysis, it appears that domestically based obstacles to development have been the significant factor in retarding growth, and not external obstacles. If internal handicaps had been less formidable, the stimuli from foreign trade would have been more effective in inducing favorable responses to capital accumulation and to progress.

**Seif Elnasr (2002)** described the recent economic policies “….over the past few years, the Sudanese economy has experienced some structural problems that led to slow economic growth. These include excess demand for goods
and services, unfavorable investment climate, budget deficit and external imbalances."
The conclusions of this study which pertain to the area of production and investment are that:
There is a strong negative trend to the neural technological progress as shown by the production function. Therefore, the policy measures to be taken are:

- An exemption of computers from import tax is one of the policy instruments which have been declared and implemented.
- Expanding the basic and higher education is one of the policy measures which have also been declared and implemented, but the policy instruments related to maintaining the quality of education should be improved.

On the other hand, the low production coefficient of capital indicates that capital should be increased in the production process. This can be done by fostering investment following various policies.

Production in Sudan is labor intensive and in order to achieve economic growth, labor must be much more based on capital (increase labor capital ratio) in order to be more efficient.

Sabir (1982) study is concerned with the causes and consequences of export instability and the interregional impact of the geographic concentration of cotton production in the Sudan. A case study approach was chosen to examine the specific factors relevant to Sudan's economy.

The findings show the country specific nature of export instability and the need to re-examining the results of previous studies based on cross-section analysis. In contrast to previous studies that emphasize the demand side, this study finds that the causes of export instability in the Sudan are of a
domestic nature and related to the supply side. Other significant findings, not in conformity with the conventional view are: developing countries and planned economies are more contributors to Sudan's export instability than industrial countries, and bilateralism has contributed to export instability. The above findings have important policy implications.

In examining the impact of export instability on economic growth, this study adopted the conventional hypothesis that export instability is detrimental to economic growth in developing countries. The literature on export instability gives exclusive attention to the uncertainty effect, theorizing that export instability transmits its impact to economic growth through uncertainty. In his study he emphasizes that foreign exchange shortage is the basic conceptual link between export earnings and growth. Using a simple growth model with foreign exchange shortage, it is concluded that export instability has been detrimental to economic growth in the Sudan, confirming the conventional hypothesis. This is in contrast to other research in this area that adopts a set of behavioral hypothesis based on a permanent income approach and is contrary to the often accepted argument, postulating that export instability has a stimulating impact on investment and economic growth.

*Medawi (1996)* argued that Since 1970s, Sudan economy had been suffering from disequilibria in balance of payments. Moreover, Sudan economy had suffered from shortages in foreign currencies needed to finance development projects and balance of payments deficit.

Sudan's exports represent the main source of foreign currencies, so disturbances in exports value have a negative impact on the balance of trade. However, exports revenues are not enough to satisfy the requirements of development process.
In order to develop and promote exports, since 1978 the government used to devaluate the national currency. Devaluation is assumed to increase exports, curtail imports and thereby mitigate the balance of payments deficit. The devaluation of the national currency was supposed to make Sudan's exports cheaper in the world market, more quantity will be sold which in turn encourages producers and exporters to increase the supply of exports in international markets and hence large revenue will be realized. This mechanism works if the price elasticity of import demand and export supply is highly elastic. Unfortunately, the price elasticity of the agricultural product is characterized by low elasticity and most of Sudan's exports are primary products of agricultural origin. Accordingly, longer time is needed to increase the supply of agricultural product.

The study focuses on reviewing the exchange rate policies of the national currency in particular the devaluation of the national currency as an instrument adopted to encourage and promote exports throughout the period 1978-1995.

The study attempts to analyze the impact of exchange rate changes on export performance according to the following hypothesis:

- Devaluation of the national currency with the purpose of improving the performance of the export sector cannot be realized without structural transformation of the economy.

- With the existing structure of the Sudan economy, the encouragement of agricultural exports through large devaluation results in severe economic distortions.

By using the analytical and empirical method, the main result of the study can be summarized as follows:

- Sudan's exports are composed mainly of agricultural products,
i.e., Cotton, Groundnuts, Sesame, Gum Arabic, Oilseeds and livestock and meat. The production of these products is constrained by natural factors such as rainfall, drought and agricultural diseases. Moreover, the production process depends on imported inputs such as petroleum products, machine and equipment and fertilizers.

- The poor performance of the Sudan's exports can be attributed to many problems and obstacles. The high cost of production, which reduces the competitiveness of export is a major problem facing Sudan's exports. Moreover, Sudan's exports faces price fluctuation in the world demand also have less value added because they are exported as raw materials. Instability of the export policies, insufficient finance to the production process in its early stages and the absence of coordination with other economic policies are factors led to weak performance of Sudan's exports.

- The continuous devaluation of the national currency failed to encourage and promote exports due to the inelastic nature of export's supply. Also the failure of devaluation policy to reduce imports could be attributed to the nature of the imported products, i.e., necessity consumer goods and strategic inputs which are embodied in the production process.

- The first empirical model of the pre-devaluation period shows that 85% of changes in export's value were attributed to changes in exchange rate, inflation rate, cost of export and gross domestic product. Moreover, the empirical model of the post-devaluation period shows that 98% of changes in exports value
was attributed to changes in exchange rate, inflation rate, the cost of export and gross domestic product.

- The second empirical model shows that 55% of the changes in the inflation rate can be attributed to changes in exchange rate. Therefore, the persistent devaluation of the national currency had led to inflationary pressures which adversely affect the Sudan economy.

Based on the above mentioned results the main recommendations are:

- To increase the competitiveness of the Sudan's export value, the government should adopt a realistic and stable exchange rate policy and has to reduce the cost of production.
- Implementing new economic policy aimed to develop the existing export items and introducing new export items in order to diversify exports and reduces the reliance on the traditional export item.
- Following Agro - industry strategy in order to promote and develop industrial exports and to benefit from their value added.
- Providing the necessities required to develop the export sector along with promoting and developing of the products that do not depends on imported items such as livestock.

A. Eldawi (1980) argued that:

- The main problem of the economic development in the Sudan is that of bringing about a more vigorous rate of growth which will be compatible with the economic potentialities of the country. In other words, the problem is to accelerate the present rate of development.
- The agricultural sector, being the main leading sector in the national economy, represents the cornerstone of development since it is well endowed with natural resources. With adequate and well-planned
investments this sector is capable of realizing the economic prosperity and welfare of the Sudanese people.

Although world markets exist for almost all the agricultural products that the Sudan exports, particular emphasis is likely to be placed on providing for the needs of neighboring Arab countries which are importers of these commodities. Exports of vegetable oils, sugar, wheat and meat for instance could find a ready market in these countries.

It is very important to strengthen and improve the supporting facilities needed for the expansion of agricultural and industrial programs. The strategy should be to spread the transport and communications network wider to various part of the country.

Although more emphasis is given to the agricultural potential of Sudan as the main path to develop, a long-term activity of vital importance is export-oriented industrial development. Although the availability of raw material supplies, skilled labor and managerial skills are all important determinants of such industrial development, the market orientation of any new industrial production capacity must be carefully established before investment funds are committed and new plant located, if such capacity is to prove viable over time.

Foreign trade plays a vital role in the economy of the Sudan and contributes about 70% of the government's current revenues. One-third of the production in the modern sector is channeled into exports, therefore, the level of exports influences considerably the level of economic activity within the sector.

Foreign trade should be designed to exploit the comparative advantage of Sudan in agricultural production and thus to increase the
availability of goods and services far beyond the levels that could be attained by an inward looking policy aimed at self sufficiency.

Import substitution policies can play the role of supplementing the exports as means of earning foreign exchange through domestic production of previously imported items and hence release foreign exchange which can be used to import additional producer goods and speed up economic growth.

Export promotion should not be regarded as simply a short-term approach to improving the trade balance of Sudan. Rather it must be understood as an activity essential for establishing a reliable market oriented approach to development. Export promotion is therefore, a basic and continuing activity which lies at the foundation of economic development for all developing countries where the policy of import substitution no longer provides an adequate driving force in the economy and export-led growth is essential to economic progress.

It seems that, despite the expansion in exports and increased capacity to import, the country was not able to realize a more significant carry over from external trade to internal development. The effects of the export stimulus on other sectors in the economy depend not only on the return of export growth, but also on other factors which were inhibiting to growth such as market imperfection and government policies in certain aspects (i.e. insufficient incentives). The main issue is to ensure that the benefits from export trade are widely dispersed and the more they are dispersed the more one tends to get efficiency in production.

Although the Sudan has a great potential in increasing its exports, it appears to be that domestically based obstacles have been the
significant factor in slowing the rate of growth rather than external obstacles.

The need for reform of the incentives structure in Sudan is great. The present system of taxation and protection is biased against agriculture, and particularly against agricultural exports. In general it operates with a bias against exports promotion and in favor of import substitution. A better structure of incentives would substantially improve the efficiency of the resource allocation process in the Sudan and facilitate, rather than hinder, the development strategy.

Mustafa (1997) was interested to explore the adequacy of the exports' promotion policy measures, namely; the recent liberalization policies. Moreover, the study seeks to explore the factors that determine the exports costs structure and competitiveness during the period (1984-1996). Sudan exports' sector showed relative improvement in performance during the period (1992-1996) compared to the period (1984-1991), but such a progress was associated with a severe deterioration in the exchange rate, which in turn, negatively affected the exports' cost structure. The factors that affect the exports' cost structure and competitiveness were analyzed by testing the following hypothesis.

- The increase in cost of export goods is mainly due to the imposition of taxes and duties on export commodities, and the increase in transportation cost.
- The monetary expansion increased the exchange rate, which in turn raised the cost of production of traded goods, directly by raising the price of export goods, and indirectly through exchange rate deterioration and its effects on imported inputs.
- The interest rate differential, which consequently resulted from
unrealistic user cost of capital, led to capital flight and shifted liquidity outside of the banking system for speculation in foreign exchange. This has negatively affected the exchange rate, raised the prices of imported inputs and hence increased the cost of traded goods.

The relatively lower production growth rate (measured by GDP rate of growth) in comparison with higher monetary expansion, led to the deterioration of exchange rate. This has raised the price of imported inputs and hence increased the cost of production.

The study used empirical and analytical methods and obtained the following results: Using the individual commodity cost of exportation, taking into consideration all types of cost of exportation from production site to Port-Sudan or Khartoum air port. The study revealed that transportation cost, taxes and duties are not the main reasons behind the reduction of export competitiveness and profitability. However, the average markets price of the commodity constituted a large proportion in total exports' cost. Thus, the first hypothesis is rejected.

Then using a model based on the monetary approach to the exchange rate as developed by Bilson, F.B (1978), the study estimated the coefficients of the variables that determine the change in exchange rate which are the relative money supply, the interest rate differential and the relative GDP.

The results obtained supported the second, and fourth hypothesis, that the changes in relative money supply and relative GDP in the economy of Sudan over the period (1984-1995), adversely affects the exchange rate. The third hypothesis that interest rate differential determines the change in the exchange rate is rejected. About 94 per cent of the total variations in exchange rate were explained by the Model, the increase in exchange rate,
had raised the cost of imported inputs (taking into account that the Sudan exports productions’ inputs are mainly imported from abroad like petroleum, spare parts, fertilizers and production equipment).

Based on the results obtained, the following recommendations are made:

Because of the importance of the exports sector and its role in achieving the economic development of the country, it’s necessary to adopt export promotion policies.

For the retention policy, the study showed that the aims behind retention are to guarantee transfer of exports proceeds and encourage the exporters by permitting them to retain 50 per cent of exports proceeds, and allowing 100 per cent retention for all marginal exports (senna pods, henna, karkadeh, molasses and fruits). Also it is proposed to allow the exporters to use their retained proceeds before transferring it to the country (50 per cent), i.e exports proceeds are not necessarily transferred to the country as a complete value.

The assignment policy helped in the importation of the petroleum and wheat. It is possible to include other important goods (medicines, agricultural equipment, fertilizers and spare parts), to encourage the private sector to import basic goods. It’s worth noting that, lower prices of assigned exports should be determined, after surveying its world prices, in order to remove price distortions that may result from assigning exports proceeds to some exporters who might sell it cheaply in the world market for guarantied profits in import operation.

For reduction of exports cost and expansion, the study pointed out that exports encouragement will be through minimization of cost of exports as follows:
Targeting a stable monetary expansion by the adoption of consistent fiscal and monetary policies.

It’s necessary to expand production in the agricultural sector.

Tackling speculation in foreign exchange by judgmental penalties and by raising rates of return in the commercial banks, to maintain profitable returns for investors and to attract deposits to the banking system.

Hag Elamin [1997] sum up the performance of Sudan’s exports in the period 1970-1993 as, on all accounts, very poor. Sudan had been losing its share of total world exports and the cotton market. Recent government programs adopted an outward-oriented trade strategy with the main purpose of improving price incentives for exports. This outward-oriented trade strategy was implemented through adjustments in the nominal exchange rate, reduction and/or removal of export taxes and quantitative restrictions. None of the adoptive programs appear to have created or achieved a clear improvement in exports price incentives, their impact on export earnings will be minimal if the present structure of exports is maintained.

Nashashibi (1980) used the commodity competitiveness approach. His aim was to conduct a sectoral study to assist policy makers in appraising exchange rate, trade and investment policies, to bring about a more convincing evidence based on the competitiveness approach. Precisely to prove for the IMF officials and probably the policy makers in the Sudan, that the devaluation policy is necessary, and Sudan government should adopt this policy to improve the competitiveness of the exports and hence the current account and the balance of payments position.

He estimated the model for the main Sudanese export. The results obtained regarding the profitability of production for exports suggest a depreciation of
the Sudanese national currency.

**Hussain (1984)** also used the competitiveness approach to examine the impacts of devaluation policy on export profitability and competitiveness. The demand and supply price elasticity of exports were used to measure the degree of pass through of devaluation into high export prices in domestic currency. The results obtained showed that a 1 percent devaluation lead to 1.02 percent loss of foreign exchange per unit of domestic inputs. This proved that the reduction in the coefficient of competitiveness resulted in the deterioration of profitability. i.e., devaluation did not promote exports, and rather on the contrary, devaluation had adverse effect on the production of exportable goods.

**Ali (1985)** argued that devaluation was not needed to raise export's competitiveness. Moreover, he added revaluation of the national currency is advisable policy i.e. devaluation of the national currency did not raise profitability and competitiveness; rather it reduced the competitiveness of the exports.

**Diab (1985)** estimated Taylor's devaluation model on the basis of the national income accounts of Sudan. The results obtained showed that, by lowering the prices in the process of adjusting the exchange rate between the Sudanese pounds and the foreign currencies, devaluation is supposed to encourage exports and discourage imports. However, in Sudan, this was not the case.

It is obvious that, the methodological approach of the previous studies was empirical in nature; the main focus was on investigating the effectiveness of the policy measures of the import substitution industries (ISIs) and liberalization policies or export promotion (EPs).
3.2 Some previous studies in LDCs:

Most of the existing empirical studies are based on cross-section data across countries except for Ram [1987], which, as Ram pointed out, this study may result in loss of important parametric differences between countries. The purpose of the paper is to investigate the relationship between export expansion and economic performance and to provide additional statistical evidence for five Asian countries, namely, India, Malaysia, Pakistan, the Philippines, and Thailand, on the basis of time series data from 1973 to 1993. These countries can be divided into two groups: India and Pakistan are low-income economies based on the gross national product per capita of US $695 (U.S. dollars) or less in 1993, whereas Malaysia, the Philippines, and Thailand are middle-income economies with a gross national product per capita of more than US $695 but less than US $8,626 in 1993 [World Bank, 1995]. Over the past two decades, the middle-income countries have shown impressive economic growth, placing them in a group of fast-growing economies, especially since the early 1980s. These countries have made impressive advances by relying on export-led growth strategy. They favor outward-oriented policies as the economies of the so-called newly industrialized countries of the Asian Pacific Rim, such as Hong Kong, Singapore, South Korea, Taiwan, and Japan, whereas India and Pakistan have favored inward-oriented policies during a great part of their economic histories. Recently, however, these two countries have shown signs of pursuing liberal market policies. For example, in 1993, the ratios of exports to gross domestic product in these five countries were 80 percent (Malaysia), 40.81 percent (Thailand), 33.70 percent (Philippines), 16.95 percent (Pakistan), and 8.76 percent (India). Although the record of these countries (specifically India and Pakistan) is not as successful as the growth record of
newly industrialized countries, still the success of outward-oriented policies in East Asia has revived the debate on increased openness and export promotion strategies in less-developed countries.
CHAPTER FOUR
STRUCTURE AND POLICIES OF THE FOREIGN TRADE SECTOR IN SUDAN

4.1 Introduction:
The Sudan economy is an open economy in the sense that foreign trade sector (exports and imports) is an important sector in the economy. Foreign trade plays a vital role in the economy of the Sudan and contributes about 61 percent in 2009 to the government’s current revenues. Therefore, exports influence considerably Sudan’s economic activity. Sudan also relies heavily on imports of manufactured goods, machinery and equipment and raw materials. In 2009 the value of imported manufactured goods and machinery and equipment approximately equals about 53 percent of the total import.

The lack of technology and organizational expertise makes it necessary for the country to avail itself of imported technician and business specialists, again placing pressures on the limited resources that are available to cover imports requirements.

Available evidence suggests that most developing countries, including Sudan have witnessed persistent decline in their foreign exchange earnings in the early 1980’s. This largely follows the collapse in their exports prices and since most of them specialize in limited line(s) of exports. This triggered series of developments within domestic economy.

