THE IMPACT OF THE ECONOMIC PARTNERSHIP AGREEMENT WITH THE EUROPEAN UNION ON THE AGRICULTURAL TRADE OF SUDAN

Imad Eldin Elfadil Abdel karim Yousif [*1],
King Saud University, Kingdom of Saudi Arabia
Azharia Elbushra², University of Juba, Sudan
Azhari Ibrahim³, University of Khartoum, Sudan

Abstract: The objective of this paper is to investigate the impact of the Economic Partnership Agreement (EPA) with the European Unions (EU) on the agricultural trade of Sudan. More specifically it attempts to estimate the effects of the EPA on domestic production, demand and trade of agricultural commodities in Sudan. A multimarket model with Armington specification is applied to achieve the paper objectives. The model is based on the average data of years 2007 and 2008 for the main agricultural exports of Sudan to the EU, namely gum Arabic, sesame, cotton and groundnuts. The model results reveal that, removal of tariff between Sudan and the EU resulted in an increase of the export of cotton, sesame, groundnuts and gum Arabic by 65%, 63%, 33% and 62%, respectively, and decreasing their exports to rest of the world. This is attributed to the increase of the EU demand for these products in response to the reduction of their domestic price after application of zero tariff. The net result for Sudan is the increase in aggregate output of the agricultural production and improvement in foreign exchange earnings with slight negative impact on domestic demand. To benefit from the opportunity provided by the EPA, Sudan should improve the quality and standards of its agricultural exports in order to meet the EU market regulations.

Keywords: *EU, Sudan's agricultural trade, armington specification*

INTRODUCTION

The relations between African Caribbean and Pacific (ACP) countries[4] and European Union (EU) countries, started in 1963 when they signed Yaoundé I Agreement, followed by Yaoundé II in 1969, and Yaoundé III in 1973. In 1975 they signed Lome I Agreement followed by Lome II in 1980, Lome III in 1985 and Lome IV in 1990. In 23rd of June 2000 the Cotonou Partnership Agreement (CPA) was signed. The key principles of the

[*1] Dr Imad Eldin Elfadil Abdel karim Yousif, Department of Agricultural Economics, College of Food and Agricultural Science, King Saud University, P. O. Box 2460, Riyadh 11451, Kingdom of Saudi Arabia, Email: adfk9@yahoo.com
[2] University of Juba, Sudan
[3] University of Khartoum, Sudan
[4] The ACP countries groups include Pacific, Caribbean, Eastern and Southern Africa, Southern Africa, Central Africa and Western Africa groups.

CPA are reciprocity, differentiation, deeper regional integration and coordination of trade and aid.

The CPA has adopted the Economic Partnership Agreement (EPA) as the new framework for economic and trade cooperation. The primary aim of this cooperation is to contribute to the development of trade regime that promotes sustainable development and the integration of ACP countries into the world-economy (Ministry of Foreign Trade, 2007).

The EPAs need to be negotiated during an interim period starting from 2000 and ending in December 2007. In this context, Sudan has embarked on the EPA negotiations with EU within the Eastern and Southern Africa (ESA) regional economic community, while many benefits are expected from these EPAs many countries-specific challenges need to be clarified, analyzed and taken into account during the preparation of a negotiating position by each economic communities and each country (Ben Hammouda, et. al.2006).

Sudan needs to be ware of certain challenges that will be imposed on its economy by the implementation of the EPA with the EU such as the management of the expected losses of fiscal revenue, adaptation to the expected increase in competition related to the principle of reciprocity included in the EPA, the evaluation of the net benefit from the EPAs, the limited capacity of negotiators and the need to ensure consistency between negotiations under different components of the EPAs.

Problem Statement

Recently, the economy of Sudan moved from high dependence on agriculture to heavy dependence on oil with little genuine economic transformation, but agriculture remains the main source of employment and income for the majority of the population. Agricultural exports are considered to be the major source of foreign exchange earning after petroleum products since late 1990 (World Bank, 2007).

The EU countries occupied a leading position on the customers list of Sudan's agricultural exports and imports. The major items exported to the EU includes raw materials, particularly cotton, gum Arabic, sesame, and groundnuts. Major Sudan's imports from the EU countries include machineries and capital equipment, manufactured goods, means of transports, chemical, foodstuff, textiles and other materials.

The EPA is expected have positive effect on agricultural export of Sudan as market access to the EU market is expected to improve after the EPA. On the other hand, the opening of Sudanese markets for the EU commodities is expected to have no significant effect on agricultural trade of Sudan because the imports from the EU are mainly in the form of capital goods that have no competing impacts for Sudan major agricultural commodities.

