

**MARKET STRUCTURE IN REGIONAL INTEGRATION: ANALYSIS  
OF THE KENYAN SUGAR INDUSTRY IN COMESA**

**BY**

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**DECLARATION**

**This paper is my original work and has not been presented for a degree in any other university.**



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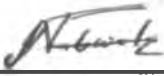
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14/09/2004

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**This paper has been submitted for examination with our approval as university supervisors.**



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## DEDICATION

To my mother *Nang'ayo* Flora Masakhwe and late father *Omusimalwa* Mikail Oyeyo.

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I am eternally indebted to several individuals.

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Needless to say, all errors and inadequacies remain mine and solely so.

## **ABSTRACT**

The study analysed intra - industry trade in sugar within COMESA and also evaluated the market with regard to distribution of production share. Theoretical foundations contend that intra - industry trade normally takes place when countries are similar in their relative factor supplies and therefore comparative advantage cannot be used to explain its occurrence. We infer the homogeneity of white sugar from the value of the Grubel - Lloyd index calculated to be 0.71 for the period 1995-2000 thus argue that there is no further basis for trade in this industry and since it does exist, we evaluated the structure of the market for sugar. This we did noting that there has been an increase in sugar imports to Kenya since the trade related provisions of COMESA came into effect. The bulk of this increase has been from COMESA-member countries. This increase has been perceived as unfair yet it has not been explained properly. This study estimated intra sugar-industry trade and further, the structure of the market proxied by production levels of selected COMESA countries against their number of sugar-producing firms for the single year 2000. It emerged that there is unequal production share distribution thus imperfect competition, the level of which, as evident from the Gini coefficient of 0.23, is low. Working out an equitable production share distribution of member countries in line with their respective number of sugar firms will reduce the disparity existing currently.

## **ACRONYMS**

ACP – African Caribbean Pacific countries

CIS – Commonwealth of Independent States

COMESA – Common Market for Eastern and Southern Africa

FTA – Free Trade Area

GDP – Gross Domestic Product

GL – Grubel-Lloyd index

IIT – Intra Industry Trade

PTA – Preferential Trade Area for Eastern and Southern Africa

RIA – Regional Integration Agreement

SITC – Standard Industrial Trade Classification

# **CHAPTER ONE**

## **1.0 INTRODUCTION**

### **1.1 Background**

The process of globalisation has been accompanied by growing inequalities among nations. Regional inequalities have necessitated nations especially developing nations to plunge further into the international system by enhancing trade relations and dynamics at regional level in order to respond to the challenges of globalisation. Regional economic integration can be looked upon as being responsive action to the challenges inherent in the world economic order emanating from the international political divisions and alignments. It is in this light that the Common Market for Eastern and Southern Africa (COMESA) is considered an important engine for facilitating its member countries to enter into the global village complex at a more equal standing in spite of the disadvantage facing them as less developed nations.

However, there are limitations in embracing regionalism. The former Soviet Union case provides an interesting insight. Shortly after the collapse of the Soviet Union, most of its former States, with the exception of the Baltic States, joined the Commonwealth of Independent States (CIS). At the same time, many CIS countries opened up their trade regimes by dismantling various trade restrictions, state trading monopolies, multiple exchange rate regimes as well as formal tariff barriers. However, in the course of the 1990s, pressure for the protection of domestic industries increased. Import tariffs on "sensitive imports" such as refined sugar started to pop up. By far, the most serious barriers to trade and the ones most frequently used are non-tariff barriers. The more complex and constantly trade regimes may open doors for rent seeking and smuggling.



The defining characteristic of a regional integration agreement (RIA) is geographically discriminatory trade policy Baldwin and Venables (1995). Traditionally there are three types of RIAs. A free trade area is an RIA formed by removing tariffs on trade among member nations and leaving members with autonomy in setting their tariffs on trade with non-member countries. A customs union applies a common tariff structure to trade with non-members. A common market permits free movement of factors of production as well as goods and services between member states. Another frequently used term is preferential trading agreement, sometimes used synonymously with RIA, and sometimes to denote a region with reduced but not necessarily zero tariffs. Modern RIAs however have a range and variety of rules far richer than these traditional distinctions.