Sudan has implemented a wide range of policies to influence its external accounts. The key features include:

- Various exchange rate \(^1\) regimes.

\(^1\) An exchange rate is the rate at which one nation’s currency can be exchanged.
• Floating exchange rate (1992 onward).
  § Tariffs and quantitative restrictions on imports.
  § Surrender of foreign exchange earnings by exporters to the central bank.
  § Advanced import deposits by importers.
  § Restrictions on capital outflows.
  § Retention and assignment policies.

The foreign trade sector (exports and imports) has recorded appreciable increases during the last decade, reflecting broadly the economic growth.

**Table (4-1):** Total exports and imports (Millions US $), percentage change, and balance of trade during the period (2000-2009):

<table>
<thead>
<tr>
<th>Items</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports</td>
<td>1807</td>
<td>1699</td>
<td>1949</td>
<td>2542</td>
<td>3778</td>
<td>4824</td>
<td>5657</td>
<td>8866</td>
<td>12450</td>
<td>7800</td>
</tr>
<tr>
<td>Annual rate of growth</td>
<td>____</td>
<td>-6.0</td>
<td>14.7</td>
<td>30.4</td>
<td>48.6</td>
<td>27.7</td>
<td>17.3</td>
<td>56.7</td>
<td>40.4</td>
<td>-37.3</td>
</tr>
<tr>
<td>Imports</td>
<td>1553</td>
<td>2301</td>
<td>2446</td>
<td>2882</td>
<td>4075</td>
<td>6757</td>
<td>8074</td>
<td>8450</td>
<td>9200</td>
<td>8200</td>
</tr>
<tr>
<td>Annual rate of growth</td>
<td>____</td>
<td>48.2</td>
<td>6.3</td>
<td>17.8</td>
<td>46.7</td>
<td>65.8</td>
<td>19.5</td>
<td>4.7</td>
<td>8.9</td>
<td>-10.9</td>
</tr>
<tr>
<td>Balance of trade</td>
<td>254</td>
<td>-602</td>
<td>-497</td>
<td>-340</td>
<td>-297</td>
<td>-1933</td>
<td>-2417</td>
<td>416</td>
<td>3250</td>
<td>-400</td>
</tr>
</tbody>
</table>

Source: International Trade Statistics Yearbook (ITSY) various Reports.

Refer to table (4-1), imports follows broadly the trend set by the exports with a time lag. These fluctuations are mainly due to the fact that, exports consist almost entirely of primary commodities, which are subject to wide
variations because of world demand and supply position.

Eldawi (1980) observed that “During seventies and eighties of the last centuries, the relationship between exports and imports appears to work through governmental policies aimed at linking the import control regulation to export earnings. Therefore, self adjusting mechanism has been ineffective in recent years, because of the inelastic nature of an increasing proportion of total import comprising capital goods.”

We believe that this statement is still relevant for the period 2000-2009. During this period, Sudan's exports increased on average by 331.6 percent and amounted to 7.8 bln US$ (see table 4-1). Imports increased on average by 428.0 percent and amounted to 8.2 bln US$ (see table 4-1). The trade balance recorded a deficit of 0.4 bln US$, compared to a surplus of 0.2 bln US$ in 2000.

Arabi (2002) argued “The inspection of net excess demand in the period 1960-1994 reveal the gap between current account deficit and domestic demand has been widening as a result of unfavorable terms of trade and emergence of parallel market of exchange rate and shortage of foreign currency.”

The continuing trade deficit precipitates adverse consequences. When the Sudan is running a continuous trade deficit, our trading partners wind up holding a sizable amount of the Sudan currency every year. A trade deficit means we're importing more goods and services than we export, and we wind up exporting Sudan pound in order to pay for the excess goods. As those pounds build up overseas, governments, companies and individuals recycle them by buying Sudan bonds and stocks and other assets. This increases the exposure of these overseas owners of pounds to the risks of the Sudan currency and Sudan asset markets. If the value of the pound
declines, their pound-denominated investments will lose value as well. At some point, these overseas owners of Sudan pounds start to demand higher returns—higher interest rates on Treasury bonds, for example—to offset that currency risk. Some may sell off a portion of their pounds, producing exactly the kind of fall in the currency that they had worried about in the first place, which leads again to a demand for higher returns.

The higher (rate of return) interest rates demanded by overseas pound holders finally start to slow economic growth in the Sudan. That slowdown, plus the higher prices consumers have to pay for imported goods because of the weak pound, takes a painful bite out of family incomes.

4.2 Structure of foreign trade:
4.2.1 Composition of exports:
Like other developing countries, Sudan’s exports were dominated by few primary commodities, of which extra long stable cotton was the most important, followed by groundnut, sesame, gum Arabic, sorghum and recently livestock. At present, almost 90 percent of Sudan’s exports are petroleum products.

In the following discussion, we shall introduce the composition of Sudan’s foreign trade sector and what they are represented for the Sudan’s economy.

1. Cotton:
Cotton occupied a dominant position in the total exports earning of Sudan. This in turn implied that, the Sudan economy was susceptible to the magnitude and receipts from cotton. In spite of the important role of cotton as a main source of foreign currency, its production faced many problems i.e., irrigation system, cultivation, disease... etc.
Despite the policies that had been announced by the government to diversify
the exports so as to avoid the dependency on one cash crop, cotton was played a dominant role or the leading crop of Sudanese exports. During the period 1991 to 1993, cotton exports decreased to the lowest level. This was due to decreased cultivated area in favor of wheat to realize self sufficiency and food security. Throughout the period 1960-1977, its average share about 53.3% of total exports proceeds. In 2005, 2007, 2009 its share about 16.99 %, 14.40% and 6.12% respectively.

2. Groundnuts:
Groundnut is an important crop specially for producing edible oil. Its export has been increasingly steadily and becoming more pronounced from the early fifties. In 1970s, an increase in its export was resulted from the deliberate attempt to diversify and increase exports. There was a great deterioration in groundnuts exportation from 1987 to 1990. This was due to drought which affected production. Further, emergence of new suppliers in the world market causes a large reduction in its price. In 1993 when the world demand for groundnuts increased, the quantity exported increased and there was an improvement in its exports value. But in 1994, 1995 and 1996 the exported quantity decreased. The instability in groundnuts production was due to problems in production process and marketing policy. Throughout the period 1960-1977, its average share about 13.4% of total exports proceeds. In 2005, 2007, 2009 its share about 0.0 %, 0.0% and 0.0% respectively.

3. Sesame:
Sesame was counted as an exports item since 1956. The trend of the
exported quantity has been rising significantly. The sharp decline of its share in total exports proceeds in late 1970s, was due to a remarkable decrease in production because of unfavorable climate condition.

Since 1992, sesame exports increased as its production also increased and it became one of the most important sources of foreign exchange.

Throughout the period 1960-1977, its average share about 7.1% of total exports proceeds. In 2005, 2007, 2009 its share about 18.78 %, 19.51% and 20.39 % respectively.

4. Gum Arabic:

In the first decade of the last century, three countries ceased to be gum Arabic exporters. Sudan was strengthening its position as the biggest exporter among the remaining two: Nigeria and Senegal.

In late twenties, gum Arabic industry was developed in Tanzania, since then, world gum export was mainly from these four countries.

Its production and exports affected by drought, desertification, prices in international markets and financial policies. In spite of the fact that Sudan is the largest supplier of gum Arabic to the world market, the share of gum to total exports value is relatively small because of the competition from artificial substitutes.

The improvement in gum Arabic exports continued up to 1991 due to good marketing pricing system which characterized by:

- Competitive and elastic price of gum Arabic during the season.
- Exportation of high quality of gum Arabic.
- The continuation of supply of gum Arabic.

In 1992, the gum Arabic suffered from the competition of industrial substitutes, increasing of production cost and shortage of labor because of rural urban migration.
As a result of a new policy, the quantity produced and exported increased, which reflects the success of the pricing system, growing of (Hashab) inside agricultural schemes and manufacturing of gum Arabic in order to increase the value added. 1995 witnessed a reduction in gum Arabic production and consequent reduction in its share in total export proceeds. Gum Arabic can play an important role in economic development only if problems facing its production and exportation solved. These problems cause instability in the production of gum Arabic.

Throughout the period 1960-1977, its average share about 8.5% of total exports proceeds. In 2005, 2007, 2009 its share about 17.04 %, 10.91% and 4.71% respectively.

5. **Sorghum:**

Sorghum is the staple food for Sudanese. Sudan exports sorghum when production exceeds domestic consumption. In 1985/1986 the government forbidden the exportation of sorghum because of poor production resulting from bad weather condition prevailed at that time (drought). Since 1992 Sudan had continued to export varying quantities of sorghum as the agricultural sector faces many problems. Therefore, through effective policy Sudan can export more sorghum and at the same time realize food security.

In 2005, 2007, 2009 its share about 0.0 %, 5.80 % and 0.0% respectively of total exports proceeds.

6. **Livestock:**

Sudan owns great numbers of cattle, sheep, goats and camels. Since earlier time Sudan started exportation of live stock besides their main products. In addition, Sudan is endowed with fishery wealth as well as substantial amount of poultry production.
In 1989, the quantity exported of live stock was decreased compared with the previous year, but its value was high, because of increased price in international markets. The reasons behind the decrease of the exported quantity were:

- High prices in domestic market.
- An increase of animal food prices.
- Smuggling to neighboring countries.
- Instability in export policies.

In 1990/1991, livestock entered new markets and exports of slaughtered animal were also increased. The policy adopted by the government was:

- Adopting realistic prices.
- Solving the problem of transportation and export customs.
- Removing of export tax on live and slaughtered animals.

These policies resulted in a great increase in the exported quantity. This increased the contribution of this sector in total exports proceeds to U.S $114.9 million in 2005.

This sector is promising since the cost of production and risks involved are very low.

In 2005, 2007, 2009 its share about 2.87 %, 16.95 % and 25.55 % respectively of total exports proceeds.

7. Hides and Skins:

As Sudan owns huge animals resources, exportation of hides and skins contributes to export proceeds. Exportation of hides can play an important role beside that of livestock and slaughtered animals and it indicates high utilization of value added.

From the above discussion, it appears that Sudan’s exports are mainly primary agricultural products and faces many problems such as:
Stagnation in exports.
Exports instability.
Worsening terms of trade.

Historical ties can explain the heavy concentration of Sudan on the exports of raw materials and the consequent large share of export going to the EU. In fact, the concentration of Sudan on the exports of raw materials in particular cotton and Gum Arabic, acts to constrain its ability to diversify markets effectively. An analysis of the direction of exports on the basis of commodity categories reveals a difference in the pattern of trade between agricultural raw materials and food products. Almost all raw materials were sent to the industrial countries, while exports of food products were directed mainly to the Arab countries. This is because raw materials can only be sold to economies which have an industrial base to process them.

Competitiveness of Sudan’s exports and commodity composition have been the primary forces retarding the growth of exports. Thus, the adverse effects of commodity composition may be explained by the concentration of exports on a few commodities which face stagnant world demand. See (Hag Elamin and Osman, 1995).

Sudanese exports also face many constraints a part from high production costs i.e., the shortage of data concerning products and exports capacity leaves little to integrate into international markets.

Exports play an important role in our economy as a main source of hard currency. Therefore, promoting exports especially non-petroleum exports is the only means of reviving the national economy.

In 2005, 2007, 2009 its (non-petroleum products) share about 3.41 %, 0.58 % and 2.36 % respectively of total exports proceeds.
Table (4-2): Main items of exports as percentage of total values of exports during the period (1970-2009)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>46.0</td>
<td>42.6</td>
<td>49.6</td>
<td>48.0</td>
<td>20.0</td>
<td>22.1</td>
<td>2.9</td>
<td>2.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Gum Arabic</td>
<td>8.8</td>
<td>5.0</td>
<td>1.0</td>
<td>7.8</td>
<td>12.0</td>
<td>9.2</td>
<td>1.3</td>
<td>2.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Groundnut</td>
<td>5.3</td>
<td>22.6</td>
<td>2.2</td>
<td>3.3</td>
<td>-</td>
<td>0.5</td>
<td>0.3</td>
<td>0.0</td>
<td>-</td>
</tr>
<tr>
<td>Livestock</td>
<td>-</td>
<td>1.1</td>
<td>6.1</td>
<td>13.8</td>
<td>11.0</td>
<td>15.1</td>
<td>3.7</td>
<td>2.4</td>
<td>2.3</td>
</tr>
<tr>
<td>Sesame</td>
<td>6.3</td>
<td>7.8</td>
<td>9.2</td>
<td>12.0</td>
<td>14.0</td>
<td>14.5</td>
<td>8.1</td>
<td>2.5</td>
<td>1.8</td>
</tr>
<tr>
<td>Sorghum (Dura)</td>
<td>-</td>
<td>2.0</td>
<td>15.8</td>
<td>1.0</td>
<td>1.0</td>
<td>7.9</td>
<td>0.6</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Skins &amp; Hides</td>
<td>-</td>
<td>-</td>
<td>4.2</td>
<td>5.0</td>
<td>-</td>
<td>3.7</td>
<td>0.4</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Others</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25.5</td>
<td>3.2</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Bank of Sudan Annual Reports (Various issues)

4.2.2 Composition of imports:

The obvious feature of Sudan’s imports is that, they are mainly capital goods, essential consumer goods, machinery and equipment. There is strong relationship between imports and exports performance since all raw materials, inputs, spare parts and pesticides are imported.

Imports of consumer goods consist largely of non-durables, of which wheat and wheat flour has been the most important single item and represents 7.2% of total imports in 2009. Expenditure on consumer goods rose from U.S $ 853.3 million in 2005 to U.S $ 3275.9 million in 2009 (CBoS Annual Reports). An increasing trend of spending on consumer goods can be attributed to increases in per capita income and migration from rural to urban areas which has a consequence on consumption pattern of the migrants and recently an increase in the world food prices. The following
Table (4-3) shows imports by commodity during 2009 (CBoS Annual Reports).

**Table (4-3):** Summary of imports by commodity during the year (2009)

(Value in Millions U.S $)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Value</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery and Equipment</td>
<td>2,609.2</td>
<td>26.9</td>
</tr>
<tr>
<td>Manufactured goods</td>
<td>2,491.9</td>
<td>25.7</td>
</tr>
<tr>
<td>Food-stuffs</td>
<td>1,637.9</td>
<td>16.9</td>
</tr>
<tr>
<td>Wheat and Wheat Flour</td>
<td>696.0</td>
<td>7.2</td>
</tr>
<tr>
<td>Dairy products</td>
<td>135.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Animal Fats and Edible Oils</td>
<td>133.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Tea</td>
<td>125.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Sugar</td>
<td>108.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Vegetables and Vegetables products</td>
<td>60.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Fruits and Fruit products</td>
<td>41.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Coffee</td>
<td>34.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Others</td>
<td>301.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Transport Means</td>
<td>1,195.5</td>
<td>12.3</td>
</tr>
<tr>
<td>Chemicals</td>
<td>859.5</td>
<td>8.9</td>
</tr>
<tr>
<td>Textiles</td>
<td>341.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Petroleum by-products</td>
<td>325.6</td>
<td>3.4</td>
</tr>
<tr>
<td>Raw Materials</td>
<td>159.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Beverages and Tobacco</td>
<td>69.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>9,690.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As can be seen from table (4-3), imports of machinery and equipment were on the top of the import list and it constitutes 26.9% of the total import and that is due to the increased spending on development projects. Spending on machinery and equipment showed an increase of U.S $ 1,971.9 million and U.S $ 2,609.2 million during 2005 and 2009 respectively.

4.3 Direction of trade:

4.3.1 Exports:

Historically, the European Union is the main customer of Sudan’s exports. Within this group, Italy and Germany were the largest buyers purchasing mainly cotton and gum Arabic. The directional pattern of Sudan’s merchandize trade has been subject to significant changes in the last two decades. Exports to the European Union increased between 1970 and 1980, but have been declined after 1990. The U.S.S.R, which was among the largest customers of Sudan’s exports, became an inconsiderable buyer in the late 1970s and 1980s.

The Asian Countries continued to be Sudan’s principal customer. Although their percentage share decreased from 86.1% in 2005 to 84.9% of total exports in 2009, China continued to be the largest dealer within the group, importing mainly petroleum products. The next dealer in the community was U.A.E. Table (4-3) also shows that, the value of exports to China rose remarkably from 71.0% in 2005 to 75.8% in 2009 and export to U.A.E increased from 1.9% in 2005 to 6.1% in 2009. Table (4-4) shows the share value of Sudan’s main customers of the total value of exports during 2009 compared with the preceding five years.
**Table (4-4):** The shares value of Sudan’s main customers in the total value of exports (millions of U.S $) during the period 2005-2009.

