Determinants of Real Exports in Sudan: An Empirical Analysis (1990-2013)

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Department of Economics

Faculty of Economics and Rural Development

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Date of Examination: 16/2/2017
Dedication

To My Mother

To My Father

To My Brothers: Eltipe, Adel, Mubarak, Elhadawy.

To My Sisters: Sua'ad, Eslam, Abrar

To my family
Acknowledgement

Foremost, my deepest thank to my God before and after for giving me the ability to accomplish this work.

I would like to thank my Supervisor Dr. Mutasim Ahmed Abdelmawla mohamed for his guidance, comments, helpful suggestion and constructive criticisms. Also many thanks to my co-supervisor Dr. Omran Abbas Yousif Abdallha for his good supervision, encouragement and assistance during the research period. Sincere appreciation is also extended to the staff of the Department of Economics, University of Gezira. I am also grateful to my Parents for their encouragement and support.

I am also grateful to my friends and colleagues who supported and encouraged me. Special thanks to my friend Jamma Masoud Khaled Eltaeeb for helping and support.

Finally, great thanks to those who supported, helped and encouraged me to accomplish this work.
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Abstract

Exports are considered as one of the most important economic indicators for increasing foreign resource revenues to support economic growth and bridge the gap of financial resources. This research examined from an empirical point of view, the impact of some macroeconomic variables on Sudan’s real export over the period (1990-2013) taking into consideration real gross domestic product, economic infrastructure, and exchange rate as explanatory variables. The importance of the research stems from the fact that export earnings are considered among the essential factors that enhance economic growth. In addition to that, exports significantly contribute to the main productive sectors of the economy by providing the required financial resources and creating job opportunities. The research data were collected from official sources namely, the Central Bank of Sudan and the Central Bureau of Statistics, and the Ordinary Least Squares (OLS) method is applied to estimate the log-linear form of the specified model. The results indicate that real exports in Sudan are highly responsive to changes in real GDP, while less responsive to exchange rate devaluation and infrastructure. Based on the research findings, the research recommends providing adequate financial resources for the productive sectors of the economy for enhancing production and stimulating exports. Exchange rate stabilizing policies should also be adopted for reducing the gap in exchange markets and for improving the purchasing power of the home currency, which will no doubt impact positively on exports performance. Rehabilitation of economic infrastructure is highly recommended for reducing the cost of transportation and making exports more competitive in the international markets.
محدودات الصادرات الحقيقية للسودان: دراسة تطبيقية (1990-2013م)
محمد دفع الله عبد الله بابكر
درجة الماجستير في إقتصاديات التنمية: 16/2/2017م
قسم الاقتصاد – كلية الاقتصاد والتنمية الريفية
جامعة الجزيرة
الملخص 

الدراسة تعتبر الصادرات من أهم المؤشرات الاقتصادية التي تعتمد على توفير العملات الأجنبية لزيادة النمو الاقتصادي وسد فجوة التمويل. فحص هذا البحث من وجهة النظر التطبيقية، تأثير بعض المتغيرات الاقتصادية الكلية على صادرات السودان الحقيقية خلال الفترة (1990-2013) بالأخذ في الاعتبار الناتج المحلي الإجمالي الحقيقي، البنية التحتية الاقتصادية، وسعر الصرف تم تفسيرها. تنبع أهمية البحث عن حقيقة أن عائدات الصادرات تعتبر من العوامل الضرورية لتعزيز النمو الاقتصادي. بالإضافة لذلك، تساهم الصادرات بصورة جوهرية في القطاعات الإنتاجية للاقتصاد بتقديم الموارد المالية المطلوبة وخلق فرص التوظيف. تم جمع بيانات البحث من مصادر رسمية تمثلت في بنك السودان المركزي والجهاز المركزي للإحصاء، وطبقت طريقة المربعات الصغرى العادية (OLS) لتقدير الصيغة اللوغاريتمية للنموذج الذي تم توصيفه. تشير النتائج إلى أن الصادرات الحقيقية للسودان تستجيب بدرجة عالية للتغيرات في الناتج المحلي الإجمالي الحقيقي، بينما تستجيب بدرجة أقل لخفض سعر الصرف والبنية التحتية. بدأ باستنتاج البحث، بوصي البحث بتحقيق موارد المالية كافية للقطاعات الإنتاجية في الاقتصاد من أجل زيادة الإنتاج وتعزيز الصادرات. كذلك، ينبغي تبني سياسات الاستقرار في سعر الصرف لتقليل الفجوة في أسواق سعر الصرف، ومن أجل تحسين القوة الشرائية للعملة المحلية، والتي لا شك سوف تتفعل إيجاباً على أداء الصادرات. تعتبر إعادة تأهيل البنية التحتية الاقتصادية في غاية الأهمية لتقليل تكاليف النقل وجعل الصادرات أكثر تنافسية في الأسواق العالمية.
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Chapter One
General Introduction

1.1 Introduction:

Theoretical arguments on the export led growth nexus are divergent. Standard proposition of the neoclassical type suggests that good export performance and "outward orientation" make major contribution to economic growth firstly by increasing specialization, expanding the efficiency, and raising benefit of comparative advantage, secondly, by offering greater capacity utilization, thirdly, by offering greater economies of scale due to an enlargement of effective market size, and fourthly, by inducing more rapid technological changes (World Bank, 1993). Along similar lines, Abdaldaim (2015) argued that, exports represent the backbone of the economy in developing countries by being the main source of hard currency and the major contributor to economic growth.