Modern regional integration theory began with Viner (1950) under the name of "*customs union theory*". His lucid but informed reasoning is full of insights and anticipates many of the post-war theoretical and policy debates. Viner's most famous results - that the welfare impact of customs union formation is ambiguous - triggered a flood of papers. Most of these assumed perfect competition and constant returns Kowalczyk (1992).

Much of the recent literature on RIAs has focused on environments that are imperfectly competitive. While this is a focus shared by much recent trade theory, it is particularly important for the analysis of RIAs for two reasons. The first reason is that integration in Europe has occurred among economies with similar structures and large volumes of intra-industry trade. This observation can be made of COMESA - member countries. The second reason is the possibility that there is an interaction between market structure and gains from integration. The theoretical literature on RIAs does not provide a unified treatment of imperfect competition, although imperfect competition has been

assumed in many numerical simulations. Indeed imperfect competition has been the hottest topic in international trade theory in recent times (Pomfret 1992). Much of the theory of international trade, positive and normative is based on the model of atomistic competition where all individual consumers and producers are assumed to be price-takers. In reality, it is becoming increasingly evident that a significant proportion of international trade takes place in imperfectly competitive markets.

### **1.1.1 Market Structures in International Trade**

Studies on international trade have assumed different market structures especially perfect competition (Kowalczyk 1992). Relaxation of the assumption of perfect competition led to the discovery of new circumstances for which trade barriers could increase national welfare, and a case could then be made for government interventions. However, due to the inherent difficulty in modelling imperfectly competitive markets, empirical work has suffered compared to theoretical work and few of the hypotheses have been rigorously tested (Pomfret 1992). The prevalence of imperfect competition is self-evident in manufacturing and is also often present in agriculture. Helpman (1990) supports this view and concludes his work by saying that international trade theory has come close to reality than ever before. Even if international markets are more competitive than domestic markets, imperfect competition is still important although there is no systematic evidence to show how important.

The reasons for the emergence of imperfect competition in international trade are similar to those familiar from the theory of domestic industrial organisation. In both cases we are looking for forces that produce concentrated industries that are sheltered from competition in the relevant market. Some new aspects however become important in the context of trade. These new aspects include economies

of scale and scope, entry barriers, product differentiation and marketing and trade. (Dixit 1984)

Economies of scale and scope dictate that firms should have a large scale or product mix. At the level of the production technology, one would expect the importance of this to decrease as international trade enlarges the market. But in some industries, scale economies at the firm's organisational level arise because there are intangible assets such as knowledge or specific managerial skills that cannot be traded in arm's-length markets. This problem is if anything more serious at an international level (Caves 1982). Such industries come to consist of few and large Multi-national firms, and become Oligopolistic.

Entry barriers can be innocent consequences of technological features, or erected by incumbents in their strategic interests (Salop 1979). With international trade such strategic behaviour may also occur in a government's actions, i.e. imperfect competition may be deliberate policy choice.

Product differentiation may be geographic when transport costs are present, or in physical characteristics when tastes differ, or in brand images created by persuasive advertising. In all such cases, the size of the competing market is reduced, and the monopoly power of each firm is increased. Where the product attribute is a non-marketable asset, this interacts with the emergence of large Multi-national firms.

Finally, even when production takes place in atomistic units, marketing and trade can be Oligopolistic. This can be so when a few trading corporations carry out these activities. More important instances are those where collusion among a country's firms for export purposes is encouraged or even arranged by its government. In such cases, countries are the units of analysis, and trade is normally oligopolistic.

### **1.1.2 The Kenyan Sugar Industry**

The Kenyan sugar industry was established by the government as a means, by which employment could be created, income generated for cane farmers and to achieve greater self-sufficiency through import – substitution.