<table>
<thead>
<tr>
<th>Customers</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian Countries</td>
<td>4,155.2</td>
<td>4,872.8</td>
<td>8,158.8</td>
<td>10,541.6</td>
<td>6,648.3</td>
</tr>
<tr>
<td>China</td>
<td>3,427.1</td>
<td>4,243.9</td>
<td>7,276.9</td>
<td>8,755.2</td>
<td>5,935.7</td>
</tr>
<tr>
<td>Japan</td>
<td>577.5</td>
<td>522.6</td>
<td>756.4</td>
<td>1,126.6</td>
<td>213.8</td>
</tr>
<tr>
<td>India</td>
<td>30.8</td>
<td>22.5</td>
<td>16.4</td>
<td>183.0</td>
<td>194.8</td>
</tr>
<tr>
<td>South Korea</td>
<td>7.9</td>
<td>6.2</td>
<td>49.6</td>
<td>91.7</td>
<td>10.4</td>
</tr>
<tr>
<td>Indonesia</td>
<td>40.1</td>
<td>2.4</td>
<td>1.6</td>
<td>215.2</td>
<td>144.4</td>
</tr>
<tr>
<td>Other Asian Countries</td>
<td>71.8</td>
<td>75.2</td>
<td>57.9</td>
<td>169.8</td>
<td>149.2</td>
</tr>
<tr>
<td>Arab Countries</td>
<td>377.8</td>
<td>549.5</td>
<td>423.2</td>
<td>761.2</td>
<td>860.3</td>
</tr>
<tr>
<td>U.A.E</td>
<td>90.0</td>
<td>227.4</td>
<td>224.9</td>
<td>476.3</td>
<td>477.9</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>136.4</td>
<td>126.4</td>
<td>98.1</td>
<td>104.4</td>
<td>198.0</td>
</tr>
<tr>
<td>Egypt</td>
<td>78.7</td>
<td>96.8</td>
<td>54.4</td>
<td>60.2</td>
<td>54.8</td>
</tr>
<tr>
<td>Other Arab Countries</td>
<td>72.7</td>
<td>98.9</td>
<td>45.8</td>
<td>120.2</td>
<td>129.6</td>
</tr>
<tr>
<td>European Countries</td>
<td>140.3</td>
<td>102.1</td>
<td>187.7</td>
<td>260.3</td>
<td>76.1</td>
</tr>
<tr>
<td>E.U</td>
<td>109.8</td>
<td>61.3</td>
<td>39.8</td>
<td>245.3</td>
<td>45.4</td>
</tr>
<tr>
<td>U.K</td>
<td>21.8</td>
<td>19.0</td>
<td>29.4</td>
<td>7.8</td>
<td>24.4</td>
</tr>
<tr>
<td>Other European Countries</td>
<td>8.7</td>
<td>21.8</td>
<td>118.5</td>
<td>7.1</td>
<td>6.4</td>
</tr>
<tr>
<td>Canada</td>
<td>63.0</td>
<td>63.2</td>
<td>60.3</td>
<td>79.7</td>
<td>85.4</td>
</tr>
<tr>
<td>U.S.A</td>
<td>12.3</td>
<td>4.9</td>
<td>9.4</td>
<td>2.0</td>
<td>8.1</td>
</tr>
<tr>
<td>Other Countries</td>
<td>75.7</td>
<td>64.1</td>
<td>39.8</td>
<td>107.4</td>
<td>155.4</td>
</tr>
<tr>
<td>Total</td>
<td>4,824.3</td>
<td>5,656.6</td>
<td>8,879.2</td>
<td>11,670.5</td>
<td>7,833.6</td>
</tr>
</tbody>
</table>

Source: Bank of Sudan Annual Reports (Various issues).
4.3.2 Imports:

Sudan’s imports from Asian countries increased to U.S $ 3,690.8 in 2009. China continued to be the major dealer followed by India. Sudan imports from China decreased from 20.5% in 2005 to 19.9 in 2009. On the other hand, imports from Japan declined from 5.1% in 2005 to 4.6% in 2009. Imports from other countries shows an increase from 4.7% in 2005 to 5.0% in 2009.

Table (4-5) shows the main suppliers and their share value in the total volume of Sudan’s imports during (2005-2009).

Table (4-5): The share value of Sudan’s main suppliers in total value of imports (millions of U.S $) during the period (2005-2009).

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Countries</td>
<td>2,560.1</td>
<td>3,522.5</td>
<td>4,073.3</td>
<td>4,180.8</td>
<td>3,690.8</td>
</tr>
<tr>
<td>China</td>
<td>1,383.0</td>
<td>1,679.4</td>
<td>2,436.2</td>
<td>2,163.3</td>
<td>1,926.9</td>
</tr>
<tr>
<td>India</td>
<td>317.8</td>
<td>599.0</td>
<td>546.5</td>
<td>885.8</td>
<td>624.5</td>
</tr>
<tr>
<td>Japan</td>
<td>341.8</td>
<td>535.8</td>
<td>367.8</td>
<td>389.0</td>
<td>449.0</td>
</tr>
<tr>
<td>South Korea</td>
<td>149.8</td>
<td>335.4</td>
<td>305.6</td>
<td>237.2</td>
<td>202.4</td>
</tr>
<tr>
<td>Other Asia Countries</td>
<td>327.7</td>
<td>372.9</td>
<td>417.2</td>
<td>505.5</td>
<td>488.0</td>
</tr>
<tr>
<td>European Countries</td>
<td>1,526.1</td>
<td>1,735.0</td>
<td>1,598.3</td>
<td>1,586.0</td>
<td>2,136.2</td>
</tr>
<tr>
<td>E.U</td>
<td>751.8</td>
<td>1,096.2</td>
<td>1,014.8</td>
<td>1,280.4</td>
<td>1,723.8</td>
</tr>
<tr>
<td>U.K</td>
<td>221.8</td>
<td>307.8</td>
<td>250.6</td>
<td>214.8</td>
<td>200.0</td>
</tr>
<tr>
<td>Other European Countries</td>
<td>552.4</td>
<td>331.0</td>
<td>332.9</td>
<td>305.6</td>
<td>1,631.1</td>
</tr>
<tr>
<td>Arab Countries</td>
<td>1,789.5</td>
<td>1,804.8</td>
<td>1,924.5</td>
<td>2,136.4</td>
<td>1,551.7</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>627.5</td>
<td>649.3</td>
<td>654.6</td>
<td>746.2</td>
<td>564.7</td>
</tr>
<tr>
<td>U.A.E</td>
<td>394.7</td>
<td>444.7</td>
<td>480.4</td>
<td>626.3</td>
<td>526.9</td>
</tr>
<tr>
<td>Egypt</td>
<td>369.5</td>
<td>428.2</td>
<td>493.0</td>
<td>451.7</td>
<td>460.1</td>
</tr>
<tr>
<td>Australia</td>
<td>221.8</td>
<td>223.1</td>
<td>178.1</td>
<td>305.3</td>
<td>369.9</td>
</tr>
<tr>
<td>U.S.A</td>
<td>129.7</td>
<td>104.0</td>
<td>154.4</td>
<td>211.5</td>
<td>353.6</td>
</tr>
<tr>
<td>Other Countries</td>
<td>553.6</td>
<td>664.1</td>
<td>846.8</td>
<td>931.5</td>
<td>1,588.7</td>
</tr>
<tr>
<td>Total</td>
<td>6,756.8</td>
<td>8,073.5</td>
<td>8,775.4</td>
<td>9,351.1</td>
<td>9,690.9</td>
</tr>
</tbody>
</table>

4.4 The macro-economic environment and foreign trade policies in Sudan economy since 1960:
The Sudan economy during the period of British administration was a typical example of colonial dualistic economy with dynamic export endeavor surrounded by a stagnant traditional sector.
At independence, Sudan’s GDP was estimated as amounting to Ls 284 million (U.S $795 million). Per capita GDP amounted to Ls 28, or about U.S $ 78, classifying Sudan among the poorest countries in the world.
For two decades, from the early 1960s to the end of 1970s, Sudan followed import substitution policy as development strategy. This strategy was formulated and implemented through the ten years and five years plans.
El-hassan (1970) stated:
“…..Sudan’s Ten Years Plan (1960/61-1970/71) represented the first attempt for comprehensive planning in the country. The plan put out broad and un-quantified objectives aiming at increasing and broadening the country’s national product, increasing real per capita income, expanding exports and imports substitutes, improving social conditions and services and maintaining stable price level.
The Five Year Plan (1970/71-1974/75) was drawn to develop the economy along the socialist line. The main objectives of the plan were to accelerate the rate of growth of domestic product following (import substitution strategy) to 7.6 per annum.
In January 1973 The Interim Action Program (IAP) was introduced as one of the huge expansionary policies adopted by the government.”
During the seventies, Sudan’s economic policies were characterized as interventionist and protectionist. Accordingly, policies were mainly
designed to protect domestic industry from foreign competition (i.e., “infant industry” argument) and increase the government controls over the allocation of resources and production of goods. In the frame of the inward oriented development strategy, the trade regime exhibited the characteristics of import substitution strategy with high rate of trade protection using quantitative restrictions, high tariffs, licensing requirements and other measures which biased incentives away from the export sector to the domestic sector. The government interventions in the price mechanism, strict controls in the foreign exchange market and the maintenance of fixed exchange-rate which results in overvalued domestic currency were the main features of the economic policy.

From mid 1970’s onwards, the inward-looking industrialization process had reached its more difficult phase with external shocks (1973-1974 oil prices) to the economy. Instead of adjusting to these external shocks, Sudan attempt to preserve growth through massive external borrowing. As a result of the oil price shock and its consequence of high import bill and inefficiency of the long standing inward looking development strategy and inflationary financing of growing public sector deficits, the country faced crisis towards the end of 1970s.

According to Ali (1984):

“…..For Sudan’s major export commodity prices have declined over the period 1970-1982 at annual rates of 4.1% for groundnuts and livestock and 1.9% for cotton, the term of trade for the country registered an annual rate of 0.6% over the same period”

In 1983 The World Bank reported that:

“The decline in world prices for key export goods together with rising prices led to a decline in Sudan’s net barter terms of trade between
1980-1989 of over 30%. This compounded the decline of nearly 10% in the period 1978-1980 that was caused primarily by rising petroleum prices.” (Ali, 1984 p. 15).

Under the pressures of increasing economic difficulties during 1970s the government of the Sudan undertook a comprehensive economic policy measures. The International Monetary Fund and The World Bank’s technical assistants recommended The Structural Adjustments Programs (SAPs) accompanied by National Economic Salvation Program (NESP) in 1990’s, with the view to strengthening the economic capacity of the country, and to remove anti-export bias. The main objectives of the SAPs (1978-1985) as declared by the minister of finance were:

- Removal of obstacles facing production and increasing the productivity of existing projects.
- Increasing national income and hence government revenues though increasing productivity for exports.
- Reduction of government expenditure to provide real excess for development process and reduction of borrowing from banking system.
- Reduction of inflation rate and cost of living.
- Supporting the government revenue.

Moreover, within the framework of stabilization and fiscal reform program, in September 13, 1979 the minister of finance announced foreign exchange and foreign trade reform measures aiming at:

- Transform the condition of multiple exchange rate system to two rates (official and parallel rates).
- Liberalize foreign trade, this depend on the assumption that free perfect competition market reflect the real value of resources and
lead to optimal allocation of resources. These programs did not prove to be effective, because they were fragmented and lacked an overall strategy for structural adjustment and growth promotion.

“\textit{In 1979 Sudan became one of the first countries to adopt (IMF\&WB) macroeconomic stabilization and structural adjustment programs. The reforms emphasized two central policies: successive devaluations and trade liberalization measures that shifted imports from the official market to free market. These reforms were also motivated by the emerging role of Sudan as a major labor exporting country to the oil surplus economies of the Middle-East. Remittances from Sudanese nationals working abroad averaged more than three times the dollar value of official exports during 1983/1984. These huge foreign exchange resources prompted the government to adopt reforms to unify the exchange rate. These efforts were largely unsuccessful, however, and Sudanese national share continued to send the bulk of their remittance through the parallel foreign exchange market, attracted by its more depreciated exchange rate.”} (Elbadawi, 1992).

The NESP (1990-1993) has been designed on the basis of the recommendations of the National Economic Salvation Conference. The general objectives of the NESP are:

- Re-vitalization of the Sudanese economy through re-allocation of resources towards production.
- Enhancement of the role of private sector, whether national or foreign to play a more active role in achieving the objectives of the program and to reorient financial, economic and institutional structures to create a more conducive environment for private
sector participation in economic development.

Maintenace of social balance by protecting the poor during adjustment period. Accordingly, the series of reform started: flexible exchange rate, and direct export incentives were increased to reduce anti-export biased of previous policies. The liberalization of imports and the capital account were, however, approached gradually and nominal tariffs were reduced remarkably, quantitative restrictions were abolished.

What distinguishes NESP from the earlier reform is that: for the first time the government of the Sudan demonstrated the usage of economic policies to create a more liberal market oriented economy and focused on structural reform measures and floating foreign exchange rate. In general, these measures aimed at encouraging export and reducing import. However, the driving forces behind the Sudan experience in the post NESP period have remained a matter of debate. Some has stressed Sudan’s liberal provision of export incentives. Others have concentrated on the macroeconomic and import liberalization policies that caused Sudan’s aggressive nominal exchange rate policy led to sustained real depreciation.

“A major move to stabilize the economy started in 1996 with the adoption of a home growth stabilization program designed on the IMF stabilization model with massive devaluation, privatization, and stringent monetary and fiscal policies. Investment in the oil sector has already had an impact on the growth performance of the economy. As a result, the period since 1995 saw the only sustained growth episode in the history of the country.” (A. Abdel Gadir, Elbadawi. 2004).
“The sustained growth rates of GDP for the period 2000-2009 were achieved within a context of stable macroeconomic policies and relatively controlled and carefully guided inflationary pressures. The government was able to stabilize prices and sharply reduce inflation from a record high of 130.6% in 1996 to a single digit by the end of the 1990s.” (Medani, 2010).

“The key factor behind the turnaround in growth in the period 1995 onward was the ability of the government to reap the benefits of a major strategic initiative in the form of the commercial exploitation of oil following strategic economic agreements with China, Malaysia and other small companies, including building of massive infrastructure in support of the oil industry.” (A. Abdel Gadir, Elbadawi, 2004).

CBoS Reports: put it “... the internal factors which contributed to this performance were export promotion policy, depressed domestic demand, exchange rate policy and the government’s strong commitment to achieve growth ...”

“One possible explanation for the growth of TFP of the 1990s was related to the earlier phase of the inflow of foreign direct investment into the oil sector.” (Elbadawi, 2004).

The oil extraction in 1999 is the most successful aspect of Sudan experience. Then after, exports value rose from US$1.4 billion in 1999 to US$8.5 billion in 2009. Oil exports represent 91.03% of the total export values in 2009.

“Sudan is increasingly becoming dependent on oil revenues and export earnings, which constituted 63% and 95% of GDP, respectively, in
2008. This oil dependency is threatening budget credibility, predictability and planning functions and also the ability to deliver services. It also endangers budgetary allocations and resource distribution to different tiers of government.” (Ali, Badawi).

“FDI grew at an annual average of 82.3% in 2000-2005 (mainly from China, Malaysia and India), making Sudan one of the highest receiving countries in the Arab world in the same period. FDI has been directed mainly towards the oil sector (more than 80%), with the remaining share going to agriculture, construction and transportation.” (Medani, 2010).

In Sudan, the degree of openness has recently been rising steadily, from a low level of 11.1% in 1990 to 33% in 2000 and 46.3% in 2005. It dropped slightly to 42% in 2007 and rose to 44.8% in 2008, making the economy more prone to external shocks (IMF data). (Medani, 2010).

Before exporting oil, Sudan used to depend on traditional exports, which came mainly from agriculture (irrigated, rain-fed traditional and livestock sub-sectors), with a small contribution from manufacturing and mining. Agricultural exports are mainly cotton, sesame, gum Arabic, oil seeds, sorghum and livestock products (live animals, meat, hide and skins). Manufacturing and mining exports are sugar, molasses and gold. With the discovery of oil in 2000, Sudanese export composition and value changed drastically. Non-oil products became insignificant in value and as a percentage of total exports. Oil exports have become predominant (relative to non-oil exports), amounting to 74.8% of all Sudanese exports in 2000 and reaching a record high of more than 95% in 2008. The country has steadily become completely dependent on oil as the main source of export earnings.
Since 2000, oil revenues have steadily augmented the share of oil revenue in total revenue, which increased steadily from 15.6% in 2001 to 58.9% in 2005 from 61.0% in 2006 to 63.6% in 2007 and 64.5% in 2008.

Oil dependency has been associated with shrinking of non-oil exports from agriculture and manufacturing sectors, and the appreciation of the Sudanese pound and declining competitiveness of traditional exports and local services. Coupled with infrastructural deficiencies and economic sectors structural rigidities, the country has faced scarcity with regard to the domestic supply of goods (consumables, intermediate and capital goods). With incomes from oil exports rising, more dependency on imports has emerged to meet the pressure of rising demand. The country has not taken the opportunity to redirect oil resources to broaden its productive capacity and diversify exports and the productive base to internalize growth and make it depend on broad-based agribusiness, manufacturing and services sectors.

It is important to point out that the effect of oil wealth on consumption has been great, resulting in a sharp rise in import volume, types and costs.
CHAPTER FIVE

SPECIFICATION OF THE FOREIGN TRADE SECTOR MODEL

5.1 Introduction:

There are different approaches for building sectoral models or large scale macro-models attempting to describe the overall functioning of the economy. The task of determining the appropriate model to begin with is very demanding. The exercise is subject to what is called specimetrics. According to Leamer: “Specimetrics describes the process by which a researcher is led to choose one specification of the model rather than another, furthermore, it attempts to identify the influences that may be properly drawn from a data set when the data generating mechanism is ambiguous.”

The following are some suggested approaches:

❖ Top-down or general to specific approach, proposed by Hendry, suggests that one starts with a model with several regressors and then reduced down to a model containing only the important variables. According to Hendry and Richard (1983) a simplified model should satisfy a number of criteria.

❖ Discrimination approach where, given two or more competing models, one chooses a model based on some criteria of goodness of fit.

❖ Orthodox approach on which the model is formulated on the basis of theory. The parameters of the model are estimated by using the available data sets. Having built the model, the model builder will stick to its results in spite of its shortcomings. The shortcomings are blamed to the deficiency of the data.