Objectives

The general objective of this paper is to investigate the impact of the EPA with the EU on the agricultural trade of Sudan, with the following specific objectives:

1. Estimate the effects of the EPA on domestic production and demand of agricultural commodities.

2. Estimate the impacts of the EPA on the agricultural trade of Sudan (with the EU and the rest of the world).

3. Estimate the welfare impacts of the EPA on the producers, and consumers of agricultural products in Sudan.

RESEARCH METHODOLOGY

Analytical Techniques

The Armington model was applied to achieve the study objectives. Armington model is a useful tool in analyzing a number of various agricultural and international trade issues. The model introduces products differentiation and gains from trade in consuming differentiated products. It assumes that final goods internationally traded are differentiated on the basis of the country of origin (lioyd and zhang, 2006). The general nature of the Armington model allows for simultaneous determination of supply, demand, producers and consumers surplus, welfare, for all commodities under the study.

Specification of the Armington Model

Armington model can be specified as a system of non- linear equations. First the Armington composite good (q_d) can be defined as a constant elasticity of substitution (CES) composite of domestic good and of imports from other countries.

$$q_d = \left[\sum_{i=1}^{n} \alpha_i X_i^{\rho} \right]^{1/\rho}$$

Where $X_{i,}$ is domestic good with i =1 and is for imported good if i = 2....n, ρ is CES activity function exponent,

$$\rho = 1 - \left(\frac{1}{\sigma} \right)$$

σ is the constant elasticity of substitution (CES), and α_i is the CES weight of good i

$$\alpha_i = \left[\frac{X_i}{k} \right]^{(1/\sigma)},$$

Where, k is the calibrated constant.

The model is calibrated by scaling the quantities so that internal prices are all unity in the benchmark. This includes the price for Armington composite good (P). The price index for the composite good is equal to:

$$P = \left[\sum_{i=1}^{n} \alpha_i^{\sigma} P_i^{1-\sigma} \right]^{1-1/\rho}$$

Where P_i is the calibrated domestic product market price if i =1 and is the calibrated internal price for imports if i = 2....n.

At the same time, from the first order conditions, the demand for good X_i is equal to:

$$X_i = \left[\frac{\alpha_i}{P_i} \right]^{\sigma} \left[\sum_{i=1}^{n} \alpha_i P_i^{1-\sigma} \right]^{-1} Y$$
$$= \left[\frac{\alpha_i}{P_i} \right]^{\sigma} P^{\sigma - 1} Y$$

Where Y is the total expenditure (Y= P q_d)

The supply function of the composite good (q_s) can be specified as:

$$q_s = k_s P^{1 - \varepsilon_s}$$

Where, ε_s is the elasticity of supply for composite good.

The supply of domestic good (X_{si}) is presented by:

$$X_{si} = K_{si} P_i^{\varepsilon_{is}}$$

The equation is extended to include trade measures (tariff) to represent the import supply equation as follows:

$$X_{si} = k_{si} \left[\frac{P_i}{(1 + t_j)} \right]^{\varepsilon_{si}}$$

Where $X_{si,}$ is the domestic supply if i =1 and is for imports supply if i = 2....n,

ε_{si}, is the elasticity of supply for domestic good if i =1 and is for imports if i = 2....n, While t, is the tariff rate and k_{si} is the calibrated constant.

Equilibrium Condition

The following equilibrium conditions and constraints are maintained in the model

q_s- q_d =0   For composite good

X_{si}- X_i =0   for domestic and imported goods

At the same time, the composite price constraint should be satisfied as follows:

$$\left[\sum_{i=1}^{n}\alpha_i^{\sigma}P_i^{1-\sigma}\right]^{1-1/\rho} - P = 0$$

Output Transformation Function

Marketed domestic output can be allocated to domestic sales or to exports reflecting the assumption of imperfect transformability between these uses. The constant elasticity of transformation (CET) function, applied here is identical to CES function. The only difference in the mathematical statement is the sign in front of the functional exponent. In the case of the CES the exponent has a positive sign while in the CET it has a negative sign (Punt, et al. 2003).

Welfare Analysis

The concept of consumer and producer surplus has been employed to evaluate the sign and magnitude of welfare effects associated with policy changes (see Loo and Tower, 1990; Jechlitschka, 1997). Once we solve the system of equations defined above, we use composite prices for consumers and produces based on a CES and CET price

index to calculate consumer and producer surplus. Gain and losses to producers from price changes are measured as changes in producer surplus. Likewise, consumer gain or losses can be measured as changes in consumer surplus.