Kenya became self-sufficient in sugar for the first time in 1979. In 1980 and 1981 there was a small exportable surplus of sugar. By the mid 1980s however, Kenya was again faced with the situation of being unable to meet the domestic demand of sugar. The bulk of Kenya's sugar requirements have been met by locally produced sugar. Domestic demand for sugar has grown rapidly over the recent past. Production has also grown over this period. As the growth in domestic production has not kept pace with the growth in domestic demand, imports have accounted for an increasingly large proportion of the country's sugar needs.

Mulwa (2001) argues that the Kenyan sugar industry has been less efficient compared to others in COMESA region due to price differentials but goes ahead to conclude that it has been subjected to unfair competition and that the government has a role in protecting it continuously by imposing duty on cheaper imports while continuing with privatization plan.

### **1.1.3 The Common Market for Eastern and Southern Africa (COMESA)**

Established in 1994, COMESA replaced the Preferential Trade Area for Eastern and Southern Africa (PTA), which had been in existence since 1981. With a membership of 20 countries, COMESA is considered Africa's first free trade zone. It had instituted phased import-tariff elimination by 1992, later changed to 2000. As at 1<sup>st</sup> April 1999, 2 countries had published the 90% tariff reduction, 8 countries had published the 80% tariff reduction, 1 country the 70% reduction

and 3 countries the 60% reduction. The classic non - tariff barriers (quantitative restrictions, licensing, import permits and restrictive foreign exchange controls) have been largely eliminated and rules of origin have been simplified, with more scope for import content, by the adoption of a 35% local value added criterion.

Among other things, COMESA member states have agreed on the need to create and maintain a full free trade area guaranteeing the free movement of goods and services produced within COMESA and the removal of all tariffs and non-tariff barriers. In pursuit of the goals of a free trade area, a customs union, and an economic community, COMESA is implementing a wide range of programmes. Of interest to us is the Programme on trade liberalisation, which aimed at reducing tariff by 100 per cent by October 2000, and that on promotion of the development of agro-industries in the COMESA region.

The sugar industry is an agro-industry and therefore the Kenyan government could site the provision to defend any action it might deem necessary to protect its sugar industry. The standstill provisions in the COMESA treaty and specifically Article 49 makes provisions for the protection of infant industries and includes safeguard measures in the event of serious disturbances in the economy of a member state.

Kenya has done this to control the amount of sugar from COMESA region. Under Article 61 of the COMESA agreement, the amount of duty-free sugar imports from other COMESA countries to Kenya has been limited to 200,000 tonnes for one year only (Daily Nation Feb. 19<sup>th</sup> 2002). This is largely the difference between domestic production and demand.

## **1.2 Statement of the Problem**

In November 2000, the trade - related provisions of COMESA came into effect resulting to the removal of tariffs on various goods traded amongst member countries, including sugar. Consequently, Kenya experienced an increase in sugar imports accompanied in some cases by the under declaration of the price of that sugar. This could be a simple case of tax evasion or could be an indication of the strong influence that market structure has on trade especially with RIAs, which the authorities have yet to appreciate. To remedy this anomaly, the government informed COMESA that quantitative restrictions would be imposed on sugar imports to protect the Kenyan sugar industry. This however is an interim measure to be reviewed annually by the COMESA council of ministers and therefore cannot be considered a lasting solution to the problem.

Past studies on the sugar industry in Kenya within the context of regional and international trade have not considered the market structure of the sugar industry. Mulwa (2001) mentions as a way of passing, the need for the government to protect the sugar sub - sector from "unfair competition". He states that the infant - industry argument was not put into place at the time of introducing Structural Adjustment Programmes.

That the structure of the market is significant in international trade analysis has been shown in past studies. This is an aspect that less developed countries need to appreciate in their endeavour to integrate regionally. The market structure of the sugar industry within the COMESA region need to be evaluated, necessary actions considered and policy recommendations made to the authorities.

### **1.3 Objectives of the Study**

Market structure is an important factor in trade theory analysis. Most studies assume a given market structure. The primary purpose of the study is to evaluate the market structure of the sugar industry within COMESA region. The specific objectives of the study are: -

- a) Estimate the level of intra - sugar industry trade in COMESA
- b) Estimate production-share distribution in the sugar industry of COMESA.