❖ Experimental approach makes use of both theory and the empirical observations available to extract the maximum information from the available data sets. The experimentation compels the researcher to try:
  • Various variables
  • Various functional forms

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Various number of equations
Various econometric techniques

The approach which we are going to follow in this study is mainly experimental. However, other approaches will be used whenever possible.

5.2 The model:

The pre-specification of the foreign trade sector incorporates four functions, namely; production function, export function, import function and exchange rate function. An identity representing the balance of trade is also introduced.

5.2.1 The form of the production function:

The production function can be thought of as a technical process by which the factor inputs are transformed into output.

There is a wide choice of mathematical forms which can be used to represent production function. However, for studying the production condition of the Sudan economy, we shall attempt to employ the Cobb-Douglas type of production function. Because it allows for considerable flexibility in factor proportions. This helps to bring out the effect of policy on factor utilization and combinations as a result of change in relative prices of factors. However, the coefficients of inputs of the Cobb-Douglas function are readily interpretable in terms of elasticity and returns to scale. The Cobb-Douglas function also has the characteristic of being linear in the logarithms which makes it more convenient for estimation purposes.


Since in reality there is a substitution between factors of production, it seems that the Cobb-Douglas function is the most suitable to our context. Another encouraging feature of this function is that, the exponent of the labor variable was asserted, empirically, to be close to the observed share of wages in total income. Two variables are experimented with labor and imports as a proxy for capital.
i-Labor
Ideally, this variable should be measured in terms of standardized units with no changes in skill, composition or intensity. The simple measures usually used are the averages number of persons employed or the number of mean-hours worked. Until recently, there is no clear and concrete strategy of labor force measurement in Sudan, see Ibrahim (1983).

ii-Import as a proxy for capital:
There is a theoretical controversy with regard to the measurement of capital stock. See Kendrick (1973), Denison (1974) and Gallop and Jorgenson (1980). The series of capital stock is derived by accumulating net investment. This procedure was used by Klein and Shinkai (1963) in their model of Japan and Goldsmith (1962) in his study of the national wealth of the U.S.A. The series of net investment is obtained, by deducting the value of depreciation in constant prices from gross investment.

In an economy less than self-sufficient as the Sudanese economy, imports of raw materials and producer’s equipment could be regarded as factors of production and could be justified for inclusion in the production function as a proxy for capital.

In the light of the above consideration, the production function of the Sudan economy is formulated as:

\[
Q = a_0 L^{a_1} Im^{a_2}
\]

Where:
Q is output
L is labor force
Im is imports
5.2.2 Exports-Imports functions:

In view of the importance of foreign trade to economic growth and development, especially in developing countries, a number of empirical studies on the determinant of export and import functions have been carried out. In their models of export function, Houthakker and Magee (1969) found that the level of real income in importing countries and price competitiveness in exporting countries are the principal determinants of exports for a number of developing countries. Khan (1978) adds that prices play an important role in the determination of exports for developing countries. He further states that if it is anything to go by, the size of the estimated price elasticity were fairly high for most of the fifteen countries studied. Also, Bond (1985) in his empirical study on non-oil exporting developing countries found that real effective exchange rate, gross national product in importing countries and output in exporting countries as well as long-term developments in both exporting and importing countries, play an important role in the determinant of exports.

In view of developments in the area of econometric modeling and the fact that there is no universally accepted model of either exports or imports function that can fit all or capture the dynamics in different countries; the models have undergone a number of refinements in recent times. Leamer and Stern (1970) note that there are no well defined criteria for choosing a particular functional relationship, specification. Rather it is the researcher who decides what functional form to use (influenced by the theoretical position chosen), provided the choice is not harmful to the results obtained. Generally, the demand for imports is determined by both economic and non-economic factors. These generally include exchange rates and/or relative prices, economic activity, domestic and external economic conditions, production and/or labor costs, and political circumstances.
However, relative prices and real income are the major factors significantly affecting the demand for imports.

Reinikka (1994) who studies the usefulness of modeling import function says that “It allows for the empirical measurement of price (using exchange rate as a proxy) and income elasticity”. Egwaikhide (1999) in his dynamic specification model of import determination in Nigeria, discovers that short run changes in the availability of foreign exchange earnings, relative prices and real output (income) significantly explain the growth in total imports. In all, the author concludes that the effect of foreign exchange availability is particularly remarkable. Furthermore, results from major components of imports regression shows that imports of raw materials responded significantly to foreign exchange earnings, relative prices and industrial output through an error correction mechanism. The imports of capital goods, another imports component, is highly sensitive to the dynamics of relative price. The last component of import function, that is, the consumer goods. It is basically determined by the foreign exchange availability.

Aliyu (2001) shows in three disaggregated import function models for the Nigerian economy between 1970-1998, the influence of real income, real exchange rate level of foreign reserves, imports capacity and a dummy variable (for taste and preference) on the level of import function. Obtaining the coefficients of the independent variables from a dynamic specification of the models using logarithmic values of the variables shows that the coefficients are in themselves the elasticity of the respective variables. Results shows that only the income and error correction mechanism elasticity’s are elastic while that of real exchange rate, real imports capacity and the dummy variable are all in elastic. All coefficients of the dynamic specification were correctly signed.

Riezman et al. (1995:77-110) provided an investigation on export led growth that took account of import explicitly in the model. Using the forecast error variance
decomposition, they found that the export-led growth would work both directly (import→export→growth) and indirectly through import (export→import→growth) in these countries.

Hemphill (1974) gave attention to import capacity and import restriction. He estimated import demand function for eight developing countries based on the traditional import model. The model relates import demand with foreign exchange receipts and foreign exchange reserve. The result was consistent with the theory that import is highly dependent on capacity variables, namely foreign exchange receipts and foreign exchange reserve. But, this approach does not consider the effect of demand side factors like GDP growth and relative price on imports.

According to Moran (1989), LDC’s import depends on both the demand side and capacity factors. He estimated the general import model, which incorporated both traditional and Hemphill import model, using pooled cross-section time-series data for twenty-one developing countries during the period 1970-83. Real income is considered, as determinant of imports but its significance, measured by the corresponding t-values, is smaller than the significance of foreign exchange receipts and international reserves. The short run income elasticity of import is also generally statistically significant. The estimates of the traditional model showed that the income elasticity of import is statistically significant and it is higher than the corresponding elasticity in the general model. In his result, the general import model dominates the traditional and Hemphill model. He concluded that an import model that neglects either the traditional or Hemphill variables will give biased result for developing country imports. The other interesting result is that the measure for import capacity is more dominant for developing countries group as compared to all others. Moran used the foreign exchange stock and flows as a measure for import capacity. But, Lopez and Thomas (1990) argued that this is equivalent to estimating something very close to identity.
Lopez and Thomas (1990) estimated import model for the seven Sub-Saharan Africa countries with slight modification from that of Moran (1989) using OLS estimation procedure for the period 1966-86. The major difference of their model from that of Moran (1989) is that they used export-debt ratio as an indicator for import capacity, absorption as a percentage of GDP as another very influential demand variable, in addition to the real GDP, and real effective exchange rate instead of the relative price. In this study, real income (measured by GDP) elasticity of import has the expected sign and is statistically significant except for two countries.

On the other hand, Mega (1993) estimated the generalized import demand of Moran (1989). He used an error correction model to estimate demand elasticity for aggregate imports and components in Kenya over the period 1964-1991. In this result, real income is not significant in the long run in the import of food, beverages and tobacco, which are consumer goods. In his view, the reason for this is that, as the economy expands, domestic production substitutes these goods. Similarly, real income does not have a significant influence in the long run on mineral fuels and lubricants imports, which are part of intermediate goods. In his view, the reason for this is that, real income is highly correlated (0.84) with relative import prices. Machinery and transport equipment that are part of capital goods are significantly influenced by real income Yuan and Kochhar (1994) also estimated Moran (1989) type general model for China during the period 1980-1992 based on quarterly data, using Johansen’s cointegration estimation procedure. The difference of this model from Moran (1989) is that international reserve is ignored and industrial output is used instead of GDP. The result shows that output elasticity of aggregate import is positive and significant in the short run as well as in the long run, and that the short run output elasticity of import is greater than the long run. In their view, the reason for this result is that import substitution strategy has played
an important role over the sample period. In addition to this, they also identified the causality relationship between industry output and GDP growth. The result in this case suggested that the causal relationship between imports and GDP is in both directions.

On the other hand, Umo and Fakiyesi (1995) examined the determinants of components of import in Nigeria, based on OLS estimation procedure for the period between 1950 and 1988. They tested for structural break by partitioning the years. The regression result shows that the import of machinery is negatively related to real per capita income in the period 1955-1972. This means that an increase in per capita income is not spent on purchase of machinery or investment. According to his view, the reasons for this relationship could be due to the problems of ineffective planning and civil war. The import of invisible goods is positively related to real income, but it is not statistically significant. The researcher’s explanation is that it may be collinear with the population variable. Per capita income is not significant in the import of food and durable consumers items. Similarly, raw materials, which are intermediate goods, are not related to per capita income. The weakness of this study is that it is based on Engle Granger two-step procedure in which the DF and ADF tests generally suffer from parameter instability. In addition, the power of these tests is low, and the standard errors of the cointegrating vector are biased and cannot be used for hypothesis testing (Enders, 1995).

Senhadji (1997) conducted a study on the determinants of import in 77 countries. His model was similar to the traditional import demand model except that he used GDP minus export instead of GDP as an explanatory variable. The result shows that the long run income elasticity of import for a large majority of countries has a positive sign, and is statistically significant in most cases. He also compared
industrial and developing countries and concluded that industrial countries tend to have significantly higher income elasticity of imports than developing countries. Egwalkahide (1999), on the other hand, estimated a generalized import model for Nigeria, during the period 1953-1989 using Engle-Granger cointegration method. In his model, industrial output instead of GDP is used as a regressor. The study shows that in the short-run change in output of the industrial sector has a positive influence on the import of raw materials.

On the exports function model, Iyoha (1995) discovers the power effect of foreign trade on economic growth. In his modeling of exports and import function for the Nigerian economy, Yekini (1999) discovers that exchange rate, lending rate, gross domestic product and capacity to imports are good determinants of imports and exports function in Nigerian economy.

Huan Chen design a model based on the Keynesian national income accounting identity, he argued that a single equation model is not enough to explore the relationship between foreign trade and economic growth considering the probable two-way causal link existing in the variables. As a result, establishing simultaneous multi-equations model is a more appropriate choice. The model is as following:

\[
Y_t = C_t + I_t + G_t + Ex_t - Im_t
\]
\[
C_t = a_0 + a_1 Im_t + a_2 C_{t-1} + V_{1t}
\]
\[
I_t = b_0 + b_1 Y_t + b_2 I_{t-1} + V_{2t}
\]

Where: \(Y_t\) national income, \(C_t\) consumption, \(I_t\) investment, \(G_t\) government spending, \(Ex_t\) exports, \(Im_t\) imports.

He conclude that, exports indeed plays an important role in promoting economic growth, and the positive effect of exports exceeds the negative effects of imports.

In An Export Supply and Trade Reform: The Turkish Evidence written by Utku Utku, Dilek Seymen and Aydin Avi. They argue that a traditional model of export supply with explanatory variables such as export prices, foreign costs and...
productive capacity can be further extended by taking the effects of trade reform which consists of measures to reduce anti-export bias and thus leads to strong-supply response. Their extended model of export supply also includes import compression factor and technological innovation together with trade reform.

Ercan Uygur (1996) in Export Policies and Performance: The Case of Turkey, argued that in order to be able to make inferences concerning the relative effects and effectiveness of export policies in general and promotion schemes in particular, manufacturing export supply functions are estimated. The estimated equations are based on the export supply function of a representative exporter that aims to maximize profits. The derivation of such functions can be seen in, for example, Aspe and Giavazzi (1982) and Funke and Holly (1993). The export supply function is the following:

\[ Ex = f(I, P_x/P_d, D, S) \]

Where:

- \( I \) is gross fixed investment,
- \( P_x \) is the price of exported good,
- \( P_d \) is the price of goods sold in the domestic market,
- \( D \) is domestic excess demand and
- \( S \) is export subsidy.

He adds that this function implies instantaneous adjustment since the time factor is not explicitly accounted for. Yet, there may be time lags in the adjustment process due to (i) adjustment costs, (ii) information lag, (iii) the sluggishness of export prices which in turn may reflect menu cost and (iv) transportation lags. Thus, a dynamic specification of the export supply function may be necessary, incorporating lags of dependent and the explanatory variables.

In An Econometric Model of UAE Imports, Hafiz Mahmoud shaltout (1984) specified the import demand equation in a multiplication form as follows:

\[ M = a_0 Y^{a_1}(P_m/P_d)^{a_2}D^{a_3} \mu \]
Where:
M represents the quantity imported, \( a_0 \) intercept, \( a_1 \) income elasticity of demand for imports, \( a_2 \) relative price elasticity of demand for imports, D dummy variable represents an up normal increase in petroleum prices (1974-1978), \( \mu \) stochastic error term.

According to the behavioral assumptions, the expected signs are \( a_1 > 0; a_2 < 0 \) Kotan and Saygili (1999) incorporated two different model specifications to estimate an import demand function for Turkey. It is found that in the long run, income level affects imports considerably.

Gulati (1978:519-522) examined the effect of the capital imports on savings and growth for less developed countries. He found that the effect of capital imports on economic growth would depend on the degree to which the growth is constrained by the lack of capital.

Dutta and Ahmed (2004:607-613) investigated the behavior of Indian aggregate imports during the period 1971-1995. According to his econometric estimates of the import-demand function for India, import-demand is largely explained by real GDP. Humpage (2000), in his study claimed that there is a positive relationship between imports and economic growth. However, the direction of influence between imports and economic growth is less certain.

According to his study, the direction of causality seems to run predominantly from income to imports at quarterly frequencies, not the other way around.

Hooper et al. (1998) estimated that a 1 percent increase in real GDP in the U.S. would lead to a 2 percent rise in U.S. imports.

Baharumshch and Rashid (1999:389-406) detected the presence of a stationary long-run relationship between exports, imports and GDP. The empirical findings of their study indicated that an important determinant of long-run growth in the fast growing Malaysian economy is imports of foreign technology.
Awokuse (2007:389-395) investigated the contribution of both exports and imports to economic growth in Bulgaria, Czech Republic, and Poland by using a neoclassical growth modeling framework and multivariate cointegrated VAR methods. His study's findings indicate that the exclusion of imports and the singular focus of many past studies on just the role of exports as the engine of growth may be misleading or at best incomplete.

Ramos (2001:613-623) investigated the Granger-causality between exports, imports and economic growth in Portugal over the period 1865-1998. The empirical results of the study didn’t confirm a unidirectional causality between the variables considered. There is a feedback effect between exports-output growth and import-output growth. Riezman et-al. (1995:77-110) provided an investigation on export led growth that took account of import explicitly in the model. Using the forecast error variance decomposition, they found that the export-led growth would work both directly (import > export > growth) and indirectly through import (export > import > growth) in these countries.

Similarly, Asafu-Adjaye and Chakraborty (1999:164-175), also found the evidence that real output, export and imports were co-integrated in inward oriented countries. Using the error correction models, they found causality running indirectly, namely, from exports to imports and then real output. In summary, taken together all findings, it is clear that import is an important channel to economic growth.

In Sudan, the pioneering work of Beshai (1967) focused on some selected commodities of Sudan’s exports between 1900-1967. Since cotton occupies a dominant position in the total export earning of Sudan, an econometric analysis of the demand for Sudanese cotton indicates that, the price of Sudanese cotton (lagged), the price of Egyptian cotton (lagged), the index of textile production in the importing country (lagged) and cotton stocks in the importing country (lagged)
had fairly good estimate. In the same vein, Mun Elseed (2007) showed that national income, relative import price and foreign exchange rate were the major determinants of total imports in Sudan. He also showed that national income and foreign exchange rate were the major determinants of total exports of the Sudan during the period 1960-2006.

Arabi (2002) state that, the total exports shared to GDP can be set to depend on the real exchange rate, export duties, openness as a proxy of barriers and restriction set by the government on foreign trade and the policy package set by the IMF in 1978.

The 3SLS estimates shows that all variables except the economic policy package of 1978, have positive impact on the ratio of total exports to GDP.

Total demand for imports is related to domestic absorption, real capacity to exports (export earnings constitute a major source to finance imports), relative price, imports’ exchange rate and foreign reserves.

The 3SLS estimates shows that all variables have positive impact on imports.

From the above discussion, it seems that a number of determining factors can be experimented with for both the export demand function and the import demand function. In this study, the export function and the import function for the Sudan economy will be specified as follows respectively:

\[ \text{Ex} = f(WY, \text{Exrate}, \text{Inf}, D1, D2) \]

\[ \text{Im} = f(Y, \text{Exrate}, \text{Inf}) \]

Where:

\[ WY = \text{world income}; \text{Exrate} = \text{exchange rate}; \text{Inf} = \text{the inflation rate}; Y = \text{domestic income}. \]
5.2.3 Exchange rate function:

5.2.3.1 Determinants of exchange rates:
Exchange rates are affected by many factors such as differences in interest rates, risk, foreign reserve as well as government intervention in the exchange rates market. The main determinants of foreign exchange are:

**Relative Price Levels:** In the long run, the exchange rate between any two currencies may be expected to reflect differences in the price levels in the two countries. (This is the so-called purchasing power parity theory of exchange rate determination).