The backbone of the Sudanese economy since 1970s is the agricultural sector, which represents nearly 40% of GDP. Until the mid-1980s, traditional irrigated cotton was the Sudan's main exported product, which represented almost half of the total exports in the 1970s. Oilseeds, Gum Arabic, livestock, and sorghum (Dura) make up most of the balance. The industrial sector in Sudan was lagging behind, contributing only 12-15% of GDP (Almosharaf and Tain, 2014). According to the Integrated Framework Program (IFP, 2008) of Sudan, improvements in trade institutions are needed to convert measures to raise productivity, reduce trade costs, and rationalize the incentive regime into a coherent trade strategy that can boost exports and reduce poverty.

Thorbecke (2012) argued that Germany’s nominal exchange rate has remained weaker because it is linked to weaker euro-zone economies. Germany’s real exchange rate also depreciated vis-à-vis euro-zone countries after 2000 because German firms and workers controlled unit labor costs. His paper investigated how exchange rate changes affect German exports. Results from Johansen maximum likelihood and dynamic ordinary least squares (DOLS) estimation indicate that the export elasticity for the unit labor cost-deflated exchange rate equals (0.6). Results from panel DOLS estimation indicate that price elasticities are much higher for consumption goods exports than for capital goods exports and for exports to the euro-zone than for exports outside of it.
These results imply that Germany’s internal devaluation after 2000 contributed to a surge in exports to Europe.

Africa’s exports are unusually concentrated on agricultural and processed primary products. The share of manufactures and processed items in Africa’s exports are unusually small (Woo, and Mayer 1998). Thirwall (2000) argued that primary commodities have both low price and income elasticity of demand, which means that when supply increases price can drop dramatically, and demand grows only with income.

Sisay (2010) argued that, high dependence of Ethiopia on primary exports has many drawbacks for the country. Firstly, traditional exports has been dominated by declining terms of trade, which made export earnings not to increase well enough despite increased export volumes, despite the recent spikes in value of traditional exports. This revealed from the fact that unit value of exports was 116 in 1981 while it declined to 81 in 2004 showing nearly a 30% decline in 24 years. Secondly, exports of traditional exports do not have much linkage effects in the economy because mostly they are send raw. Terms of Trade was found to have a significant negative impact on merchandise exports while insignificant impact on manufacturing exports. As theoretically expected, trade liberalization, proxy by share of trade in GDP, was found to positively influence merchandise exports while it was found to have an insignificant influence on manufacturing exports.

1.2 The Research Problem:

Sudan like other Sub Saharan Africa countries has been experiencing economic crisis since the late 1970, represented among others, in the balance of payments (BOP) deficit, mounting external debt, volatile export earnings, deficit in the government budget, and general price level fluctuations. In particular, the BOP has been deteriorating for a long time due to low responsiveness of world markets to the Sudanese exports, which are characterized by being primary goods. Along the same line, the weakness of macroeconomic policies affected the foreign trade sector negatively.

1.3 The Objectives of the Research:

The main objective of this research is to highlight the issue of export promotion in Sudan. More specifically, this research tries to examine from an empirical point of
the impacts of real Gross Domestic Product (DGP), Infrastructure (Transportation and Communication), and exchange rate on the Sudanese real exports during the period (1990-2013).

1.4 The Importance of the Research:

The importance of this research stems from the fact that export earnings are considered among the essential factors that enhance economic growth. In addition to that, exports significantly contribute to the main productive sectors of the economy by providing the required financial resources and creating job opportunities.

1.5 The Research Methodology:

The methodology that will be used in this research is analytical framework by using the Ordinary Least Squares (OLS) technique. Data covering the period (1990-2013) are obtained from the Central Bureau of Statistics and the Central Bank of Sudan annual reports, to estimate a log-linear relationship between real exports on the one hand, and the real GDP, infrastructure, and exchange rate on the other hand.

1.6 The Hypotheses of the Research:

This research hypothesizes that:

(a) Real exports respond positively to changes in real GDP.
(b) Economic infrastructure stimulates real export earnings.
(c) Exchange rate devaluation impacts positively on real exports.

1.7 The Organization of the Research:

The rest of this research is organized as follows: Chapter (2) reviews relevant literature, while chapter (3) is devoted to exports in Sudan. Chapter (4) discusses the research methodology, data and empirical results. Chapter (5) includes the conclusions and recommendations.
Chapter Two  
Literature Review

Exports of Goods and Services include the transfer of ownership goods in the home country to those residing in other countries, and also the transfer of services provided by resident producers to the residents in the other countries. There is huge numbers of studies that investigate the impact of Real Gross Domestic Product, Exchange Rate, and Transportation Communication on Real Exports.

Export earnings assume vital importance not only for developing countries, but also for developed countries. Developed countries mainly export capital and final goods, while the main part of export of developing countries consists of mining-industry goods especially natural resources. According to export-led growth hypothesis, increased export can perform the role of “engine of economic growth” because it can increase employment, create profit, trigger greater productivity and lead to rise in accumulate on of reserves allowing a country to balance their finances (Emilio, 2001).

The last years have seen substantial progress for the Sub Saharan African (SSA) countries. The GDP growth in the SSA countries was 4.6% in 2012, while investments have increased from 15.9% of GDP in 2000 to over 22% of GDP in 2012 (World Bank, 2013). Despite the fact that the medium-term growth of the Sub-Saharan Africa region has been strong, the debate over the quality of this development continues, especially in reference to the composition of the export basket. The export basket usually consists of a small range of export products, a fact that has consequences for the countries’ long-term growth prospects. In 2013 Sub-Saharan Africa is a region that exhibits a high dependency on primary products such as copper and iron. The export industry in various SSA countries is still based on a small number of primary products, which is in contrast to many other developing countries that have experienced a shift from primary commodities to manufacturing (Collier, 2002). For this reason export diversification has been a focal point in the discussion on how to improve the economic performance of the SSA countries.