### **1.4 Significance of the Study**

Though still a net importer of sugar, local production of Kenyan sugar firms, which cater for about 80 per cent of the current domestic needs, goes a long way to saving some badly needed foreign exchange reserves. In addition it is estimated that the sugar industry employs about 100,000 people directly. Since sugarcane farms are in the rural areas, it can be said that the impact of the sugar industry towards achieving distributional objectives in the economy is quite considerable. Sugar further forms a significant part of the government revenue source for excise duty. The sugar industry has a vital role to play in the growth and development of the Kenyan economy and this alone point to the need for strengthening the industry through research and evaluation studies.

Since the beginning of the 1980s, international trade economists have sought to incorporate oligopoly and other forms of imperfect competition into the formal analysis of international trade and trade policy so as to make contact with important empirical regularities and policy concerns. Traditional trade theory based on perfect competition did not effectively explain phenomena such as intra-industry trade and the high volume of trade between similar countries

In February 2002, Kenya imposed duty of up to 100 per cent on imports, from COMESA countries, above the 200,000 tonnes-import quotas allowed by the government. This quota is the difference between domestic production of 400,000 tonnes and consumption of 600,000 tonnes. This COMESA - sanctioned protection of the Kenyan sugar industry expired at the end of February 2003. The industry is expected to open up to intra - regional trade by then or measures to extend this protection for another year put in place. Renewal of protection is not a long-term option for the sugar industry. Proper understanding of the sugar market structure is necessary to explain the present situation and undertake long-term measures. It follows therefore that studies on industrial structure and commercial policies especially in developing countries of which Kenya is one are important; thus this study.



## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

Most papers on regional integration theory that followed Viner (1950) assumed perfect competition and constant returns, Kowalczyk (1992). However, much recent literature on RIAs assumed imperfect competition. These include the work on monopolistic competition by Krugman (1979, 1980) and Lancaster (1979, 1980), and on oligopoly by Brander and Spencer (1981), which spawned a vast new theoretical literature. Vousden (1990) contains a thorough modern textbook analysis of trade policy with various market structures. Helpman and Krugman (1985, 1989) aim to provide a unifying theoretical framework for analysing international trade and trade policy with imperfect competition.

Various aspects of monopoly with regard to price-discrimination on home and export market have been studied by Katrak (1980), Rieber (1982) and Davies and McGuinness (1982). The issue of pricing when discrimination across countries is not allowed has been tackled by Auquier and Caves (1979), Jacquemin (1982), Katrak (1977) and Brander and Spencer (1981).

Next to pure monopoly, the industry structure most amenable to analysis is that of monopolistic competition which has been thoroughly analysed by Krugman (1979, 1980), Dixit and Norman (1980), Lancaster (1980), and Helpman (1981). They draw distinction between intra-industry trade, based on product diversity and scale economies and inter-industry trade, explained by the usual factor endowment considerations.

The case of oligopoly consists of special models and examples. Markusen (1981) has a two-sector general equilibrium model, with a competitive sector Y and an

oligopoly sector X. More precisely there is one producer of X in each country and they interact as Cournot duopolists. Now country size is a determinant of trade. The larger country imports X, and if its own production of X decreases sufficiently, trade may lower its aggregate welfare.

Brander and Krugman (1980) examine a similar model in partial equilibrium, which brings out a new feature of Oligopolistic trade. Firms with different marginal costs can coexist in an imperfectly competitive market for a homogeneous product, if the higher-cost firm perceives appropriately larger demand elasticity and therefore uses a correspondingly lower mark-up. With Cournot behaviour, the perceived demand elasticity for a firm is the industry elasticity divided by the firm's market share.