Based on this theory, one would expect that, if the rate of inflation in country A is higher than country B, country A’s currency is likely to depreciate relative to country B’s.

**Rate of Growth:** Although relative price levels may play an important role in the long run, other factors tend to exert more influence on exchange rates in the short run. In particular, if one country’s rate of economic growth is higher than the rest of the world, its currency is likely to depreciate.

Consequently, the conventional model for estimating exchange rate function suggests the following relation.

\[ \text{Exrate} = f(\text{RYG}, \text{Inf}, \text{Exrate}_{t-1}) \]

Where: RYG the rate of domestic income growth, Inf the inflation rate and Exrate\(_{t-1}\) lagged exchange rate.

The lagged variable (exchange rate) aimed to capture responses in time.

**5.3 Simultaneous equation system:**
The entire model can be written as:
\[ Y = f(L, Im) \] .................................................................(5.1)
\[ Ex = f(WY, Exrate, Inf, D1, D2) \] ...................................................(5.2)
\[ Im = f(Y, Exrate, Inf) \] .................................................................(5.3)
\[ Exrate = f(RYG, Inf, Exrate_{t-1}) \] ...................................................(5.4)

A log linear model is preferred due to their generally superior fit and ease of interpretation. Therefore, the logarithmic transformation of the estimated model is:

\[ \log Y_t = a_0 + a_1 \log L_t + a_2 \log Im_t \] ...................................................(5.5)

\[ \log Ex_t = b_1 \log WY_t + b_2 \log Exrate_t + b_3 \log Inf_t + b_4 D_1 + b_5 D_2 \] .................(5.6)

\[ \log Im_t = c_1 \log Y_t + c_2 \log Exrate_t + c_3 \log Inf_t \] ...................................................(5.7)

\[ \log Exrate_t = d_1 RYG_t + d_2 \log Inf_t + d_3 \log Exrate_{t-1} \] ...................................................(5.8)

\[ BT = (Ex - Im) \]

where:
\[ Y_t = \text{Domestic income} \]
\[ L_t = \text{Labor} \]
\[ Im_t = \text{Import} \]
\[ Ex_t = \text{Export} \]
\[ WY_t = \text{World Income} \]
\[ Exrate_t = \text{Exrate} \]
\[ Inf_t = \text{Inflation} \]
\[ RYG_t = \text{Rate of Domestic income Growth} \]
\[ Exrate_{t-1} = \text{Lagged Exchange rate} \]
\[ BT = \text{Balance of Trade} \]
\[ t = \text{denotes time} \]
D₁, D₂ Dummy Variables

D₁ = Exchange rate regime:  
D₁ = 0 Fixed exchange rate (1960-1991);  
D₁ = 1 Floating or managed float exchange rate (1992-2009)

D₂ = Crude oil exploration period:  
D₂ = 0 Before crude oil exploration (1960-1999);  
D₂ = 1 After crude oil exploration (2000-2009)

The two dummy variables were included in the export function;  
D₁ represents exchange rate regime;  
D₂ to capture the period before and after the oil exploration in Sudan.

Since we are taking the log of the variables, the estimated coefficient represents relevant elasticities. We expect  
a₁ > 0, a₂ > 0, b₁ > 0, b₂ > 0, b₃ < 0  
b₄ unknown effects,  
b₅ > 0, c₁> 0, c₂ < 0, c₃ > 0, d₁ > o, d₂ < 0, d₃ >0.

In the above specification there are four endogenous variables, domestic income, the export, the import and the exchange rate. The predetermined variables are labor, world income, inflation, rate of domestic income growth and lagged exchange rate. Failure to account this will give rise to simultaneous equation bias. Both the order and rank conditions are used to identify the equations of the model (see Appendix A).

5.4 Test of Stationarity:

When these tests are applied to each of the nine time series, the null hypothesis of a unit root cannot be rejected. Therefore, on the basis of Dickey Fuller, the conclusion is that for the period 1960-2009, Yᵢ, Lᵢ, Exᵢ, WYᵢ, Exrateᵢ, Infᵢ, Imᵢ, RYGᵢ, and Exratet-1 time series were nonstationary. But a unit root is rejected for the first differences of the series except for exchange rate. The series can thus be regarded as a realizations of stochastic I(1) variables.
Table (5-1): Unit Root Test (Dickey Fuller & Augmented Dickey Fuller Test):

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>5%</th>
<th>difference</th>
<th>5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>-1.4319</td>
<td>-3.5025</td>
<td>-5.7961</td>
<td>-2.9228</td>
</tr>
<tr>
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<td>-1.1650</td>
<td>-3.5025</td>
<td>-6.1309</td>
<td>-2.9228</td>
</tr>
<tr>
<td>Ex</td>
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<td>-3.5025</td>
<td>-7.0508</td>
<td>-2.9228</td>
</tr>
<tr>
<td>WY</td>
<td>-0.4312</td>
<td>-3.5025</td>
<td>-3.1061</td>
<td>-2.9228</td>
</tr>
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<td>-3.5025</td>
<td>-4.7989</td>
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<td>-5.7961</td>
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<td>-5.7243</td>
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<tr>
<td>RYG</td>
<td>-1.4319</td>
<td>-3.5025</td>
<td>-5.7961</td>
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</tr>
</tbody>
</table>
CHAPTER SIX

ESTIMATION, EVALUATION AND DISCUSSION OF RESULTS

6.1 Results of estimation

6.1.1 Introduction

The estimation results using two stages method and three stages method are given in figure (6-1) and figure (6-2) respectively. The three stages estimated coefficients are expected to be unbiased and consistent with the simultaneous postulation.

In the first case, we have estimated the model by two stages least squares method:

Figure (6-1): The 2SLS estimation result:

System: SYS01
Estimation Method: Iterative Two-Stage Least Squares
Date: 03/25/12 Time: 01:42
Sample: 1961 2009
Included observations: 50
Total system (unbalanced) observations 195
Convergence achieved after 37 iterations

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(1)</td>
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<td>11.26006</td>
<td>2.266729</td>
</tr>
<tr>
<td>C(2)</td>
<td>-0.112120</td>
<td>0.615418</td>
<td>-0.182185</td>
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<tr>
<td>C(3)</td>
<td>0.244163</td>
<td>0.107027</td>
<td>2.281325</td>
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<td>C(4)</td>
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<tr>
<td>C(5)</td>
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<td>C(6)</td>
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<td>-1.452269</td>
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<td>C(7)</td>
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<td>0.001906</td>
<td>1.855552</td>
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<tr>
<td>C(8)</td>
<td>0.261002</td>
<td>0.419711</td>
<td>0.621861</td>
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<td>C(9)</td>
<td>0.250295</td>
<td>0.297402</td>
<td>0.841607</td>
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<tr>
<td>C(10)</td>
<td>0.814838</td>
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<tr>
<td>C(11)</td>
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<td>C(12)</td>
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<td>C(13)</td>
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<td>C(14)</td>
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<td>55.61251</td>
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<td>C(15)</td>
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<td>0.002255</td>
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<tr>
<td>C(16)</td>
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<td>C(17)</td>
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<td>0.008254</td>
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</tr>
</tbody>
</table>

Determinant residual covariance 5.93E-06

Equation: LOG(Y)=C(1)+C(2)*LOG(L)+C(3)*LOG(IM)+[AR(1)=C(4)]

Observations: 49

R-squared 0.975357 Mean dependent var 22.74473
Adjusted R-squared 0.973714 S.D. dependent var 1.051198
S.E. of regression 0.170429 Sum squared resid 1.307079
Durbin-Watson stat 1.742487

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Equation: \( \log(EX) = C(5) \log(WY) + C(6) \log(EXRATE) + C(7) \cdot \text{INF} + C(8) \cdot D1 + C(9) \cdot D2 + [AR(1) = C(10)] \)

<table>
<thead>
<tr>
<th>Observations:</th>
<th>R-squared</th>
<th>Mean dependent var</th>
<th>Adjusted R-squared</th>
<th>S.D. dependent var</th>
<th>S.E. of regression</th>
<th>Durbin-Watson stat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48</td>
<td>0.929340</td>
<td>0.920929</td>
<td>0.279743</td>
<td>0.279743</td>
<td>2.062285</td>
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</tbody>
</table>

Equation: \( \log(IM) = C(11) \log(Y) + C(12) \log(EXRATE) + C(13) \cdot \text{INF} + [AR(1) = C(14)] \)

<table>
<thead>
<tr>
<th>Observations:</th>
<th>R-squared</th>
<th>Mean dependent var</th>
<th>Adjusted R-squared</th>
<th>S.D. dependent var</th>
<th>S.E. of regression</th>
<th>Durbin-Watson stat</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>49</td>
<td>0.957304</td>
<td>0.954457</td>
<td>0.228276</td>
<td>0.228276</td>
<td>1.724240</td>
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</tbody>
</table>

Equation: \( \log(EXRATE) = C(15) \cdot RYG + C(16) \cdot \text{INF} + C(17) \cdot \log(EXRATE(-1)) \)

<table>
<thead>
<tr>
<th>Observations:</th>
<th>R-squared</th>
<th>Mean dependent var</th>
<th>Adjusted R-squared</th>
<th>S.D. dependent var</th>
<th>S.E. of regression</th>
<th>Durbin-Watson stat</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.994320</td>
<td>0.994074</td>
<td>0.293731</td>
<td>0.293731</td>
<td>2.197029</td>
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### 6.1.2 The Two Stage Least Square Methods Results:

**1-The production function:**

The result shows that the production function is able to explain 97 percent of variation in the dependent variable (domestic income). The DW statistic showed there is no serial correlation among the disturbance term. An examination of the coefficient reveals that imports are significant (at 5 percent level). A 10 percent increase in labor force leads to 1.1 percent decrease in domestic income, a 10 percent rise in imports lead to 2.4 percent increases in domestic income.

**2-The export function:**

The result shows that the export function is able to explain 92 percent of variation in the dependent variable (export quantity). The DW statistic showed there no serial correlation among the disturbance term. An examination of the coefficient reveals that world income and the inflation rate are significant (at 5 percent level). A 10 percent increase in world income leads to 9.3 percent rise in export, a
depreciation of 10 percent of a national currency leads to 1.2 percent decrease in export which contradict an economic theory, a 10 percent increase in general level of price has no effect on exports, following different foreign exchange rates regime and oil exploration have the same effect on export volume, a 10 percent increase in oil production lead to a 2.5 percent rise in export quantity.

3-The import function:
The result shows that the import function is able to explain 95 percent of variation in the dependent variable (import quantity). The DW static showed there is no serial correlation between the disturbance terms. An examination of the coefficient reveals that only domestic income is significant (at 5 percent level). A 10 percent increase in domestic income leads to 4.7 percent rise in import, a depreciation of 10 percent of a national currency leads to 0.4 percent rise in import which contradict an economic theory, a 10 percent increase in general level of price has no effect on imports.

4-The exchange rate function:
The result shows that the exchange rate function is able to explain 99 percent of variation in the dependent variable (exchange rate). The DW static fall under rejection region and therefore, there is no serial correlation. An examination of the coefficient reveals that the rate of growth of domestic income, the inflation rate and the previous year exchange rate are significant (at 5 percent level). A 10 percent increase in the rate of growth of domestic income an inflation rate have no effects on the exchange are price and a 10 percent increase in last year exchange rate level (depreciation) leads to the same effects in the current year exchange rate price (depreciation).

But as we noted before, the 2SLS method does not exploit the correlation of the disturbance across equations. Generally three stages least squares is more efficient than two stages least squares. As a result, we estimated the simultaneous equation
model using 3SLS method which give consistent and asymptotically normal estimates, and, under some conditions, asymptotically more efficient than single equation estimate

**Figure (6-2):** The 3SLS estimation result:

System: SYS01  
Estimation Method: Three-Stage Least Squares  
Date: 03/25/12  Time: 02:46  
Sample: 1961-2009  
Included observations: 50  
Total system (unbalanced) observations 195  
Convergence achieved after: 1 weight matrix, 51 total coef iterations

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>C(1)</td>
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<td>C(2)</td>
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<td>0.556300</td>
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<tr>
<td>C(3)</td>
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<td>C(4)</td>
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<td>C(7)</td>
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<tr>
<td>C(12)</td>
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<td>0.088670</td>
<td>0.201447</td>
</tr>
<tr>
<td>C(13)</td>
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<td>C(14)</td>
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<td>C(15)</td>
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<td>C(17)</td>
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</table>

Determinant residual covariance 3.03E-06

Equation: LOG(Y)=C(1)+C(2)*LOG(L)+C(3)*LOG(IM)+[AR(1)=C(4)]  
Observations: 49

| R-squared        | 0.973474 | Mean dependent var | 22.74473 |
| Adjusted R-squared | 0.971705 | S.D. dependent var | 1.051198 |
| S.E. of regression | 0.176823 | Sum squared resid  | 1.406982 |
| Durbin-Watson stat | 1.795066 |                     |         |

Equation: LOG(EX)=C(5)*LOG(WY)+C(6)*LOG(EXRATE)+C(7)*INF+C(8)*D1+C(9)*D2+[AR(1)=C(10)]  
Observations: 48

| R-squared        | 0.926640 | Mean dependent var | 6.894970 |
| Adjusted R-squared | 0.917907 | S.D. dependent var | 0.949832 |
| S.E. of regression | 0.285039 | Sum squared resid  | 3.412383 |
| Durbin-Watson stat | 2.056766 |                     |         |
6.1.3 The Three Stage Least Square Methods Results:

1-The production function:

The result shows an improvement over 2SLS estimation. The model is able to explain 97 percent of variation in the depended variable which reflect the fitness of the regression line. Imported quantity variable as a proxy for capital has an expected sign and significant at five percent level. Durbin Watson statistics reveals no presence of autocorrelation.

2-The export function:

The result shows an improvement over 2SLS estimation. The model is able to explain 92 percent of variation in the depended variable which reflect the fitness of the regression line. Durbin Watson statistics reveals no presence of autocorrelation.

Sudan’s exports are imports with respect to the rest of the world. Accordingly, we expect our export to vary directly with the level of foreign income. A 10 percent increase in world income raises export by 9.0 percent. However, the foreign elasticity is higher than the domestic elasticity, as often suggested, the price in the foreign market will be lower than in the domestic market leading to the phenomenon commonly referred to as” dumping”.

---

**Equation:** 
\[ \text{LOG(IM)} = C(11) \times \text{LOG(Y)} + C(12) \times \text{LOG(EXRATE)} + C(13) \times \text{INF} + \{AR(1) = C(14)\} \]

**Observations:** 49

<table>
<thead>
<tr>
<th>R-squared</th>
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<th>Mean dependent var</th>
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</tr>
</thead>
<tbody>
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<tr>
<td>Durbin-Watson stat</td>
<td>1.780267</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equation:** 
\[ \text{LOG(EXRATE)} = C(15) \times \text{RYG} + C(16) \times \text{INF} + C(17) \times \text{LOG(EXRATE}(1)) \]

**Observations:** 49

<table>
<thead>
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<th>R-squared</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Adjusted R-squared</td>
<td>0.994027</td>
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<td>3.999755</td>
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<tr>
<td>Durbin-Watson stat</td>
<td>2.262253</td>
<td></td>
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</table>
Devaluation\(^1\) are usually an important component of conventional stabilization programs prompts by international institutions and are believed to be a primary policy option in balance of payments stabilization. Traditional views such as the elasticity, absorption, and the Keynesian argue that devaluations have a positive effect on output. The monetary approach, however, argues that exchange rate changes influence real magnitudes mainly through the real balance effect in the short run, but leave all variables unchanged in the long run. The relative merits of devaluation in developing countries, however, have been challenged in recent years by the New Structuralist Economists. Even prominent members of the IMF executive board expressed their concern over the enthusiasm for devaluation and an active exchange rate policy on the grounds that, by relying too heavily on exchange rate adjustments, fund programs became excessively inflationary.

The elasticity approach states that devaluation will be effective as long as the Marshall-Lerner condition is satisfied. The Keynesian approach, in which output is assumed to be demand determined and the economy operates below its potential (less than full-employment condition), states that devaluation will have a positive impact on output and employment. According to the absorption approach, through its expenditure switching and expenditure reducing effects, a devaluation will generate increase in real output. See, for instance, Khan and Montiel (1991).

A study conducted by Khan (1988), investigated the experience of sixty seven developing countries with IMF programs and concluded that they were successful in improving the current account, balance of payments, and in curbing inflation, but at the cost of a decline in the growth rate.

\(^1\) Devaluation is a reduction in the exchange value of a currency of a country.
The 3SLS results show; 10 percent depreciation of exchange rate relative to Sudan’s trading partners would decrease the exported quantity by 1.4 percent. In contrary to the traditional view, devaluation can be contractionary. Earlier studies which focused on the demand side indicated that devaluation may contract aggregate demand if: (1) income is redistributed to groups with lower marginal propensity to consume; (2) the trade balance is initially in deficit and real income decreases; (3) higher tax revenues realized by the government are not spent; (4) real wealth or real balance decline; (5) nominal interest rates increase; (6) investment declines; (7) the domestic currency value of foreign debt and debt service; and (8) foreign profit income increases.

In addition to these demand-related effects, there are a number of supply side channels through which devaluations can lead to a contraction in output if: (1) the cost of imported input to production increases; (2) the cost of working capital increases as real balances decline; and (3) wages are indexed to foreign and domestic goods prices. Once these supply channels are incorporated into the analysis, it is possible for devaluations to be contractionary even if the net effect on aggregate demand is expansionary. This becomes the case when aggregate demand shifts by less than aggregate supply.