In same the context, there are challenges for countries with natural resources abundance such as oil in comparison with other countries. The main point is that in parallel with windfall of oil revenues these countries have to pay more attention to the development
of the non-oil sector as well as its export performance (Sorsa, 1999). Because in the most cases oil driven economic development leads to some undesirable consequences such as Dutch Disease in the oil rich countries.

The export led growth hypothesis essentially to motivate an empirical exercise of this nature. The export led growth hypothesis as stated earlier, postulates that exports are a main determinant of overall economic growth. The theoretical rationale for this hypothesis hinges on a number of arguments which include the following: Firstly, that the export sector may generate positive externalities on non-export sector through move efficient management styles and improved production techniques (Feder, G 1983). Secondly, export expansion will increase productivity by offering potential for scale economics (Helpman and Krugman, 1991). These argument have recently been extended by the literature on “endogenous” growth theory which emphasizes the role of export on long run growth via a higher rate of technological innovation and dynamic learning from abroad (Lucas, 1988; Rome, 1986; Grossman and Helpman, 1991, 1995; Edwards, 1992; Alisana and Rodrick, 1999).

It has been acknowledged that macroeconomic variables, such as exchange rate and inflation play an important role in influencing the exports performance. In particular, exchange rate is an important factor in promoting export growth, diversification and external competitiveness of goods produced in the country (United Nations Conference on Trade Development; UNCTAD, 2005). Indeed, real exchange devaluation fosters the internal production condition and enhances the competitiveness of the goods and leads to diversification of exports (Oyejide, 2007 and Fugazza, 2004). On the other hand, exchange rate overvaluation undermines the exports competitiveness and result in negative impact on export growth. That is, overvaluation of the domestic currency acts as a tax on exports, and hence represses their prices (in domestic currency) relative to the prices of home goods. This distortion in the incentive structure penalizes exporting activities and hence makes their production relatively less attractive than that of home goods (Oyejide, 2007).

Mahran (1984) used Cob-Douglas production functions rather than the fixed coefficients (Leontief) function for purpose of investigating exports supply response in the south. His results suggest that a fall in the relative price (South’s terms of trade) will
unambiguously lead to a fall in exports supply of basic goods by the south. Therefore, the export supply function is unambiguously normally sloped and the perverse result of Chichilnisky (1981) and Lysy (1983) cannot arise in the present case (quoted in Gomaa, 2005).

Since the export promotion strategy has become important in accelerating economic growth, development literature has shifted its emphasis to identification of the factors that affect the response of the exports to policy packages related to such a strategy. Many studies on export flows assume that exports determined by supply side variables such as taxes domestic price subsidies and tariffs fewer studies focus on the demand side determinants of exports such as the demand for imported inputs in world markets. This gap in the literature seems to have risen because the LDCs assumed to be small and face an infinitely elastic demand for their exports, so that changes in demand can influence exports only through changes in world price (Mohammed, 2006).

Mahran (1990) investigated the empirical relationship between economic growth and export expansion in 12 Arab countries for which data was available. The periods covered by the analysis differ for different countries dictated mainly, by data availability however; for most countries the data covered the period 1966-1986. The results reveal that changes in the trade have no significant impact on economic growth in many of the Arab countries been examined including Sudan. These results confirm to the stylized fact that export expansion in these economies does not respond to the change in the terms of trade.

Mohamed et al (2009) conducted panel data estimation to account for the role of the real exchange rate and other economic fundamentals such as macroeconomic stability, terms of trade, capital goods investment, external demand and human capital on the export performance of Indonesia, Malaysia, Singapore and Thailand. They find that appreciation of real exchange rate; also, its misalignment and volatility have strong negative impact on export performance.

By employing Pooled Mean Group over the period of (1970 – 2003), Benbouziane and Benamar (2007) investigated the impact of exchange rate regime on the real sector in some Middle East and North Africa Countries including Algeria, Bahrain, Iran, Kuwait,
Libya, Saudi Arabia, and Sudan which are oil rich. Study finds that as a whole, exchange rate overvaluation reduces competitiveness of manufactured goods in these countries.

Defining the exchange rate policy is one of the most important issues in the response of the trade balance to the real exchange rate (RER). The impacts of currency depreciation on a country’s trade balance have been extensively examined in the empirical literature in the context of the Marshal Lerner condition and the J-curve theory. According to the former, currency devaluation improves the trade balance only if the sum of the absolute values of import and export demand price elasticity exceeds unity. However; due to lag dynamics, the structure can be worse in the short run because of the inelastic demand for imports and exports in the immediate aftermath of an exchange rate change. Recently, numerous papers have tested the Marshal Lerner condition and J-curve. For example, Bahmani-Oskooee and Brooks (1999) have tested the Marshal Lerner condition for 30 developed and developing countries for the period 1960-1992. Gomes and Paz (2005) found the existence of a long-run relationship between the trade balance, RER, foreign and domestic income for Brazil and Malaysia during 1965-2002. Bahmani-Oskooee and Ratha (2004) provided a good survey on the Marshal Lerner condition and J-curve, showing inconclusive results for this issue.

Sisay (2010) argued that Ethiopian exports are mainly traditional. Merchandise exports have been growing at an average rate of 7% during 1981-2008, while manufacturing exports were growing at an average rate of 4%. Real merchandise exports were 1.16 billion USD$ in 2008, while manufacturing real exports were 92.3 million USD; 8% of merchandise exports. Merchandise export revenue was highly dependent on non-manufacturing exports, where the average share of manufacturing exports during (1981 – 2008) was around 14%.

Agasha (2007) used VEC model to analyze the determinants of export growth rate in Uganda. The researcher used quarterly data from 1987 – 2006. The researcher estimated export growth rate as a function of GDP, terms of trade, real exchange rate, foreign price level and foreign direct investment (FDI). The results from the long run co-integrating regression showed that GDP, real exchange rate and terms of trade affect export growth rate positively and significantly, while foreign price level affects export
growth rate negatively and significantly. FDI is found to be insignificant.