Brander and Spencer (1983) consider the strategic use of research and development (R&D) by a country's government to give its firms an advantage in international competition. Krishna (1983) points out quite a different strategic use of trade restrictions. He considers the duopoly where the home and the foreign firm are unable to sustain collusion by themselves. If the home government imposes an import quota, it will now become profitable for the home firm to raise its price somewhat with the assurance that the foreign firm will not be able to sell more by undercutting. Then the foreign firm can sell its quota amount at a higher price. This can increase both firms' profits. The effect of the quota is to allow collusion (i.e., it is a "facilitating practice"). The losers are the home consumers who now pay a higher price. This model has special appeal from the viewpoint of the "new political economy" which views trade policy as an outcome of lobbying by concentrated special interest groups.

Empirical work consists of simulation studies based on calibrated models or case studies. These approaches are not very convincing. Published research is limited to a handful of studies. Generally the problem of defining variables and of

assembling a large enough sample have discouraged econometric testing of hypotheses about imperfect competition and international trade.

Baldwin and Krugman (1988) have performed a simulation exercise for the market for 16 Kilobyte Random-Access Memory chips (16 K RAMs). Chip technology was dominated by the United States until the late 1970s when comparative advantage shifted to Japan, and the question is whether Japan acquired a comparative advantage naturally or by protecting the home market. Baldwin and Krugman model production with decreasing unit cost, neglecting the learning process, and Oligopolistic interaction by conjectural variations\* consequences from one type of strategic trade policy, but there is no way of knowing whether they capture what actually happened in the market for 16K RAMs.

Smith and Venables (1988) and Venables and Smith (1986) have applied an imperfect-competition model to calculate the effects of completing the EC's internal market. In a partial equilibrium framework, they apply a differentiated-product model to ten Standard Industrial Trade Classification (SITC) 30 digit industries, dividing the world into six markets (France, Germany, Italy, the United Kingdom, the rest of the EC, and the rest of the world). They find that their results are fairly insensitive to model variations (for example, replacing Cournot behaviour by Bertrand or allowing the firms to change the number of varieties they produce). Reducing intra-EC trade barriers does increase welfare, but removal of market segmentation has a much larger welfare effect; under present conditions unrealised scale economies are less harmful than the exercise of monopoly power in segmented markets.

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\* Conjectural variation is the rate of change of rivals' total output with respect to a firm's output.

## **2.1 Overview of Literature Review:**

Literature review indicates studies on international trade and not regional integration agreements. The few that considered RIAs concentrated on Europe and North America with scant mention of South America and Asia. Africa is left out due to the fact that regional economic integration is a more recent phenomenon that is yet to take a fully formal dimension. This however is changing with COMESA leading the way for other African regions.

As stated earlier, results on simulated work depend upon how well the chosen model captures the actual market structure and behaviour; there are, however, some added problems. First, the Lucas critique applies with particular force in this context. The parameters themselves are likely to change as a result of policy changes, because different policies may lead to different market structures and oligopolistic interaction is itself likely to be changed by policy changes. Thus, even if the modeller accurately represents the current market structure and behaviour, the simulations are unlikely to capture behaviour under new conditions. Second, literature based estimates of parameters often involve a large subjective element in the selection process. Lastly, the simulation studies are stylised with hypothetical payoff matrices or market structures with the additional difficulty of identifying all subsidies (and other government support) and in accurately estimating the true returns to an industry.

We feel therefore that the market-structure of a particular industry need to be evaluated in order to understand the underlying factors of particular trade flows, their effects and effects of particular trade policies. Our study shall evaluate the structure of the market in the sugar industry of COMESA after determining the level of intra - sugar industry trade.

## CHAPTER THREE

### 3.0 METHODOLOGY

We adopt the definition of an industry that two different products are the output of a single industry if it is relatively easy to substitute one for the other in the production process and that the products must use an identical technological intensity. To further narrow down, we add the criterion that consumers must put the products to the same use for them to be of the same industry. The standard industrial trade classification system (SITC) breaks down production into categories, which are further subdivided into headings thus going some way towards defining the industry. The SITC puts commodities in the same group on the basis of their similarities in production while we are more interested in the extent to which goods serve the same purpose to the consumer. We define industry from the consumer point of view. We therefore use data available on trade in white sugar, which is classified under SITC 06111. This classification has been changing over the years such that data collection could be problematic.