As indicated by many studies, the impact of a devaluation on output is theoretically ambiguous and the relevant empirical evidence is largely inconclusive. See, for instance, Lizondo and Montiel (1991) and Gylfason and Schmid (1993). On one hand, a devaluation generates an expansionary effect via aggregate demand; on the other hand, through its effect on the cost of imported intermediate inputs, it has a negative impact on the aggregate supply.
Kravis argued that it is likely for export industries to have higher supply elasticity than export of agricultural product. Agenor (1991) attempted to tackle this ambiguity by developing a rational expectations model of output determination, which distinguishes the effect of anticipated and unanticipated changes in the real exchange rate, and estimated the model on across-section data set of twenty three developing countries. The intuitive explanation of this model is that an anticipated devaluation would lead to an increase in prices which, in turn, would push nominal wage up under the assumption that labor supply depends on expected real wage (Friedman-Phelps hypothesis). As a result, the demand for labor and imported inputs would decline, and consequently output would also decline. On the other hand, an unanticipated depreciation would have no impact on prices and real wages. However, it would lead to an unexpected increase in domestic demand as the relative price of domestic output (unexpectedly) falls. This implies that an unanticipated increase in price would, in turn, stimulate supply. He concluded that anticipated devaluations have a negative impact on output, whereas unanticipated devaluations have a positive impact.

According to the results: A 10 percent increase in the general price level relative to other trading partners has no effect on exports.

3-The import function:

The result shows an improvement over 2SLS estimation. The model is able to explain 95 percent of variation in the depended variable which reflect the fitness of the regression line. Durbin Watson statistics reveals no presence of autocorrelation. A 10 percent increase in domestic income raises import by 7.7 percent. The number of empirical studies on the relationship between imports and growth is

---

1 The assumption is that unanticipated inflation fools suppliers into thinking that, the higher prices they are receiving for their products are higher relative prices rather than an increase in the general price level.
quite limited, because the theoretical relationship and causality between imports and economic growth tends to be more complicated than that between exports and growth. Rivera-Batiz (1985) argues that a rise in economic activity would induce an increase in imports, the reason being that high real income promotes consumption. In that regard, there is a direct connection between economic growth and the import. Recent endogenous growth models have emphasized the importance of imports as an important channel for foreign technology and knowledge to flow into the domestic economy (Grossman and Helpman, 1991; Lee, 1995:91-110; Mazumdar, 2001:209-224). New technologies could be embodied in imports of intermediate goods such as machines and equipment and labor productivity could increase over time as workers acquire the knowledge to 'unbundle' the new embodied technology (Thangavelu and Rajaguru, 2004:10831094). Moreover, it is widely acknowledged that imports play a central role in the countries whose manufacturing base is built on export oriented industries (Esfahani, 1991:93-116; Serletis, 1992:135-145; Riezman et al., 1996:77-110; Liu et al., 1997:1679-1686). If foreign exchange accumulation is sufficient, the economic growth is promoted by importing of high quality goods and services, which in turn expand the production possibilities (Baharumshah, 1999:389-406). Gulati (1978:519-522) examined the effect of the capital imports on savings and growth for less developed countries. He found that the effect of capital imports on economic growth would depend on the degree to which the growth is constrained by the lack of capital. Humpage (2000), in his study claimed that there is a positive relationship between imports and economic growth. However, the direction of influence between imports and economic growth is less certain. Hooper et al. (1998) estimated that a 1 percent increase in real GDP in the U.S. would lead to a 2 percent rise in U.S.
imports. Ramos (2001:613-623) investigated the Granger-causality between exports, imports and economic growth in Portugal over the period 1865-1998. The empirical results of the study didn’t confirm a unidirectional causality between the variables considered. There is a feedback effect between exports-output growth and import-output growth. Ahmed Ugur (2008) in a multivariate Var-analysis of import and growth in Turkey, show that while there is a bidirectional relationship between GDP and investment goods import and raw materials import, there is a unidirectional relationship between GDP and consumption goods import and other goods import.

The 3SLS results shows; 10 percent depreciation of exchange rate relative to Sudan’s trading partners would increase the imported quantity by 0.2 percent. Under controlled foreign exchange regime. In order to reduce import, the government directly administer the foreign exchange to maintain the balance of payment.

In Sudan, pre-reform trade regime payments for all kinds of foreign trade had to be approved by The Central Bank of Sudan (CBoS). Since late seventies, there was a strict foreign exchange licensing system for private use. After 1992/93, the government of Sudan liberalized control on foreign exchange and foreign exchange was available for licensed importer through the auction market.

**Devaluation:**

Devaluation is an instrument of import control. It is argued that a reduction in the exchange value of a country’s currency (depreciation) restricts imports and expands exports (Kreinin, 1995). This means, as a result of devaluation, the prices of export product imported by foreign buyers are lowered, while the prices of imports increased. Thus, as the result of high price of import, the consumption of imported goods decline and consumers shift from imported goods to domestic substitutes and due to low price of export, the demand for export increases, thereby
improving foreign trade balances and increasing domestic output. In contrast to this argument, in developing countries devaluation may be unsuccessful in increasing exports and lowering imports (Singh, 1982). This is because developing countries cannot easily increase their export even if the world demand for their goods increased and at the same time the world demand for their export is inelastic with respect to income and price; “most imports of developing countries are inputs into production and the elasticity of substitution in production between imports and domestic value added is essentially zero” (Ghei and Pritchett, 1999:468). Therefore, devaluation has little role in achieving macroeconomic balance. The other argument is that if both imports and exports are highly responsive to changes in real exchange rates, devaluation improves balance of payment problems and economic growth. In practice, the effect may be different, that is, devaluation may not increase the supply of import substitutes and export in developing countries where trade is liberalized at the same time of devaluation; however, devaluation can increase the supply of import substitutes in developing countries where trade is not liberalized at the same time of devaluation (Ghei and Pritchett, 1999).

In Sudan, free exchange rate system was one of the reform measures adopted by the government in 1992. The successive devaluation of early 1990’s was followed by continuous liberalizing measures of the external sector. The effect of liberalization in Sudan economy is that, it improved economic growth (measured by real GDP) and resulted an import boom relative to its previous position. According to the results; 10 percent increase in the general price level relative to other trading partners has no effect on imports. Economic theory and empirical studies confirm that, inflation leads to appreciation. Appreciation expands imports and restricts exports (Kreinin, 1995). This means, as a result of an increase in the general price level, the prices of export product imported by foreign buyers are increased, while the prices of imports decreased. Thus, as the result of low price of
import, the consumption of imported goods increase and consumers shift from domestic substitutes to imported goods and due to high price of export, the demand for export decreases, thereby deteriorating foreign trade balances and decreasing domestic output.

4 - The exchange rate function:

The model is able to explain 99 percent of variation in the depended variable and reveals strong explanatory power of the independent variables. The Durbin Watson statistics indicate there is no serial autocorrelation problem among the disturbance term.

A 10 percent increase in rate of growth of domestic income has no effect on the exchange rate price.

The 3SLS results shows; 10 percent increase in the general price level relative to other trading partners would increase the exchange rate price by 0.1 percent.

According to the results; 10 percent increase in the previous year foreign exchange rate value lead to the same effect in the current year.

6.2 Evaluation and discussion of results

6.2.1 Introduction

To evaluate the results, one should use three criteria:

- Economic theory; coefficients’ signs, sizes and whether the results are consistent with economic theory.
- Statistical criterion; t-test, R², F,… etc.
- Econometric criterion; test for the assumptions underlying the econometric methods used.

6.2.2 Sudan’s export and import performance:

The empirical analysis clearly shows that export performance of Sudan is largely driven by the demand side factors like world demand, foreign exchange rate and
relative price and the import performance is largely depends on domestic income, foreign exchange rate and relative price. Exports are the mainstay of perhaps a fifth or more of the world’s population. Also, they may be a major source of economic growth, both directly, because exports are part of production, and indirectly, as exports facilitate imports of goods and services, and of new ideas, knowledge, and technology. By encouraging specialization according to comparative advantage, high and rising exports enhance static and dynamic efficiency and economic growth. For instance, the rapid expansion of exports relative to output in the fast growing East Asian economies over the years is hardly an accident.

The determinant of trade flows comes under the realm of estimating price/income elasticity of trade flows. Apparently, trade determination follows an assessment of the effects of currency depreciation on a nation’s current account. The underlying framework is elasticity approach on trade balances. Since elasticities varies considerably across countries along with variance in its significance, there is no consensus on the impact of real devaluation on trade balance. A similar disagreement can be found in Sudan context.

Basically, there are two diverging views regarding the sources of Sudan’s export performance. One prominent view considers the influence of restricted trade policy regime and the resulting biases towards exports. The second view focuses on the importance of demand side factors such as world income (of major trade partners) and stresses the trivial role of relative prices.

The empirical analysis clearly shows that export performance of Sudan is largely driven by the demand side factors like world demand, exchange rate and relative price. Currency depreciation has no impact on improving export performance and competitiveness of exports.
The Sudan economy exhibits huge import dependency like any other developing country. The local manufacturing firms depend heavily on imported capital and intermediate goods, which directly affect investment, which is the motor of economic expansion. But, the country has low level of capital stock and intermediate goods. It is argued that lack of sufficient amount of capital and intermediate goods directly reduce investment, in turn leading to lower economic growth. The country’s exports are mainly primary goods (agricultural products). Fluctuations in production and earnings in these sectors lead to fluctuation in overall output of the economy which also results in swings in imports and the balance of payments position. The country often exposed to external shocks. As it is well known, the most serious problems caused by the sharp rise in oil prices (1973/1974-1979/1980-2007/2008) are an increase the manufacturing cost of other products the countries import, and this takes a tremendous chunk of precious foreign exchange (Klein, 1990). To avoid this problem, countries often took out loans to pay for their now more expensive imports. This shows that the rise in the oil price, in turn resulted in a serious debt problem in these countries. This problem is mainly aggravated in developing countries, which are heavily reliant on export of agricultural products and, on imported manufactured goods. Sudan, as one of these developing countries has faced the same problem. Much of the countries’ trade is an exchange of primary products for manufactured goods. However, it has been variably claimed that as world income grows, the demand for primary goods decline while the demand for manufactured goods increase, so that the relative price of the latter declines; markets of primary goods are competitive while that of manufactured goods are characterized by monopolistic nature (Kreinin, 1995). This lowers the price of the former, and increases the earnings of the producers of the latter as the result of increased productivity; the expansion of synthetic substitutes lowers the demand for many primary goods and thereby slows down their prices.
(Klein, 1990). It is known that developing countries import many goods at world prices since they are not sufficiently available domestically. Increase in the world price of these goods leads to an increase in the domestic prices further aggravating inflationary problems. It is also argued that the ratio of the export price index to the import price index of developing countries has been declining or deteriorating over the long run, implying that these countries will face a chronic balance of payment problems as the result of the unfavorable world price continue. From this it can be concluded that major aspects of Sudan economic policy such as import substitution have been influenced by the availability of foreign exchange and the intensity of external disequilibrium.

The country implementation of import substitution policy with high tariffs and non-tariff barriers were imposed on imported goods so as to expand domestic production and replace imports. Such protectionist policy had several impacts on the economy. The first is that much capital was invested in industries that could not have survived without protection. The second is that this policy reduces the demand for imports, therefore, raising the prices of import competing goods. This leads to a shift of resources from the export industry to the import competing industry, in turn that make it more difficult to export primary or manufactured products. Thus, the policy discriminates in favor of import competing industries and against export industries. Indeed, policies were biased against the agricultural sector, thereby lowering agricultural output, depressing rural income, and reducing exports. Furthermore, as the result of the policy measures followed during these periods, the country had faced a secular decline in its balance of payment. Earning from exports could not cover the rising imports.

During the 1950s and 1960s, the policy of industrialization through import substitution was dominant strategy for economic development. The infant industry argument was the oldest argument in this area. The aim of the argument is to
protect home industry from foreign producers in the initial stages of production until it could compete with low cost foreign producers (Singh, 1985). It is also stressed that, at the initial stage of production, cost per unit of output is high and therefore protection is essential in order to be able to withstand the competitive conditions. Protection is not, however, considered to continue forever. It is argued that it should be avoided after the domestic industries are able to compete with foreign producers and achieve economies of scale. Contrary to this argument, it is argued that restriction of import leads to the decline of imported inputs essential to the export sector, further discouraging export promotion and therefore leading to the decline of the growth of GDP (Jebuni, et-al, 1994). Thus, the policy of import substitution affects the export sector in less developing countries like Sudan and this policy has anti-export bias where the industry is import dependent (Lyakurwa, 1991). The other view is that the protected industry expands at the cost of other industries, and its production growth is less than the fall in production elsewhere (Salvatore, 1990). Therefore, the net effect may be negative. Even empirically, there is weak evidence that support import substitution strategy (Dornbush, 1992). In broad classification, most of the goods imported by these countries include capital, intermediate and consumer goods. It is widely argued that the importation of capital and intermediate goods has substantial impact for the development of these economies. However, the effect of imported consumer goods on GDP growth is not clear.

The effect of income (measured by real GDP) growth on imports has been analyzed in estimating import demand model. The earlier works in this area are that of Khan (1974), Goldstein and Khan (1976), and Moran (1989). Recent works in this area are that of Lopez and Thomas (1990), Mwega (1993), Yuan and Kochhar (1994), Senhadji (1997), Umo and Fakiyess (1995), and Egwaikhide (1999).
The earliest empirical work on the relationship between import and GDP growth was that of Khan (1974). He tried to analyze the determinants of imports in fifteen developing countries using a two-stage estimation procedure for the period 1951-69. The model he used was based on traditional import demand function that relates a country’s import demand to real GDP and relative prices (the ratio of unit value of imports of the country to domestic price levels). In his result, all except for six countries, income elasticity of import is significantly different from zero and has positive sign at the five per cent level of significance in the long run. However, in the short run, income elasticity of import is significant and positive for four countries, but not for the other countries.

On the other hand, Goldstein and Khan (1976) estimated traditional import demand model for 12 industrial countries during the period 1955-1975 based on quarterly data using OLS and two-step estimation procedure. In this result, the income elasticity of import is significant and has a positive sign both in the long and short run. The weakness in the above models is that they are based on the assumption that there is no import restriction and hence supply equals demand. But, most LDCs use import restriction. Therefore, excluding this restriction variable from the model may lead to biased result.

Despite the traditional view supporting the expansionary effect of devaluation, a considerable amount of research continued to investigate the relationship between devaluations and export/import performance. However, the results obtained from those studies have so far been mixed and inconclusive. This shows the need to conduct further studies on the subject. The findings of the thesis suggest the importance of changes in the exchange rate as a major determinant of the variations in the rate of growth of export/import trend. The results also support the presence of an initial contractionary effect of devaluation on output as a result of a J curve effect on current account. The moderate influence of the exchange rate
changes on export/import was shown by the finding that exchange rate variations explain as much as 23.7 and 42.3% of the changes in export and import. This suggests that it may be somewhat risky for the government to largely allow market forces to determine the value of the Sudan pound in the current period. Intervention may still be needed to correct undesirable movements in the real exchange rate. This is especially recommended in the current period until the economy makes a full transition to the adopted flexible exchange rate system in which monetary policy assumes a bigger role in stabilizing the economy. This increased role will definitely require a carefully developed monetary policy and a strengthening of the institutional capacity of the Central Bank of Sudan. The long lag with which devaluations were found to produce an expansionary effect on output through its effect on current account indicates that currency depreciations cannot be used as a quick remedy for recessions. Consecutive short-run depreciations of the currency should also be avoided because they result in a sustained negative impact on real output that delays the expected positive effect. The results also point out the need for efforts to be made to shorten the period over which the contractionary effect continues. A possible reason for the slow adjustment of output is the fact that Sudan exports and imports are not very responsive to the changes in the relative prices caused by devaluations. Increasing the response of exports requires hard work to develop Sudan’s export sector, diversify and improve the quality of its products and, above all, remove the bureaucratic obstacles that have for years weighed heavily on it.

On the other hand, the slow adjustment of the volume of Sudan imports in response to changes in relative prices because the currency devaluation was not out weight the inflation rate, has manifested itself in the inflationary wave that hit the economy after the float of the Sudan pound. The inability of the Sudanese economy to reduce its imports in response to the higher domestic currency prices is
mainly explained by Sudan’s heavy reliance on imported production needs. According to the external trade report of the Ministry of Foreign Trade (2009), intermediate inputs, capital goods and raw materials have constituted about 64% of total imports. Taken together all related items, the share of the imports that are directly related to production reaches as much as 65-80% of the total amount of imports. Furthermore, the limited substitution between domestic and imported inputs increases the economy’s dependence on the foreign ones. Thus, the rise in the inflation rate in the aftermath of the floatation decision was largely caused by the increase in the prices of imported inputs thereby increasing the costs of production and causing a general price upsurge. According to the IMF country report (2000), the inflation rate in Sudan in 1995 speeded up after devaluation reaching an annual rate of almost 68.4% based on the CPI measure. Besides having a negative impact on the trade balance due to the increase in the import bill, the increase in the prices of imported inputs raises costs of production which could decelerate the production process. Moreover, the resulting increase in the price level reduces real incomes and depresses aggregate demand. This requires an structural economic policy to reduce the reliance of the economy on imported production to contain the contractionary effect of outside increase in price level on the domestic economy. Another possible cause for the short-run contractionary effect of devaluation in Sudan has to do with foreign currency liabilities of firms that increase in value in terms of domestic currency pushing some firms to bankruptcy. Reliance on foreign currency loans, particularly the existence of dollarization, can be a direct result of the lack of development of financial markets in Sudan. In a recent study by Zakaria (2011) compared the Sudan financial market to other emerging markets, “the Sudanese market was found to be less than fully developed and less integrated into the world financial markets” . This indicates the necessity of increasing the depth of the financial market as a needed measure to
cushion the effect of depreciations on the economy. The problems associated with the Sudan financial market are:

- Small size of the market, both physically and in terms of operations;
- Low liquidity;
- Lack of transparency owing to lack of implementation of public financial management requirements, entitlements and procedures;
- Lack of adequate and operational infrastructure;
- Underdeveloped legal and procedural arrangements and laws governing and regulating the work of the stock market (for instance, the Private Companies Law may not be fully useful for the development of the stock market). There is an urgent need to reform laws and set institutional structures and arrangements in order to encourage firms and companies to register, disclose their accounts and disseminate information on actual performance and financial standings, with publication of their audited accounts at the end of each fiscal year.