Asif and Rashid (2010) concluded that devaluation is not much in improving the exports to imports ratio, which is proxy for trade balance or balance of payments. On the contrary, the short run dynamics showed that there is Granger causality between REER and X/M. Based on the findings of the study, it is suggested that policy makers should improve the trade balance by considering the alternative measures for devaluation as the successive devaluations have not made a significant change in the trade balance.

Rodrik (2008) provided evidence that undervaluation of the currency (a high real exchange rate) stimulates economic growth. This is true particularly for developing countries. There is also some evidence that the operative channel is the size of the tradable sector (especially industry). These, dings suggest that tradable goods are disproportionately from the government or market failures that keep poor countries from converging towards higher-income levels. Represented two categories of explanations as to why this may be so, focusing on (a) institutional weaknesses, and (b) product-market failures. A formal model elucidates the linkages between the level of the real exchange rate and the rate of economic growth.

The United Nations Conference on Trade and Development; (UNCTAD, 2004) stated that infrastructure and related services interact with trade in goods and services in a complex way. Firstly, the cost and quality of infrastructural services are important determinants of the volume and value of international trade through the impact they have on cross-border transactions costs. Secondly, because sectors differ in terms of how intensively they use infrastructural services, the quality and cost of such services also affect patterns of comparative advantage and international specialization. Reliable and cost-effective infrastructure services are, for example, more important for trade within international production networks in advanced industries than for trade in non-perishable commodities. Thirdly, trade in infrastructural services may improve the quality and cost effectiveness of such services, and when that is the case trade in infrastructural services will stimulate trade in other sectors through the transactions cost channel. Infrastructural services, with the exception of business services, are subjected to market imperfections such as network externalities, significant scale economies and coordination failure.
Financial services are also subject to moral hazard and adverse selection. The underlying infrastructure often has the character of a public good. Because of these market imperfections, government regulation is often necessary and so is government intervention in the provision of underlying infrastructure. In some cases market imperfections have international dimensions. This applies in particular to the interface between national and international transport and communications systems, where common or compatible standards are necessary. It also applies to areas where international regulatory arbitrage can undermine domestic regulation. The fourth area of interaction between infrastructure services and trade involves regulation. Regulation is a very information-intensive activity and good telecommunications improve the ability of regulators to cooperate at the international level. Effective telecommunications provide a low-cost channel for searching, gathering and exchanging information, which in turn a key input in all economic activities. Hardly any business today can operate without telecommunications. For many industries, the telephone is the primary point of selling, and the Internet is an increasingly important channel for marketing, and for sales for some industries. Telecommunications networks provide the supporting infrastructure for such information flows and for Internet access. During the past few decades, technological progress in the telecommunications sector has been remarkable and there has been a rapid diffusion of technology as well. It is now possible for countries that have lagged in economic and technological development to switch to the most recent technologies at relatively low costs of adoption. In Africa, for example, 95 per cent of mobile lines were GSM in 2001, well above the world average of 70 per cent. The Republic of Korea has the highest rate of broadband penetration in the world, with almost twice as many lines per 100 inhabitants as Canada, the country with the second highest rate. Finally; it appears that the digital gap is narrower and narrowing faster than the income gap between rich and poor countries. Thus, while per capita GDP grew at almost the same pace in low-income and high-income countries during the period 1995-2001, the number of mobile phones per 100 inhabitants grew almost twice as fast in low-income countries.

Pedro et al (2009) argued that transport infrastructure investment reduces the cost of distance and enables firms to establish contacts over larger distances. They studied the
impact of transport-cost reductions on firms’ export behavior, accounting for the role of entry costs and other firms’ characteristics. Using Spanish data, we estimate dynamic probability models controlling for firms’ unobserved heterogeneity and for the simultaneity of firms’ export and location decisions. Their results provided support for a positive effect of domestic transport improvements on firms’ exporting probability for small and medium sized firms. They found a strong effect of previous export experience, suggesting high entry costs into export markets.

Another important factor affecting exports supply is the domestic transport infrastructure, which plays an important role, particularly at the early stages of export sector development (UNCTAD, 2005). It has been argued that internal infrastructure including, roads, ports and customs represents an important factor influencing the exports production and diversification (Biggs, 2007 and Elbadawi et al, 2006). Inefficient and undeveloped infrastructure increases the cost of exports production and market access. In Africa, for instance, infrastructure is considered as main critical challenges for export growth and diversification, particularly in landlocked countries (Taye, 2009).
Chapter Three

Exports in Sudan: A Review

This chapter includes the literature related to exports in Sudan. Exports are the source of most financial resources in the economy. Yasseen, Eljack, and Ahmed (2015) argued that Sudan is predominately an agricultural country. Agriculture is the basic economic activity accounting for more than 35% of Gross Domestic Product (GDP). The average share of exports in GDP for the period 2000-2014 is 35.7%. The exports of Sudan are dominated by agricultural products. Sudan is the main exporter (80%) of gum Arabic in the world. Other exporting countries include Chad, Nigeria, Senegal, Ethiopia and some other African countries. Exports of gum Arabic fluctuated due to unstable policies, competition from other countries and unstable production. Their study was conducted to examine the effects of Sudan gum Arabic exports prices on the quantities during the period (2000-2014). The study used secondary data obtained from relevant official sources. It carried out the percentage to calculate the concentration of gum Arabic by countries and companies. The results of the study illustrated that the proceeds of Gum Arabic exports fluctuated during the period under consideration, but in general overview it has an increasing trend and the export price and total production have positive effects on exports quantities.