Producer surplus

The producer surplus (PS) is the area between the supply curve and equilibrium price line .It is equal to the gross revenue (R_i) minus total variable cost (TVC_i) and it is represented by:

$PS = R_i - TVC_i$,   Where, $R_i = P{\cdot}q_s$ and

$$TVC_i = Pq_s - \int_0^P q_s(p)\,dp$$

$$= Pq_s - \frac{1}{\varepsilon_s + 1}k_s P^{\varepsilon_s+1}$$

Consumer Surplus

The consumer surplus (CS) is the area between demand curve and equilibrium price line. It can be measured by the difference between marginal utility, which indicates the maximum price which consumers would be willing to pay for that unit, and the price actually paid (Sadoulet *et al.*, 1995) and it is represented by:

$CS = B_i - Y$ Where, $Y = P{\cdot}q_d$ and

$$B_i = P.q_d + \int_0^P q_d(p)\,dp$$

$$= P.q_d + \frac{k}{\varepsilon_d + 1}$$

$$(u^{\varepsilon_d+1} - P^{\varepsilon_d+1})$$

Where, B_i, Y and u are benefit, expenditure and maximum price respectively.

Finally, the net welfare (W) is derived by the sum of producer surplus, consumer surplus and tariff revenue (TR) in the case of CES function as follows:

$$W = PS + CS + TR$$

The tariff revenue is represented by the following equation:

$$TR = \sum_{i}^{n} X_{si}(P_i - P_w),$$ where i= 2.........n. and P_w is the world price.

In the case of the CET function the net welfare is represented by the following equation:

$$W = B_i - TVC_i + F$$

Where F is the foreign exchange earnings, and it is represented by the following equation;

$$F = \sum_{i}^{n} X_{si}(P_w(1 - t_i)),$$

Where i= 2.........n. and t_i is the tariff rate.

Data Sources

The model is based on the average data of years 2007 and 2008. The data was obtained from different institutional sources, namely the Department of Agricultural Economics and Statistic (Ministry of Agriculture and forestry), the Central Bank of Sudan, the Sudanese Customs Police, the Sudan Cotton Company and Ministry of Foreign Trade (Unit of EPAs). The border prices used in the model is the export unit value (export value divided by export quantity). Also, the elasticity used in the equation is obtained from the previous studies data base. The model cover major agricultural

exports of Sudan to the EU namely, gum Arabic, sesame, cotton and groundnuts.

Solving the Model

The excel solver is used to solve the model as an optimization or programming model. In the solver, one of the equation cells is specified as target cell and others as constraints. When the objectives function is solved for zero value, the model generates optimal values for all prices and factors of production, consumption and outputs of commodities included in the model at the point where the market is in equilibrium. These values represent the production and consumption levels of the economy modeled (Armington, 1969).

RESULTS AND DISCUSSION

An EPA zero tariff scenario is developed to evaluate changes in production, prices, net welfare of agricultural exports (cotton, gum Arabic, sesame and groundnuts). The agricultural exports are only considered in this study because the imports from the EU are mainly non-agricultural products.

In general, implementation of zero tariff would expected to have a positive impact on individuals countries through : (i) changes in he region trading policy environment as a result of implementing zero tariff by all members of the ACP countries; (ii) and changes in the domestic policy environment of the country itself.

The model results reveal that removal of tariff after application of the EPA resulted in export increase of cotton, sesame, groundnuts and gum Arabic by 65%, 63%, 33% and 62% respectively from Sudan to the EU as expected, while exports to rest of the world (ROW) decreased (Table 1). The

Table 1   Percentage changes of quantities for the covered agricultural commodities

Item	Cotton	Sesame	Gum Arabic	Groundnut
Aggregate output	1	1	5	6
Domestic demand	-3	-4	-14	-17
Export to the EU	65	63	33	26
Export to ROW	-64	-7	-24	-29
Total export	2	33	16	19

Source: Model results

Table 2   Percentage changes of prices for the covered agricultural commodities

Item	Cotton	Sesame	Gum Arabic	Groundnut
Aggregate output price	-2.3	-2.8	-2.3	-11.7
Domestic price	-1.1	-1.4	-1.1	-6
EU internal price	-13.8	-13.9	-13.8	-15.4
ROW prices	-4	-5	-4	-2.2

Source: Model Results

increase in agricultural exports of Sudan to the EU is attributed mainly to the decrease in the EU internal prices facing Sudanese exports after application of zero tariff as it is expected to decline, on average, by 13% for the covered commodities (Table 2).