Recently, Sudan chose to use oil revenue to finance its growing demand for expenditures in the fiscal year 2007/2008, 2008/2009 and 2009/2010 budgets to meet critically needed current and development spending, and also to boost its newly created Oil Revenue Stabilization Fund (ORSF). Sudan’s reserves of foreign exchange and gold were estimated at $1399 billion on 31 December 2008 and $769 million on 31 December 2009.

As a result of a global economic crisis a sharp decline in oil revenues (about 68% to 70% at the peak of the crisis) has reduced the volume of inflows of hard currencies to Sudan, resulting in a foreign currency deficiency. The shortage of reserve currencies has exerted strong pressure on the Sudanese pound to fall (it fell by 20% to 30% in 2009), making imports more expensive.

The cumulative effect of the decline in export revenues, the slowdown in trade, the fall in FDI and private remittances and the widening current account and balance
of payments deficits will further lead to a deterioration of the Sudanese pound’s value relative to foreign convertible currencies. If the CBoS does not adjust the exchange rate, this will lead to a further reduction in the country’s amounts of foreign reserves, as was experienced in the second quarter of 2009.

As for external debt, although its share in the total debt declined gradually since the year 2000, the external debt balance still represents a considerable percentage of GDP estimated at 37.8% in the fiscal year 2009 as per the CBoS annual report. This indicates that the increased burden on the economy due to currency depreciations is quite considerable and should be taken into consideration.

6.2.3 Trends in Export, Import and GDP:

At the theoretical level, there are many economic factors (tariff, subsidies, quantitative restrictions, economic development, world demand, foreign exchange earnings, price of exports foreign exchange rate, price of imports, consumer preference and so on) and non-economic factors (social structure, natural distortions) that determine exports/imports. Among economic variables world GDP is the main determinant of exports and domestic GDP is the main determinant of imports. The following descriptive analysis explains the trend of exports/imports and GDP in Sudan.

The years from 1960/61 to 1969/70 was a period of fairly free market and loose inward looking economic framework. In this period, the growth rate of exports, imports and GDP was fluctuating with the growth rate of exports hovering between negative 8.2 and 30.1 percent and the growth rate of imports between 12.8 and 21.3 percent while that of GDP staying between 8.5 and 13.6 percent in nominal terms.

The period 1970-1971 was characterized by an excessive government intervention and centrally planned management. There was a disappointing economic
performance during this period. The receipts from export have decreased while payments on import have increased.

The main reason for this weak economic performance was due to the policy of the government and external shocks. During this period, there was strong government interventions and marginalization of the private sector. The government monopolized all sectors and they were inefficient and this resulted in reduction of output growth. Following this period Sudan was exposed to external shocks, which affected the economic performance. The first oil shock in 1973/74 had adverse effect on the economy of Sudan. The oil price increased from 4.3 U.S. dollar per barrel in 1973 to 11 U.S. dollar per barrel. Following the oil shock, the price of imported goods increased. For example, the world fertilizer price index increased between 1972/73 and 1974/75. Similarly, the world food price index increased in 1972/73 and 1973/1974. Due to high price of import goods, imports that are important for the major economic sectors namely, agriculture, industry and service sector declined and therefore they are adversely affected. The growth of these sectors declined continually, in turn, leading to a fall in GDP growth.

During this period, the economies of many developing countries were affected by oil price increase (Fried and Schutze, 1975). This was followed by the severe drought in 1984/85. The growth rates of real GDP, export, and import declined in 1984/85 compared with the previous year rates due to the decline in agricultural sector.

During the period 1990-1993, a transitional free market economy was under way presumed to transform the economy into liberalized economy. During the period of oil exploration, the growth rate of GDP, export and import were 442, 549 and 433 percent respectively.

The trade balance in Sudan has exhibited a deficit in most years since 1980, except for in a very few years, when agricultural production was excellent and prices were

The current account deficit is expected to increase to an average of $2.9 billion (5.5% of GDP in 2009-2010) (EIU, 2009). On the other hand, the African Development Bank (AfDB, 2009a) projects the current account balance to amount to -6.73% of GDP in 2009 and -6.8% of GDP in 2010.

**Did the Adjustment Program succeed in Promoting Export?**

Many attempt to evaluate the economic policies undertaken in the ECRP and NESP runs into major difficulty. During the period 1979-1993 the Sudanese economy witnessed unprecedented development in different spheres. This period is marked by adverse weather conditions, war and civil strife. The drought of 1983/1984 and 1990 in the western and central Sudan led to severe damage in crop production. This, in turn, led to a huge reduction in export supply and exposed the precarious state of the country’s food security. The consequences were famines and a substantial rise in the real price of food and the increased necessity for food imports. All these points can be taken into consideration when we are evaluating the two structural program and it does not mean that these programs could have a success without these exogenous shocks.

**Causes of Stagnation in Sudan’s Exports:**

Several fundamental reasons could generally be advanced to explain the slow rate of growth in export earnings. These include:

- The slow growth of production of exportable due to structural and technological backward and/or inappropriate domestic policies.
- The rapid growth demand for the exportable good in the domestic market.
- The slow growth in world demand for Sudan’s exports.
Below are detailed explanations of the above mentioned reasons:

1-The growth of exportable output:
Several factors could explain the stagnation in Sudan’s agricultural export sector, including differential rates of increase in the level of prices, mainly resulting from increasing domestic supply rigidities; institutional obstacles and tariff-related bias against exports.

The explanation that has undoubtedly received the most attention in the seventies and eighties has been the taxation of agriculture and exports. Producers of export crops were confronted with a situation in which their receipts, in domestic currency per unit of sales, failed to keep pace with domestic costs and prices. This worsening in the internal terms of trade of export producers was the result of direct and indirect bias against exports. The most evident bias against exports stemmed from high direct taxation of exported commodities, design to finance public expenditure, investment and social subsidies and the protection of import-substitution through tariffs and quantitative restrictions.

While price distortions appear to be the crucial role in explaining the deterioration in export performance, technological and structural background is also at the root of the problem. The continuous deterioration of the rural infrastructure-transport, power, water, credit and banking institutions, marketing facilities, …etc and the increasing shortage of consumer goods and imported inputs are among the major constraints to which agricultural sector has been particularly prone.

This point to the slow growth in domestic production as a major factor contributing to the fall in export volume. Comparing the growth rates in production and export volumes of the major export commodities, however, it appears that export volumes deteriorated at a faster rate than the volume of total output.

2-The growth in domestic consumption of exportable:
The domestic consumption of agricultural raw materials–mainly cotton and gum Arabic- constitutes only a tiny proportion of total production. Gum Arabic production is almost entirely for exports and only few were consumed domestically. Thus, domestic demand has little or no role in reducing export earnings of cotton and gum Arabic during seventies, eighties.

The share of domestic consumption in food output, unlike that of raw materials, was comparatively large and grew at a higher rate. Food crops witnessed a sizable increase in domestic consumption due mainly to rising population. Also, substantial amounts of groundnut and sesame were utilized as a substitute for cotton-seed by the oil seed and soap industry, so reducing export earnings from these crops despite the increase in their output.

The effect of this decline on total export earnings, however, was moderately a small. This is obviously because the share of these commodities in total export earnings is relatively small, and part of the domestically processed output, mainly cakes and meals, is also exported. On the basis of the above discussion, it seems reasonable to conclude that the growth in the domestic consumption of exportable in Sudan had a negative but minor effect on total export earnings.

3-Sudan’s term of trade and the demand for its exports:
Sudan’s net barter terms of trade (NBT) in the seventies did not decline, in fact they improved at an average of 2 percent per annum. A considerable part of this improvement was due to rising export prices. This, in turn, was largely attributable to the rapid increase in cotton export prices during the seventies. Cotton export unit values improved despite the continuous shift in cotton exports from long-staple to medium staple cotton. The sharp increase in import prices in 1973/1974 as a result of world prices increases of energy products. This was almost completely neutralized by simultaneous sharp increase in the price of Sudan’s exports (especially cotton), pushing the terms of trade index to its highest level in the
seventies. Although the prices of commodities other than cotton were falling in the years following 1974, they did not offset the favorable cotton export prices. In 1990-1995, however, the NBT declined at an annual rate of about 10 percent. With the exception of gum Arabic, all Sudan’s tradable crops witnessed decline in their international prices over 1990-1995. From 1982 to 1993, the adverse external factors played a significant role in the resultant poor export performance of Sudan. Throughout the period 1978-1986, a combination of events made the international environment less conducive to stable growth for most of the oil importing developing countries. The decline in world prices for the key export commodities –cotton and groundnut- contributed to the decline in export earnings 1982-1986. Moreover, world market recession, high levels of cotton stocks in cotton-importing countries, and quality problems were the main factors.

The demand for Sudan’s major export, cotton, showed an upward trend over the period 1979-1981 and ensured a reasonable market. The recession in the industrial countries resulted in a sharp fall in the production of manmade fiber, which constitutes the biggest share in total consumption in these countries. At the same time, although, the textile production in some developing countries and in the Centrally Planned Economies remained largely unaffected by the recession and they didn’t increase their production to offset the world market shortage. Coupled with the consumers’ strong preference for cotton denims and corduroys, this largely protected cotton demand from the adverse effects of the economic slowdown in the 1970s and 1980s.

Sudan accounts for nearly 75% of the world exports of Gum Arabic, 25-30 percent of long-stable cotton, and more than 30% of sesame seeds (average for 1970-1995). Thus Sudan may not be considered as a price-taker in the world market for these commodities. The foreign price elasticity of demand for these commodities is
expected to be inelastic. An expansion in the export volume of these commodities could therefore, result in negative additional export receipts. Over the period 1970-95 there was no significant increase in export volume. On the contrary, export volumes and shares in world trade declined significantly.

1. The impact of adjustment programs on export incentives:
Acharya (1979) found a very high level of agricultural taxation and discrimination against exports in the 1970s. The World Bank (1986) shows that the ratio of farm gate prices to border prices for the major commodities in the late 1970s and early 1980s was substantially less than one.
Export promotion in Sudan was believed to be achieved by means of policy packages designed to provide the incentives seems to be crucial in promoting the production of exports. The policy instruments of the ECRP and NESP comprised exchange rate reform, trade liberalization measures (especially the removal of export taxes), elimination of costs and price distortions, a re-orientation of production on the irrigated areas towards Sudan’s most competitive crops and reform of the production relations in the state-managed agricultural schemes.
In their assessment of the ECRP, Hussein and Thirlwall (1984) have argued that devaluation, the main policy adopted to promote exports, would lead to a negative effect on export profitability. Haj Diab (1985) shows that because of the institutional and structural rigidities of the Sudanese economy, devaluation of the exchange rate may not succeed in promoting exports and reducing imports.
Hag Elamin (1992) examined the possible effects of relative price changes, resulting from devaluation or otherwise on export earnings. The results suggest that an increase in the real export prices would result in only little improvement in export earnings given the present structure and composition of exports. This implies that Sudan’s exports have poor growth prospects.
In summary, the ECRP (1978-85) and NESP (1990-93) programs have no effect on price incentives and export promotion for export production. Although the NESP appears to have taken more active steps towards liberalization of farm prices compared with the ECRP, the resultant price incentives seem to have been worse than under the ECRP. The international terms of trade movement aggravated the bias against agriculture during the NESP more than during ECRP.

6.3 Chow’s F-test \(^1\) for structural change

In order to test the parameter stability, Chow test has been applied. The test has confirmed that estimated parameters do not significantly vary across different samples and that regression for the period preceding 1992 (fixed & pegged exchange rate regime) and floating exchange rate regime are not significantly different. That indicates in the case of production, export, import and exchange rate equations that no structural difference at the 5 percent significance level exists between these two sub periods.

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\(^1\) Definition of The Chow Test: A Chow test is a particular test for structural change; an econometric test to determine whether the coefficients in a regression model are the same in separate subsamples. In reference to a paper of G.C. Chow (1960), "the standard F test for the equality of two sets of coefficients in linear regression models" is called a Chow test. See derivation and explanation in Davidson and MacKinnon, p. 375-376. More info in Greene, 2nd edition, p 211-2.
Figure (6-4): Chow Forecast test for the production function

Chow Forecast Test: Forecast from 1992 to 2009

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<tr>
<th></th>
<th></th>
<th>Probability</th>
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<tbody>
<tr>
<td>F-statistic</td>
<td>3.01</td>
<td>0.004023</td>
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<tr>
<td>Log likelihood ratio</td>
<td>52.69</td>
<td>0.000029</td>
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Test Equation:
Dependent Variable: LY
Method: Least Squares
Date: 05/20/11  Time: 05:52
Sample: 1960 1991
Included observations: 32
LY=C(1)+C(2)*LL+C(3)*LK

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tr>
<td>C(1)</td>
<td>-10.5567</td>
<td>1.8904</td>
<td>-5.5834</td>
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<td>C(2)</td>
<td>1.5941</td>
<td>0.1988</td>
<td>8.0168</td>
<td>0.0000</td>
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<tr>
<td>C(3)</td>
<td>0.4074</td>
<td>0.0741</td>
<td>5.4977</td>
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</table>

R-squared: 0.9628 Mean dependent var: 22.2182
Adjusted R-squared: 0.9603 S.D. dependent var: 0.9538
S.E. of regression: 0.1899 Akaike info criterion: -0.3946
Sum squared resid: 1.0468 Schwarz criterion: -0.2572
Log likelihood: 9.3142 Durbin-Watson stat: 0.7798

*The resulting F-statistic has an associated p-value of .004, thus we can’t reject the null of no change in regression structure in 1992.
Figure (6-5): Chow Forecast test for the export function

Chow Forecast Test: Forecast from 1992 to 2009

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<tr>
<th>Statistic</th>
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<tr>
<td>F-statistic</td>
<td>3.504460</td>
<td>0.001850</td>
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<td>Log likelihood ratio</td>
<td>59.10919</td>
<td>0.000003</td>
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Test Equation:
Dependent Variable: LEX
Method: Least Squares
Date: 05/20/11  Time: 06:24
Sample: 1960 1991
Included observations: 30
Excluded observations: 2

LEX = C(4) + C(5)*LWY + C(6)*LEXRATE + C(7)*LINF

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tr>
<td>C(4)</td>
<td>-28.32954</td>
<td>3.432635</td>
<td>-8.253001</td>
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<td>C(5)</td>
<td>1.078444</td>
<td>0.106677</td>
<td>10.10943</td>
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<td>C(6)</td>
<td>-0.424138</td>
<td>0.083200</td>
<td>-5.097797</td>
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<td>C(7)</td>
<td>-0.013053</td>
<td>0.069338</td>
<td>-0.188247</td>
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R-squared    0.878473  Mean dependent var 6.433536
Adjusted R-squared 0.864450  S.D. dependent var 0.728213
S.E. of regression 0.268107  Akaike info criterion 0.328705
Sum squared resid 1.868916  Schwarz criterion 0.515531
Log likelihood -0.930573  Durbin-Watson stat 1.045564

*The resulting F-statistic has an associated p-value of .002, thus we can’t reject the null of no change in regression structure in 1992.
Figure (6-6): Chow Forecast test for the import function

Chow Forecast Test: Forecast from 1992 to 2009

- F-statistic: 7.432517, Probability: 0.000003
- Log likelihood ratio: 87.15526, Probability: 0.000000

Test Equation:
Dependent Variable: LIM
Method: Least Squares
Date: 05/20/11  Time: 06:15
Sample: 1960 1991
Included observations: 30
Excluded observations: 2

LIM = C(10) + C(11)*LY + C(12)*EXRATE + C(13)*LINF

<table>
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<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<td>C(10)</td>
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<td>1.259448</td>
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<td>C(11)</td>
<td>0.515963</td>
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<td>8.581551</td>
</tr>
<tr>
<td>C(12)</td>
<td>-138.7719</td>
<td>29.32072</td>
<td>-4.732895</td>
</tr>
<tr>
<td>C(13)</td>
<td>0.007701</td>
<td>0.048715</td>
<td>0.158074</td>
</tr>
</tbody>
</table>

- R-squared: 0.814828
- Mean dependent var: 5.907341
- Adjusted R-squared: 0.793462
- S.D. dependent var: 0.430907
- S.E. of regression: 0.195832
- Akaike info criterion: -0.299552
- Schwarz criterion: -0.112725
- Durbin-Watson stat: 1.183160

*The resulting F-statistic has an associated p-value of .000, thus we can’t reject the null of no change in regression structure in 1992.
Figure (6-7): Chow Forecast test for the exchange rate function

Chow Forecast Test: Forecast from 1992 to 2008

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>2.323449</th>
<th>Probability</th>
<th>0.046316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log likelihood ratio</td>
<td>33.30435</td>
<td>Probability</td>
<td>0.001534</td>
</tr>
</tbody>
</table>