Like other developing countries, agriculture in Sudan is a dominant sector and contributes on average with about 40% to the total GDP and employs about 75% of total population. Agriculture also provides raw materials for the manufacturing sector, which is mainly agro-industries like sugar and food industries. Most importantly, since the independence, the agricultural exports represent about 90% of total exports and have been considered as the main source for the country’s foreign exchange reserves. Therefore, most of development plans in Sudan during the next half of last century have focused primarily on the promotion of the agricultural exports. However, the exploitation of oil in 1999 has resulted in changing the Country’s production structure, and hence affected the exports performance of the other sectors. The exports have increased dramatically, which are mainly driven by oil exports. That is, the exports of goods and services increased from 5.2% before oil exploitation to 16.3% after that. This is because
the oil boom raised the value of exports by more than 400% (African Development Bank, 2012).

Many researchers have examined the determinants of Sudan’s exports. For example, Siddig (2011) argued that devaluation in Sudan would succeed in increasing domestic price of tradable goods and encourage producers to export. However, that will affect domestic consumer negatively because the increase in price is unaccompanied by similar increases in the households income. This could also lead domestic production to deteriorate at certain time point, as the imported goods. Therefore; devaluation would encourage producer of some sectors to increase their output and exports, while hindering consumers to enjoy the previously cheaper imported and domestic commodities, as the domestic price increases.

Konandreas (2009) stated that Sudan suffers from a poor transportation network and underdeveloped trade facilitation logistic which are essential for increasing competitiveness. The main problem is the vast territory and the extensive nature of agricultural activity, making both the assembly of produce and their transportation to Port Sudan an expensive and logistically complicated operation. The recently completed DTIS study85 contains a comprehensive and succinct analysis of transportation and logistics issues faced by Sudan, which are summarized here. As regards transportation and logistics difficulties in general, issues noted included: The difficult geography complicated by the aftermath of conflict, inadequate transport infrastructure in the North, but freight transport is improving, high transport and logistics costs hindering export competitiveness, lack of logistics services providers, need for further development of freight forwarding industry and lacking system of inland container depots and not taking advantage of container development favoring international trade. A critical constraint so far for perishable agricultural commodities such as fruits and vegetables is the near total lack of adequate cold storage and logistics facilities at Khartoum airport. A modest cold storage facility presented completed at Khartoum airport. It would be possible to store temporarily there fruit and vegetables under controlled temperatures while waiting to be exported through Khartoum airport. It anticipated that, in addition to some basic services such as cleaning, grading, packing and storing produce for export, the facility will also arrange for export inspection and the preparation of documentation for private vegetable
growers. Larger and more modern cold storage facilities envisaged under the new Khartoum airport, although it will be some time before is completed. For all commodities, road transportation to the port is costly as exporters have to pay the cost for empty returning vehicles from land ports after delivering their consignments on board. These add to their heavy transaction costs related to export fees and taxes making the price of exported commodities of Sudan uncompetitive in world markets. Sudan is a price-taker in world markets where prices are determined by the forces of supply and demand. High quality and price competition from other countries, as well as speculation among Sudanese exporters at times, were among the quoted reasons undercutting prices of Sudanese exports.

Sudan’s export competitiveness is further, undermined by high transport costs and recent exchange rate appreciation. Charges at Port Sudan are the highest in the region. Shipments frequently delayed at the port for 5–6 weeks before released, which further increases costs. The relative absence of international trade logistics firms limits the country’s access to efficient global logistics services, thereby making it hard for Sudanese firms to take full advantage of the containerized shipping revolution and to integrate in to global supply chains. Long marketing chains increase the cost of getting goods to Port Sudan. Sudan’s internal transportation infrastructure process rehabilitated (in the North) and constructed (in the South). These improvements are essential for connecting rural producers to world markets. Exchange rate appreciation has also hurt Sudanese exporters in recent years. The real exchange rate appreciated by 40 percent in 2005–2006, directly affecting the sales price of exports and profitability to producers. Evidence from value chain analysis shows the nominal exchange rate changes are significant for key agricultural export products, and reinforces the need for exchange rate policy to take into account competitiveness effects (IFP, 2008).

In addition to the fact that Sudan’s balance of payments constraint was relaxed significantly when oil exports began in 1999, overall the Sudanese economic fundamentals have improved, with an average real GDP growth of 4.7% during 1990-2000 compared to 1.2% during 1985-1990. In fact, over the past six years, with an average of 6.5%, the GDP growth rate was among the highest rates in developing countries. However, Sudan still confronts some serious economic problem. Foreign debt
still stands at (34.0) billion Dollars, a huge figure for Sudan that has GDP of about 9.0 billion Dollars. Furthermore, the armed conflict in Darfur and eastern Sudan means that military spending remains high despite the end of civil war in the South. Inadequate infrastructure and limited sources of investment financing are major obstacles to the development of the economy (Elhiraika and Abu Ismail, 2005).

Using Ordinary least squares technique and annual data covering the period (1982-2001), Gomaa (2005) examined the perverse export supply response for Sudan. She tested the hypothesis that the volume of exports and term of trade negatively correlated. The results reveal that there is a statistically significant negative correlation between Sudan’s exports and the terms of trade.

Mohammed (2004) investigated the effect of devaluation of Sudanese pound on the competitiveness of medium staple cotton grown in Gezira scheme for the period (1989-2000). His results suggested that depreciation of exchange rate under liberalization policies seems to have had negative effect on competitiveness of this crop over the period under study. Accordingly, that might be attributed to a number of factors including the increase in the cost of imported and domestic inputs used in the production of this crop, as result of liberalization policies. These results remain the same in spirit when the model estimated for the whole period (1970-1990). These results provide clear evidence that import substitution strategy has failed as development strategy especially if the sector remains under government control.