We estimate the level of intra - industry trade in sugar within COMESA to determine whether there existed exchange in the commodity for the period between 1994, when COMESA was established to replace PTA and 2000, when the zero tariff band on sugar came into effect. Balassa proposed the first measure of the extent of intra - industry trade in 1966. This measure is given as the extent to which exports of a given good are offset by imports of an equivalent good.

$$A_j = |X_j - M_j| / X_j + M_j$$

Where  $X_j$  is the value of the exports of commodity  $j$  by a country, and  $M_j$  is the value of the matching imports.

However, many studies use the Grubel and Lloyd index (Musonda 1997). This study will thus use the intra - industry trade index proposed by Grubel and Lloyd (1975). It is expected that the index will be positive and therefore inconsistent with trade theory. Whether the existence of intra - industry trade as evidenced by the Grubel-Lloyd index is really inconsistent with more traditional endowments-based motivations for trade has been tested empirically [see Loertscher and Wolter (1980)]. Then we estimate the distribution of sugar production share given the number of firms in the sugar industry of COMESA.

Industrial structure may be estimated using various methods. Two of the most well known methods are the Hirschman- Herfindahl index of industrial concentration and the Lorenz curve (Theil 1972).

The Hirschman-Herfindahl index of industrial concentration is the sum of the squares of all n shares:

$$C = \sum_{i=1}^n P_i^2$$

Where,

n is the number of firms,

$P_i$  is the price of the  $i^{\text{th}}$  firm,

$P_j$  is the price of the  $j^{\text{th}}$  firm.

Hirschman (1945) and Herfindahl (1950) proposed this index.

Its maximum value is 1, corresponding to complete concentration ( $P_i = 1$  for some  $i$ ,  $P_j = 0$  for each  $j \neq i$ ). Its minimum is  $1/n$ , which is attained when all shares are equal to  $1/n$ , and this minimum decrease toward zero when  $n$ , increases indefinitely.

The index could be used to estimate share in sugar production by considering  $n$  as the number of countries or firms and  $P_1, \dots, P_n$  for the production levels of each country or firm in any given year, measured as fractions of the total production of the industry in that year.

The Hirschman - Herfindahl index of industrial concentration has a serious disadvantage especially when considering concentration at the level of sets when a weighing system has to be applied (see Theil (1972) P. 42). Further, the index may not be very reliable in this instance considering the history of sugar producing firms in the region. By using the number of firms, the index may be misleading since most firms produce below capacity and as such, while they may be concentrated in a particular area, this does not necessarily reflect an advantage to that area in terms of market share.

This study applies the Gini coefficient of the Lorenz curve.

### **3.1 Model Description**

#### **Model 1**

The index of intra - industry trade, also known as the Grubel - Lloyd index is given by:

$$IIT_{ijk} = \frac{2 \min (x_{ijk}, x_{ikj})}{(x_{ijk} + x_{ikj})}$$

Where

$i$  index the industry,  
 $j$  and  $k$  index countries.

Exports of  $i$  from  $j$  to  $k$  are denoted by  $x_{ijk}$ .

Alternatively;

$$B_j = \frac{(X_j + M_j) - |X_i - M_i|}{(X_j + M_j)}$$

Where:

$X_j$  is the value of the exports of commodity  $j$  by a country,

$M_j$  is the value of the matching imports.

The index has the appealing property that it varies from zero (no intra - industry trade) to one (all intra - industry trade).

### Model 2

Consider a population of  $P$  producers. If  $P$  is very large, we could model the  $P$  production along the continuum  $(0, \infty)$  by specifying a frequency density function  $f(x)$  for production. This is defined in such a way that for any infinitesimal number  $dx$ , the proportion of the population whose production lie in the interval  $[x, x+dx]$  is  $f(x) dx$

(and the number of such production is  $pf(x) dx$ ).

The function  $f(x)$  would normally be continuous, and it behaves rather like a probability density function.

Let  $F(x)$  be the distribution function for production,

$$F(x) = \int_0^x f(t) dt \dots\dots\dots (1)$$

This defines the population of producers with production not exceeding  $x$ .