Cotton and sesame recorded the highest response which reflects the high comparative advantage of Sudan in these two commodities. The aggregate output level for the concerned commodities is increased due to increase in their export levels.

The increase of agricultural exports to the EU, increase the foreign exchange earnings and aggregate output of the covered commodities while the domestic demand is forced to decrease in response to higher export demand. Therefore, the welfare of agricultural export producers is expected to improve, and the consumer welfare is slightly decreased as shown in table (3). The end result is small loss in net welfare for cotton, sesame and gum Arabic. In case of groundnut there is an increase in consumer surplus leading to increase in the net welfare.

Table 3   Percentage changes of welfare indicators for the covered agricultural commodities

Item	Cotton	Sesame	Gum Arabic	Groundnut
Producer surplus	1.9	3	5	6
Consumer surplus	-1	-9	-9.7	7
Foreign exchange	7	56	39	47
Net welfare	-1	-4	-7	8

Source: Model results

CONCLUSION

The paper results showed clearly that application of the EPA has positive impacts on Sudan's agricultural aggregate output, exports and foreign exchange earnings. Also, the implementation of the EPA will redirect agricultural exports of Sudan towards the EU markets, and this will impose more pressures on quality assurance and standards in order to comply with the EU market regulation. Therefore, in order to maximize the benefits from the EPA, Sudan must increase investments, design and implement more effective policies in agricultural sector to raise productivity, improve quality and competitiveness. Also, Sudan need to take care of expected negative impacts of the EPA on the domestic markets.

BIOGRAPHY

Imad Eldin Elfadil Abdel Karim holds a PhD in Agricultural Economics (International Trade) with solid applied backgrounds in international agricultural trade and policy. His teaching interests focus on international marketing, agricultural policy, food security and development. He has published widely on agricultural trade liberalisation, policy analysis and food security in referred academic journals and books. He has more than ten years of research and teaching experiences in agricultural trade and policy in various Universities in Sudan and Saudi Arabia.

Azharia Elbushra holds a PhD in Agricultural Economics. She has great experience in equilibrium analysis (general and partial equilibrium models) and social accounting matrix (SAM). She teaches courses related to economics such as, agricultural economics, farm management, fish economics and livestock economics. She has many publications and presentations in the field of agricultural policy and international trade.

Azhari Ibrahim graduated from University of Khartoum, Sudan and holds MSc in agricultural economics. He has interest in agricultural policy analysis and agricultural trade modeling.

REFERENCES

Armington, P.S. (1969). A Theory of Demand for Products Distinguished by Place of Production. International Monetary Fund Staff Papers, Vol. 16, pp. 159-76.

Ben Hammouda, H., Karrinqi, E., Ouedraqo, B., Swaleh, I., Oulmano, N. and Jallabo, M. (2006). Assessing the Consequences of the Economic Partnership Agreement (EPA) on the Economy of Seychelles. Unpublished ATPC Paper, Uneca. Addis Ababa, Ethiopia.

Jechlitschka, K., und Lotze, H. (1997). Theorie und Anwendung eines Mehr-Modells Zur sektoralen Analyse Von Agrapolitken fuer Agrarinformatik.

Lioyd, P.J. and Zhang, X.G. (2006). The Armington Model. Commission Staff Working Paper, Melbourne.

Loo, T., and Tower, E. (1990). Agricultural Liberalization, Welfare, Revenue and Nutrition in Developing Countries. In Agricultural Trade Liberalization Implication for Developing Countries. Edited by I.Goldin and O. Knudsen.Paris: OECD and World Bank Proceedings 2:85-89.

Punt, C., Pauw, K., Schoor, M., Gilimani, B., Rantho, L., Mcdonald, S., Chant, L. and Valente, C. (2003). Functional Forms Used in CGE Models: Modeling Production and Commodity Flows. Project Background Paper Series, Ellensburg.

Ministry of Foreign Trade (2007). Report about Note on the State of Play in the EPA's Negotiations, Brussels, 20 December, 2007.

Sadoulet E. And Janvery, A. (1995). Quantitative Development Policy Analysis. John Hopkin University Press, Baltimore and London.

World Bank (2007). Sudan Country Brief. World Bank, Washington, DC, USA.