Hussein (2003) argued that export promotion strategy has played an important role in the development process during the period (1979-1989), while the import substitution strategy has not. This may be attributed to a number of factors can be summarized in poor infrastructure related to roads, electricity, as well as to the lack of spare parts due primarily to the scarcity of foreign exchange that characterized the 1980s.

The ration of exports to GDP estimated at 3.5% in 2003, while the average exports growth rate was estimated 4.8% during the 1970s, which increased to 9.8% by the beginning of the 1980s, and further to more than 12% during the 1990s when oil came into the national exports portfolio (Future Studies Centre, 2003).

The World Bank (2003) argued that since 1999, exports of oil has triggered significant changes in Sudan’s external position and relation. In two years, oil
established itself as the dominant export good from zero in 1998 to US$ 1.4 billion in 2000, accounting for 80 percent of exports. This created gain in the terms of trade was also registered. The national accounts indicate that while export volume grew in line with overall GDP during the 1990s, non-oil exports volume grew at an average rate of about 11 percent during (1991-2000) However; exports of cotton and gum Arabic for example declined over the years, and cotton exports overtaken by sesame exports.

According to Ali and Elbadawi (2002) given the structure of the economy, the composition of Sudan’s at independence dominated exclusively by primary products, with total exports amounting to less 65.4 million(ABOUT 23% of GDP). Cotton dominated Sudan’s exports with a share of 80% of total exports. Gum Arabic and groundnuts ranked second to cotton with a share of 7% each while melon-seed, hides, and skins ranked third with a share of 2% each.

Using ordinary least squares technique and annual time series data covering the period (1970-1998), Meezan (2000) examined the impact of fiscal and monetary policies on economic activities in Sudan. He tested the hypothesis that the money supply, government expenditure, and total exports have a positive impact on economic activity. The results reveal that most important single variable which has a significant positive effect on economic activity is exports. This suggests that export promotion have played a significant role in economic growth over the study period. On the other hand, neither monetary policy nor fiscal policy has had any significant impact on growth. This might provide an evidence of the failure of such policies and their ad hoc nature in inducing growth.

The consequences were localized famines, a substantial rise in the real price of food and the increased necessity for food imports. Several factors could explain this stagnation in Sudan’s exports in (1970-1993), 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. While price distortions appear to be crucial in explaining the deterioration in export performance, technological and structural backwardness 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 constrains to which Sudanese agriculture has been particularly prone, this points 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, this indicates that the fall in domestic productivity does not explain the whole story (Hag Elamin, 1997).

The National Salvation Revolution Government adopted a self-imposed Structural Adjustment Programs called the Three-Year National Economic Salvation Program “NESP” (1990-93). The major policies included reduction of export taxes and devaluation of the exchange rate where the Sudanese pound devalued initially by a factor of 500% against the US dollar. A new agricultural credit system has established by all commercial banks working as a “Consortium” to finance agricultural production. Price controls at production, factory and wholesale levels lifted. To achieve food security, the government reduced areas for cotton production and increased areas for wheat. A temporary ban on sorghum exports declared. Despite these positive developments, the share of exports in GDP continued its downward trend, though the real value of exports did not show a clear decline. Sudan's shares in total world exports fell from 0.016% in 1990 to 0.01% in 1993 (Hag Alamin, 1997).

Kadafor (1987) estimated an economic model that consists of three equations relating to cotton, oil seeds and gum Arabic. The objective of the study was to capture the main factors that affect Sudan's exports of major export crops and to formulate a trade policy for export promotion. The results of the study revealed that, with respect to demand for oil seeds exports only weighted average price of all varieties of oil seeds exported by Sudan is statistically significant, while Sudan’s total production and imports of Soya Beans by Europe and Japan are insignificant. Concerning the demand for gum Arabic exports, it was very much dependent on the price of gum Arabic in Europe, but domestic production and world production are insignificant. Lastly, for the case of demand for cotton exports, the world prices of cotton are found to be statistically significant, while the world textile consumption is not (quoted in Elbadawi,1995).

Hag Elamin (1992) examined the possible effect of relative prices change, resulting from devaluation or otherwise on export earnings. The effects of relative price
change on export earnings quantified by sowing export supply and demand equations in an equilibrium model where export earnings simulated under alternative relative price scenarios. The results suggest that an increase in real export price would result in only little improvement in export earnings given the present structure and composition of exports. This implies that Sudan’s export have poor growth prospects.
Chapter Four
Research Methodology, Data, and Empirical Results

4.1 Introduction:
This chapter focuses on the research methodology that will be adopted in the analysis, defines the sources of data, and discusses the empirical results.

4.2 Research Methodology and Data:
This chapter outlines the research methodology that will be used in the analysis of the findings and provides the empirical results. This research uses a multiple regression model, which consists of a single equation. The model incorporates three explanatory variables as macroeconomic variables namely, gross domestic product (GDP), exchange rate, and economic infrastructure represented in transportation and communication. The empirical model takes the following specific form:

\[ X = \beta_1 \text{GDP} + \beta_2 \text{TC} + \beta_3 \text{EX} + U_t \quad (1) \]

Where:

- X: Real Exports.
- GDP: Real Gross Domestic Product.
- TC: Economic infrastructure (expenditure on transportation and communication) as percent of GDP.
- EX: Exchange rate (units of domestic currency against a unit of foreign currency).
- U_t: The error term.

Since exports are part of domestic production, thus, enhancing domestic production matters for promoting exports. Improving real gross domestic product supports productive sectors for more production, because the economic growth promotes real exports growth through gains in productivity, which gives rise to comparative advantages in certain sectors that lead naturally to real export growth. Thus, real GDP is expected to enhance real exports (\( \beta_1 > 0 \)).