For each  $0 \leq P \leq 1$  let

$$P = F(y) \dots\dots\dots(2)$$

Then a producer with production  $y$  is ranked  $100p\%$  of the way up the production distribution. The total production of the bottom  $100p\%$  of producers is:

$$X(p) = \int_0^y x f(x) dx \dots\dots\dots(3)$$

The Lorenz curve for the distribution,  $\theta(p)$ , is defined for each  $p$  as the proportion of total production accruing to the bottom  $100p\%$  of producers:

$$\theta(p) = X(p) / \mu = \int_0^y x f(x) dx / \mu \dots\dots\dots(4)$$

Where  $\mu$  is mean production.

Clearly  $\theta(0) = 0$  and  $\theta(1) = 1$

We may differentiate equation (4) to determine the slope of the Lorenz curve:

$$\theta'(p) = d/dy \left[ \int_0^y x f(x) dx / \mu \right] \cdot dy/dp = \left[ \int_0^y x f(x) dx \right] / \mu dp/dy = yf(y) / \mu F'(y) = y / \mu \dots(5)$$

At each point  $p = P_0$  on the Lorenz curve, the slope  $(\theta')$  ( $p^0$ ) measures the production of a producer of rank  $p^0$  relative to mean production. Clearly the slope increases with  $p$ , unless all productions are equal, in which case  $\theta(p) = p$  defines the  $45^\circ$  - line or line of complete equality.

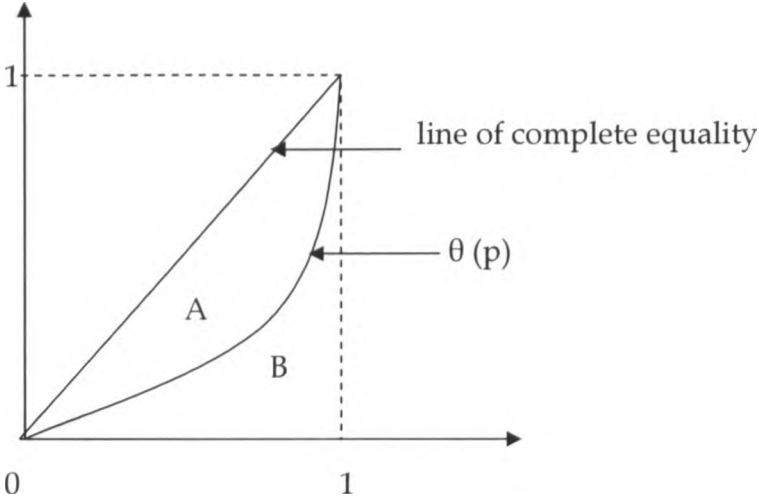


Fig. 1

Whatever the distribution of production, if it is not perfectly equal then the bottom 100p% of the population produce less than 100p% of total production for all p.

One way to quantify the inequality present in a production distribution is by means of its Gini coefficient (G). This can be defined as the area between the Lorenz curve  $\theta(p)$ , and the line of complete equality, relative to the total area below the line of complete equality.

From fig. 1

$$G = A/(A+B) = 2A = 2 \int_0^1 (1/2 - \theta(p)) dp \dots\dots\dots(6)$$

The Gini coefficient is a widely quoted index of inequality and can easily be calculated from actual data (Cowell 1977). For simplicity and because we arrive at the same results, we apply the formula given by Brown (1994) that:

$$G = 1 - \sum_{i=0}^{k-1} (Y_{i+1} + Y_i) (X_{i+1} - X_i)$$

Where:

- Y = cumulated proportion of firms
- X = cumulated proportion of production
- G = Gini coefficient

### **3.2 Estimation Procedure**

Data on the volume of trade in sugar between Kenya and other COMESA member - countries for the period when it was established and when the zero tariff on sugar trade came into effect will be used to calculate the Grubel - Lloyd index of intra - industry trade. Since there were years when no exports were recorded from Kenya to COMESA, we shall use mean values of the total exports and imports within this period. This is to determine the level of intra - sugar industry trade in COMESA.