Test Equation:
Dependent Variable: LEXRATE
Method: Least Squares
Date: 05/20/11 Time: 06:17
Sample(adjusted): 1961 1987
Included observations: 22
Excluded observations: 5 after adjusting endpoints
LEXRATE=C(14)*LRYG+C(15)*LINF+C(16)*LEXRATE(-1)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(14)</td>
<td>0.012443</td>
<td>0.032029</td>
<td>0.388488</td>
<td>0.7020</td>
</tr>
<tr>
<td>C(15)</td>
<td>0.049218</td>
<td>0.025672</td>
<td>1.917210</td>
<td>0.0704</td>
</tr>
<tr>
<td>C(16)</td>
<td>1.012358</td>
<td>0.009012</td>
<td>112.3346</td>
<td>0.0000</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.976689</td>
<td>Mean dependent var</td>
<td>-7.594792</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.974235</td>
<td>S.D. dependent var</td>
<td>0.727869</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.116834</td>
<td>Akaike info criterion</td>
<td>-1.329994</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>0.259355</td>
<td>Schwarz criterion</td>
<td>-1.181216</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>17.62994</td>
<td>Durbin-Watson stat</td>
<td>2.915131</td>
<td></td>
</tr>
</tbody>
</table>

*The resulting F-statistic has an associated p-value of .046, thus we can’t reject the null of no change in regression structure in 1992.
CHAPTER SEVEN
CONCLUDING REMARKS AND RECOMMENDATIONS

7.1 Concluding Remarks:

 blockIdx Though, formerly, there was a support for import substitution strategy, currently the situation is changing. There appears to be an agreement that trade promotes growth by enabling countries to acquire goods that they have no capacity to produce. Thus, liberalization of trade and payments removes anti-export bias, and this promotes the export sector and therefore leads to the improvement of foreign earnings and growth of GDP. Therefore, import liberalization is important to help export sector, given the fact that a country like Sudan, among the developing countries, is highly dependent on imports from developed countries.

 blockIdx There is considerable evidence that investment is one of the most important determinants of long term growth (Barro 1991; Levine and Renelt (1992). It has often been suggested that a stable macroeconomic environment promotes growth by providing a more conducive environment for private investment. This issue has been directly addressed in the growth literature in the work by Fischer (1991, 1993); Easterly and Rebelo (1993); Frenkel and Khan (1990); and Bleaney (1996). Therefore, it is important to identify the contribution of imported intermediate and capital goods to make appropriate policy announcements.

 blockIdx Despite the traditional view supporting the expansionary effect of devaluation, a considerable amount of research continued to investigate the relationship between devaluations and export/import performance. However, the results obtained from those studies have so far been mixed and inconclusive. This shows the need to conduct further studies on the subject. The findings of the thesis suggest the importance of changes in the
exchange rate as one of the determinants of the variations in the rate of growth of export/import trend.

The complexity of the global economy, it is clear that the formulation of appropriate policies, in particular foreign trade policies, would not only promote economic growth but the macroeconomic stability, which is the main thrust of the management of an economy.

The results support the presence of an initial long period contractionary effect of devaluation on output as a result of a J curve effect on current account for developing countries where economies depend on agricultural product and low elasticity. This suggests that it may be somewhat risky for the government to largely allow market forces to determine the value of the Sudan pound in the current period.

The consequences of the global financial crisis on Sudan economy was the cumulative decline in export revenues, the slowdown in trade, and the widening current account and balance of payments deficits will further lead to a deterioration of the Sudanese pound’s value relative to foreign convertible currencies. If the CBoS does not adjust the exchange rate, this will lead to a further reduction in the country’s amounts of foreign reserves, as was experienced in the second quarter of 2009.

One of the alleged costs of inflation is said to be the loss of competitiveness in international markets if the rate of change of prices is higher in the domestic currency than in the rest of the world. It is usually posited that this “external cost” of inflation can be quite sever for countries which rely heavily on foreign markets, thus requiring extra efforts on the part of policy makers to contain inflationary pressures, whether they are cost-push.

---

1 Sudan’s reserves of foreign exchange and gold were estimated at $1399 billion on 31 December 2008 and $769 million on 31 December 2009.
demand-pull, or a combination of both. It is, possible for a country with above-average inflation to devaluate its currency in order to maintain, or even improve, its competitive position, but this does not absolve the country from the requirement of stemming the inflationary pressures in order to make the devaluation successful. While inflation is measured by changes in the consumer price index, whole sale price index, or the impact deflator of GDP, competitiveness in this context is determined by changes in the export price index in one country in relation to price changes in other countries.\textsuperscript{1}

The increasing budget deficit arising from expansionary fiscal policy has added more inflationary pressure and exerted an enormous effect on the money supply growth rate. The effect of these factors has been to fuel inflationary pressures and lower the value of the Sudanese pound. For example, IMF data show that consumer price inflation averaged 16\% in 2008, and is expected to be higher than this in 2010. Depreciation of the Sudanese pound is expected to fuel imported inflation through imported consumer, intermediate and capital goods, on which the country has been heavily dependent. Combined, increased deficit financing, expanding government spending and depreciation of the Sudanese pound will all push up inflationary pressures. Inflation reduces economic growth, hurts the poor, creates social and political instability and is very difficult to bring back down when it gets out of hand. Therefore, the primary goal of monetary policy should be price stability and control of inflation.

The government should also attempt to strengthen the country’s export production capacity through the careful design and implementation of export-based production activities in agriculture, livestock, oil, mining and

\textsuperscript{1} In addition, equal changes in export prices in all countries may lead to different balance-of-payments effects depending on the price elasticity involved.
manufacturing. The adoption and use of appropriate technology in production, distribution and marketing activities in these sectors, coupled with well-planned and executed infrastructure, would allow the country to maximize its return on exports.

_kelas1 S Sudan has to adjust to the pace at which the international situation is changing. This requires exposure to the international markets with sufficient cushioning devices to minimize the effect of any negative shocks. Such devices may include membership in regional and sub-regional groupings, as they may help the country to maximize its benefits and improve its bargaining and negotiating power in the international market. Membership of international organizations such as the WTO is also important.

_kelas1 S Sudan is in the process of accession to The World Trade Organization (WTO). It is generally believed that membership of this organization, which presents a forum for the discussion of the trade disputes, will give Sudan some form of protection against unfair competition. Overall, Sudan has the potential and ability to compete in international markets, but guidelines in this regard should be developed and strictly adhered to.

_kelas1 S It ought to be remembered that Sudan economy is highly vulnerable to weather conditions since any major decline in agricultural output automatically leads to very low supply of exports. Sudan’s exports are predominantly primary commodities whilst imports are intermediate inputs, machinery and some finished goods. Such structure of exports and imports does not guarantee a long-term solution to the foreign exchange and also poses serious questions for the servicing of the country’s foreign debt. By and large, the country’s exports cannot compete on the world market if the status is maintained unchanged because of the low agricultural productivity and the poor marketing services and structures.
Notwithstanding these constraints, Sudan has a great potential for exports. Many new products could make the foundation of Sudan’s exports industry. Among the many agricultural product possibilities are live animals and meat, horticultural products (fresh fruits and vegetables) and mineral products. These commodities serve as examples of the type of products that Sudan’s exports could be diversify into. In the identification of export potentials, sustainability of supply, market prospects, quality requirements and their attainment, prices to be fetched, the prospects of meeting delivery schedules, environmental factors all need to be considered.

Sudan also has a great potential in exporting processed versions of the present raw form exports. A significant expansion in the value added of exporting could be achieved in this regard. Given the existing production capacity, exports of sugar, processed fruits and vegetables, gum Arabic and Karkadeh products, and textiles (in the form of yarn, grey cloth and fabrics) may be possible. It is not wise, however, to diversify in all these products at present as some are relatively more capital-intensive and/or skill-intensive and many of them need a reasonable and significant scale of improved efficiency. The success in this venture requires the provision of the necessary export supporting services.

Diversification into new lines of production was centre-stage in the last Ten Year Comprehensive strategy (1992-2002). Recent changes in government policies emphasized export diversification strategy. The new policy initiative reflects a number of changes which aimed at mobilizing and encouraging both local and foreign investors. The government has also accepted the concept of export processing zones and/or free trade zone, which facilitate incentives for priority sectors, such as those producing for export.
7.2 Recommendations:

The following recommendations are based on the results obtained:

- The long lag with which devaluations were found to produce an expansionary effect on output through its effect on current account indicates that currency depreciations cannot be used as a quick remedy for recessions. Consecutive short-run depreciations of the currency should also be avoided because they result in a sustained negative impact on real output that delays the expected positive effect.

- A possible reason for the slow adjustment of output is the fact that Sudan exports and imports are not very responsive to the changes in the relative prices caused by devaluations. Increasing the response of exports requires hard work to develop Sudan’s export sector, diversify and improve the quality of its products and, above all, remove the bureaucratic obstacles that have for years weighed heavily on it.

- An increase in the imported input prices raise the cost of production and consequently reduce real income. This suggests the need for the Sudan economy to decrease its reliance on imported factors to contain the contractionary effect.

- Government intervention may still be needed to correct undesirable movements in the real exchange rate. This is especially recommended in the current period until the economy makes a full transition to the adopted flexible exchange rate system in which monetary policy assumes a bigger role in stabilizing the economy. This increased role will definitely require a carefully developed monetary policy and a strengthening of the institutional capacity of the Central Bank of Sudan.

- The government should diversify the productive and exporting capacities of the agricultural, industrial, mining and livestock sectors by directing FDI to
these sectors, giving fiscal and non-fiscal incentives to private investors to invest in these sectors and adopting sound exchange rate policy. In the past, the CBoS has retained a highly inflated and overvalued exchange rate, which has adversely affected Sudanese non-oil exports, making them less competitive in international markets.
References:


BAHMANI-OSKOOEE, MOHSEN., (1986), "Determinates of international Trade Flows:
- IMF., (1997), World Economic Outlook, Washington, DC.


- PRASAD, S., (2000), Determinants of Exports in Fiji, Suva, Department Reserve Bank of Fiji.


- THOMAS, R.L.(1997), Modern Econometrics An Introduction, Manchester


- الإسكندرية: مؤسسة شباب الجامع.

- حشيش، عادل، شهاب، مسعود. (2003). أساسيات الاقتصاد الدولي. (الطبعة الأولى) لبنان:

- منشورات الملكية الحقوقية.


- الجامعة.

- مهران، حاتم. (1999) محاضرات في النموذج الكلاسيكي للتجارة الدولية. مدни: دار جامعة

- الجزيرة للطباعة والنشر.

- مهران، حاتم. (1999) محاضرات في النموذج النيوكلاسيكي للتجارة الدولية. مدني: دار جامعة

- الجزيرة للطباعة والنشر.


- المصرية اللبنانية.


- العربية.


- الطبعة الأولى، عمان: دار وائل للطباعة والنشر.

- محمد نذى شافعي. (1967). مقدمة في العلاقات الاقتصادية الدولية، الطبعة الثانية، القاهرة: دار

- النهضة العربية.

- محمود النصر و عبد الله محمد شامية. (1998). مبادئ الاقتصاد الجزئي، الطبعة السادسة، عمان:

- دار الأمل.

- محمد خير الزبير. (1985). سياسات سعر الصرف و أثرها على الاقتصاد القومي و القطاع

- المصري. ورقة مقدمة لتنظيم سوق النقد الأجنبي في السودان، الخرطوم.


- المصريف العدد الرابع.


- المطبوعات.

175
- القاهرة: مطابع الهيئة المصرية العامة.
- فرع لبنان، الطبعة الأولى، بيروت.
- الإسكندرية: مكتبة و مطبعة الأشعاع الفنيّة.
- الاقتصادي والتعمير، الكويت.
- عادل عبد الله. (1966). أسس بناء نموذج قطري نموتي لتقديم السياسات الاقتصادية، المعهد
- العربي للتخطيط، الكويت.
- عبد القادر محمد عبد القادر عطية. (2005). الحديث في الاقتصاد القياسي بين النظرية و التطبيق;
- الإسكندرية: الدار الجامعية.
- مجدالاوي للنشر.
عثمان إبراهيم السيد. بدون تاريخ. الاقتصاد السوداني، الطبعة الثانية، الخرطوم: دار جامعة الخرطوم للطباعة والنشر.


صلاح الدين نامق. بدون تاريخ. أسس علم الاقتصاد الإشتراكي، الطبعة الثالثة، القاهرة: مطبعة دار المعارف.


خلف الله أحمد محمد عزبي. بدون تاريخ. الاقتصاد القياسي مفاهيم أساسية، جامعة بخت الرضا.

البحوث والرسائل الجامعية:

محمد عبد القادر آدم وآخرون، الصادرات الزراعية السودانية ومضامين الانضمام لمنظمة التجارة العالمية، تقرير بحثي رقم 47، معهد الأبحاث الاقتصادية والاجتماعية، وزارة العلوم والتقنية، الخرطوم، (2002).


التقارير:

جمهورية السودان بنك السودان، التقارير السنوية لبنك السودان.

الأمانة العامة لمجلس الوزراء، تسويق الصادرات السودانية، الخرطوم. (1964).

الدوريات:

سليمان سيد أحمد السيد، الزراعة وتحديات العولمة، مركز الدراسات الاستراتيجية، سلسلة دراسات استراتيجية، الخرطوم. (1999).
Appendix (A)

4A.1 Identification Test:

4A.1.1 The Rank Condition:

The rank condition tells us whether the equation under consideration is identified or not.

To apply the rank condition we proceed as follows:

The simultaneous equation in tabular form are:

Table (4A-1): Tabular form of SEM

<table>
<thead>
<tr>
<th>Yt</th>
<th>Ex_t</th>
<th>Exrate_t</th>
<th>L_t</th>
<th>WY_t</th>
<th>Im_t</th>
<th>Inf_t</th>
<th>RYG_t</th>
<th>BT</th>
<th>Exrate_{t+1}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

2-Strike out the coefficients of the row of the production function:

3-Strike out the columns corresponding to the production function coefficients in 2:

Table (4A-2): Coefficients of the variables in SEM but not in the production function

<table>
<thead>
<tr>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>0</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
4-The entries left in the table are only the coefficients of the variables included in the simultaneous equation but not in the production function. From these entries, a possible matrix of order M-1 with non zero determinant obtained as follows:

\[
\begin{bmatrix}
1 & 1 & 0 & 0 \\
0 & 1 & 0 & 0 \\
0 & 1 & 1 & 0 \\
0 & 0 & 0 & 1
\end{bmatrix} \begin{bmatrix}
1 & 1 & 0 \\
0 & 1 & 0 \\
0 & 1 & 1 \\
0 & 0 & 0
\end{bmatrix}
\]

\[D1-D2 = 1-0 = 1\]

Following the same procedure for the export function, a possible matrix of order M-1 with non-zero determinant obtained as follows:

Table (4A-3): Coefficients of the variables in SEM but not in the export function

\[
\begin{bmatrix}
1 & 1 & 1 & 0 & 0 & 0 \\
1 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 1 \\
0 & 0 & 1 & 0 & 1 & 0
\end{bmatrix}
\]

\[
\begin{bmatrix}
1 & 1 & 0 & 0 \\
0 & 1 & 0 & 0 \\
0 & 0 & 1 & 0 \\
0 & 1 & 0 & 1
\end{bmatrix} \begin{bmatrix}
1 & 1 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1 \\
0 & 1 & 0
\end{bmatrix}
\]

\[D1-D2 = 1-0 = 1\]

Following the same procedure for the import function, a possible matrix of order M-1 with non-zero determinant obtained as follows:
Table (4A-4): Coefficients of the variables in SEM but not in the import function

\[
\begin{pmatrix}
0 & 1 & 0 & 0 & 0 \\
1 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 \\
1 & 0 & 0 & 0 & 1
\end{pmatrix}
\]

\[
\begin{pmatrix}
1 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 \\
0 & 0 & 1 & 0 \\
0 & 0 & 0 & 1
\end{pmatrix}
\begin{pmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1 \\
0 & 0 & 0
\end{pmatrix}
\]

D1-D2= 1-0= 1

Following the same procedure for the exchange rate function function, a possible matrix of order M-1 with non-zero determinant obtained as follows:

Table (4A-5): Coefficients of the variables in SEM but not in the exchange rate function

\[
\begin{pmatrix}
1 & 0 & 1 & 0 & 1 & 0 \\
0 & 1 & 0 & 1 & 0 & 0 \\
1 & 0 & 0 & 0 & 1 & 0 \\
0 & 1 & 0 & 0 & 1 & 1
\end{pmatrix}
\]

\[
\begin{pmatrix}
1 & 0 & 1 & 0 \\
0 & 1 & 0 & 0 \\
0 & 0 & 1 & 0 \\
0 & 0 & 1 & 1
\end{pmatrix}
\begin{pmatrix}
1 & 0 & 1 \\
0 & 1 & 0 \\
0 & 0 & 1 \\
0 & 0 & 1
\end{pmatrix}
\]

D1 – D2= 1-0 =1

**4A.1.2 The order condition:**

- The order condition tells us whether the equation under consideration is exactly identified or over-identified.
The production function excludes six variables and hence by the order condition \( E=6>M-1=3 \), therefore, it is over-identified.

The export function excludes five variables and hence by the order condition \( E=5>M-1=3 \), therefore, it is over-identified.

The import function excludes five variables and hence by the order condition \( E=5>M-1=3 \), therefore, it is over-identified.

The exchange rate function excludes five variables and hence by the order condition \( E=5>M-1=3 \), therefore, it is over-identified.