Rehabilitation of economic infrastructure facilitates the movement of people and the transportation of goods and services, plays a role in reducing costs, and
thereby encourages and stimulates exports. Accordingly, the coefficient of economic infrastructure is expected to be positive ($\beta_2 > 0$).

Theoretical arguments suggest that devaluation of exchange rate for the national currency reduces foreign price of exports, enhances flow of foreign direct investment, improves economic activities, and increases the competitiveness of exports. So, the coefficient of exchange rate is expected to be positive ($\beta_3 > 0$). However, for the devaluation policy to be effective, the exports of the country must be highly responsive to changes in exchange rate.

The Ordinary Least Squares (OLS) method will be applied to analyze data covering the period (1990-2013). The data on the variables of interest are collected from various sources; Central Bank of Sudan Annual Reports and Central Bureau of Statistics. Data on GDP are at constant prices, while expenditure on transportation and communication is calculated as percentage of GDP. The values of exchange rate are nominal. With regard to the dependent variable, the export revenues which are obtained in $\text{USA}$ are firstly multiplied by exchange rate to obtain export values in local currency, then nominal export values are divided by (CPI) to obtain the real terms. Data on all variables are reported in the appendices.

### 4.3 The Empirical Results:

To accomplish the objectives of the research, the analysis firstly begins with providing some descriptive statistics for the research variables as given in table (4.1).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Average</th>
<th>Standard Deviation (SD)</th>
<th>Coefficient of Variation (C.V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>2311.85</td>
<td>3037.05</td>
<td>1.314</td>
</tr>
<tr>
<td>GDP</td>
<td>26642.27</td>
<td>37293.58</td>
<td>1.400</td>
</tr>
<tr>
<td>TC</td>
<td>7.76</td>
<td>4.75</td>
<td>0.612</td>
</tr>
<tr>
<td>EX</td>
<td>2.00</td>
<td>1.35</td>
<td>0.674</td>
</tr>
</tbody>
</table>

**Source:** Own Calculations.

It is clear from table (4.1) that real GDP and real exports exhibited the highest degrees of volatility with estimated coefficients of variation of (140%) and (131%), respectively. Data regarding expenditure on transportation and communication as percentage of GDP.
are the most homogenous, with coefficient of variation of (61%). The average expenditure on transportation and communication as percentage of GDP is estimated at only 8%, and the average real export earnings at 2312 Million SDG. Furthermore, on average during the period (1990-2013), one US Dollar is exchanged for 2 SDG.

With regard to regression analysis, the OLS technique is applied to the log linear form of the empirical model in equation (1). The results are given in table (4.2), where the figures inside the parentheses are the t-ratios of the estimated parameters (elasticities) and those inside the square brackets are the P-values.

<table>
<thead>
<tr>
<th>Estimated Coefficient (elasticity) of the</th>
<th>F-Ratio</th>
<th>R²</th>
<th>D.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>GDP</td>
<td>TC(-1)</td>
<td>EX</td>
</tr>
<tr>
<td>-1.95</td>
<td>0.95</td>
<td>0.04</td>
<td>0.17</td>
</tr>
<tr>
<td>(-0.76)</td>
<td>(4.21)</td>
<td>(0.13)</td>
<td>(1.89)</td>
</tr>
<tr>
<td>[0.458]</td>
<td>[0.001]</td>
<td>[0.895]</td>
<td>[0.074]</td>
</tr>
<tr>
<td></td>
<td>90.03 [0.000]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.934</td>
<td></td>
<td>1.23</td>
</tr>
</tbody>
</table>

Source: Own Calculations.

According to the results in table (4.2), it is clear the overall estimated model is statistically significant at the %1 level as indicated by the (F) ratio. The explanatory power of the estimated relationship (R²) suggests that 93.4% of the variations in real exports are explained by the variations in real GDP, exchange rate, and economic infrastructure represented in transportation and communication. The Durbin – Watson statistic lies in inconclusive area at the 1% level. All expected signs of the explanatory variables are confirmed by the empirical results. According to t-ratios, it is clear that the estimated coefficient (elasticity) of real GDP is statistically significant at 1% level and the estimated elasticity of exchange rate is significant at 10%, while the estimated elasticity of the expenditure on transportation and communication as percentage of GDP is statistically insignificant. These estimated elasticities reveal that an increase by 1% in real GDP, exchange rate, and economic infrastructure will lead to increase in real exports by (0.95%), (0.17%), and (0.04%), respectively. These results illustrate that real exports in Sudan are more responsive to real GDP revealing that real GDP has potential effect on real exports in Sudan, a result which calls for the expansion and
diversification of production. The results also assert that real exports are less responsive to exchange rate devaluation. This result signifies that devaluation is not a suitable policy for enhancing real exports. In addition to that, the results showed that the elasticity of real exports with respect to infrastructure is quite small and statistically insignificant. This result may be due to the poor infrastructure that characterizes the Sudan Economy.

Based on the above results, the research recommends providing adequate financial resources for the productive sectors of the economy for enhancing production and productivity and thereby stimulating exports. Foreign trade policies should be re-formulated to give more incentives for the exporters. Exchange rate stabilizing policies should also be adopted for reducing the gap in exchange markets and for improving the purchasing power of the home currency, which will no doubt impact positively on the performance of the export sector. Lastly, rehabilitation of economic infrastructure particularly in the areas of roads and bridges is highly recommended for reducing the cost of transportation and making exports more competitive in the international markets. Diversification of transportation means matters in this regard. In particular, the country should focus more on establishing developed railway connections since railways are considered the cheapest means of transportation.
Chapter Five
Conclusions and Recommendations

5.1 Conclusions:
This research aimed to assess the impact of some macroeconomic variables particularly real GDP, exchange rate, and economic infrastructure on Sudan’s real exports. For this purpose, a log-linear regression model is employed and estimated using data over the period (1990-2013), which were obtained from Central Bank of Sudan and Central Bureau of statistics. The OLS method is applied for estimation purposes. The empirical results revealed that real GDP and exchange rate play positive and significant roles in stimulating real exports, while economic infrastructure is statistically insignificant although impacts positively. According to the estimated elasticities of the explanatory variables, real GDP turned out to be the most important single variable followed by exchange rate and lastly infrastructure.

5.2 Recommendations:
Based on the findings of this research, policies should focus on encouraging production in the sectors of agriculture and industry by providing adequate domestic financial resources, diversification of production, qualifying workforce, activation of forward and backward linkages among sectors, and attraction of more foreign direct investment not only to improve the exports, but also to bring foreign exchange and transfer technology. Foreign trade relations should be strengthened by eliminating all barriers and facilitating procedures and access to market knowledge. There is a high need to stabilize the exchange rate by regulating foreign exchange markets in order to reduce the cost of importing inputs and increasing reserves of foreign currency. Sudan’s real export earnings can also be increased by exporting manufactured goods rather than exporting raw materials and diversification of regional and international markets to which Sudan’s goods are exported. Improving economic infrastructure is highly recommended, particularly in the areas of transportation, communication, electricity, water, and bridges. This will no doubt reduce the cost of transportation and make Sudan’s exports more competitive in the international markets.
References


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## Appendices

### Table (1)

Real Gross Domestic Product (GDP), Real Exports (X) (in Million SDG), Exchange Rate (EX), and Expenditure on Transportation and Communication as Percentage of GDP (TC) in Sudan (1990-2013)

<table>
<thead>
<tr>
<th>Years</th>
<th>(1) GDP</th>
<th>(2) X</th>
<th>(3) EX</th>
<th>(4) TC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>7865.00</td>
<td>197.86</td>
<td>0.01</td>
<td>8.99</td>
</tr>
<tr>
<td>1991</td>
<td>10703.33</td>
<td>257.22</td>
<td>0.02</td>
<td>6.69</td>
</tr>
<tr>
<td>1992</td>
<td>17575.83</td>
<td>1226.25</td>
<td>0.13</td>
<td>4.04</td>
</tr>
<tr>
<td>1993</td>
<td>27098.57</td>
<td>3293.14</td>
<td>0.22</td>
<td>2.35</td>
</tr>
<tr>
<td>1994</td>
<td>41806.44</td>
<td>4656.89</td>
<td>0.84</td>
<td>2.03</td>
</tr>
<tr>
<td>1995</td>
<td>73631.64</td>
<td>8487.09</td>
<td>0.40</td>
<td>1.10</td>
</tr>
<tr>
<td>1996</td>
<td>129359.80</td>
<td>11180.74</td>
<td>0.46</td>
<td>0.68</td>
</tr>
<tr>
<td>1997</td>
<td>113643.50</td>
<td>7155.49</td>
<td>1.71</td>
<td>0.67</td>
</tr>
<tr>
<td>1998</td>
<td>93344.30</td>
<td>6007.70</td>
<td>2.37</td>
<td>0.81</td>
</tr>
<tr>
<td>1999</td>
<td>52439.55</td>
<td>3900.50</td>
<td>2.58</td>
<td>2.03</td>
</tr>
<tr>
<td>2000</td>
<td>25977.36</td>
<td>3571.71</td>
<td>2.57</td>
<td>4.41</td>
</tr>
<tr>
<td>2001</td>
<td>10988.80</td>
<td>1202.86</td>
<td>2.62</td>
<td>11.03</td>
</tr>
<tr>
<td>2002</td>
<td>5968.44</td>
<td>648.08</td>
<td>2.66</td>
<td>8.52</td>
</tr>
<tr>
<td>2003</td>
<td>4320.53</td>
<td>502.66</td>
<td>2.61</td>
<td>9.79</td>
</tr>
<tr>
<td>2004</td>
<td>2489.08</td>
<td>353.14</td>
<td>2.58</td>
<td>12.24</td>
</tr>
<tr>
<td>2005</td>
<td>2095.53</td>
<td>287.81</td>
<td>2.44</td>
<td>11.78</td>
</tr>
<tr>
<td>2006</td>
<td>2031.26</td>
<td>239.94</td>
<td>2.17</td>
<td>11.82</td>
</tr>
<tr>
<td>2007</td>
<td>1972.62</td>
<td>261.83</td>
<td>2.02</td>
<td>12.09</td>
</tr>
<tr>
<td>2008</td>
<td>2050.51</td>
<td>433.36</td>
<td>2.09</td>
<td>11.78</td>
</tr>
<tr>
<td>2009</td>
<td>2279.03</td>
<td>248.26</td>
<td>2.32</td>
<td>11.53</td>
</tr>
<tr>
<td>2010</td>
<td>2333.87</td>
<td>384.73</td>
<td>2.37</td>
<td>12.23</td>
</tr>
<tr>
<td>2011</td>
<td>2526.25</td>
<td>437.00</td>
<td>2.67</td>
<td>13.08</td>
</tr>
<tr>
<td>2012</td>
<td>3008.81</td>
<td>239.78</td>
<td>4.41</td>
<td>13.36</td>
</tr>
<tr>
<td>2013</td>
<td>3904.37</td>
<td>310.41</td>
<td>5.69</td>
<td>13.21</td>
</tr>
</tbody>
</table>

### Sources:

Colums (1), (2), and (4): Central Bureau of Statistics, Khartoum, Sudan. 
Colum (3): Central Bank of Sudan, Annual Reports (Various Issues).