To derive the Lorenz curve and thus calculate the Gini coefficient, we shall use data on sugar producing firms of the sample countries and their total sugar production for the single year 2000 when the zero tariff band came into effect. These sample countries had eliminated their tariffs on COMESA-originating products in accordance with the tariff reduction schedule which was adopted in 1992 for the gradual removal of tariffs on intra-COMESA trade, following trade liberalisation programme that commenced in 1984 on the reduction and eventual elimination of tariff and non- tariff barriers to intra-regional trade.

Each country's share of total sugar producing firms will be compared to each country's share of total production. From this, the Lorenz curve shall be derived and the Gini coefficient calculated. Inequality in the distribution of production share of total firms will be construed to indicate imperfect competition, the extent of which shall be analysed both from the upper half of the curve and the lower half.

The Gini coefficient shall give the overall extent of imperfection in the market structure, which shall be compared to the graphical outlook as presented by the Lorenz curve.

### ***3.3 Data Types and Sources***

The study will use secondary data on volume of trade (import and export) on sugar between Kenya and COMESA from 1985, one year after COMESA was established, to 2000, the year COMESA originating goods were to attract zero tariffs, to calculate the Grubel-Lloyd index. The year 2000 data on sugar output of the sampled countries and their respective total number of sugar-producing firms will be used to derive the Lorenz curve and thus calculate the Gini coefficient thereof.

This data will be acquired from the Kenya Sugar Board's yearbooks of sugar statistics, the Kenya Revenue Authority's annual trade reports and the international sugar organisation's statistical bulletins.

### **3.4 Limitations of the Study**

Like other related studies, this study makes Cournot's assumption, which is not compatible with real - world situation in which firms tend to compete more in prices rather than output.

The usual limitations arising from the use of secondary data are applicable in this study for the usual reasons associated with reliability of such data especially sourcing from less developed nations. Finally, the study is in partial equilibrium and therefore the finding will be specific to the sugar industry and cannot be generalised to all sectors of the economy. It is however hoped that the results will shed some light on the true situation.

## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

#### **4.1 The Grubel – Lloyd Index**

With the Grubel – Lloyd index, when the value is zero there is no intra - industry trade and when it is one, there is perfectly matching intra - industry trade. We used the mean values of sugar imports and exports by Kenya from 1995 to 2000 since there were years when no imports and no exports were recorded.

There is evidence that the level of intra - industry trade in sugar within COMESA region is significantly important. The GL was calculated to be 0.71, which indicates that 71 percent of trade in this industry is intra industry. This is quite high and goes against pure theory of international trade that holds that the only source of trade is specialisation based on comparative advantage. This however does not mean that the theory does not hold but could be indicating that some COMESA countries alter their comparative advantage through industrial policies. New trade theories contend that a high GL index indicates the existence of imperfect competition in the particular industry, which does not rule out non-market considerations such as export compensation and subsidies.

The high Grubel – Lloyd index could be a sign of a higher degree of product differentiation in the sugar industry as IIT occurs in differentiated products. This indicates that that the problem of commodity classification could have been felt rather strongly in this study. On the supply side, a high GL could also indicate that the extent of scale economies in the sugar industry could be higher. While the case of Mauritius puts this argument in doubt as it has numerous small-scale producing firms, not all scale economies lie at the level of the individual firms. Concentrating industry within a certain geographical area may create economies

even if the individual firms remain small – as is the case with Mauritius’ sugar firms. In which case, rather than specialisation occurring due to the relative abundance of factors, specialisation reflects the external economies of scale. On the demand side, it could be an indication of love for variety by consumers. Again the level of development of these economies given their GDP and the homogeneity of the product of the industry dispels this argument.

It is established that intra- sugar industry trade does not only exist in the COMESA region but that it is significantly large, which could be as a result of unavailability of comprehensive data on specific export destinations. This however does not limit the study, as the primary focus of the paper is not a detailed analysis of IIT.

#### **4.2 The Gini Coefficient of the Lorenz Curve**

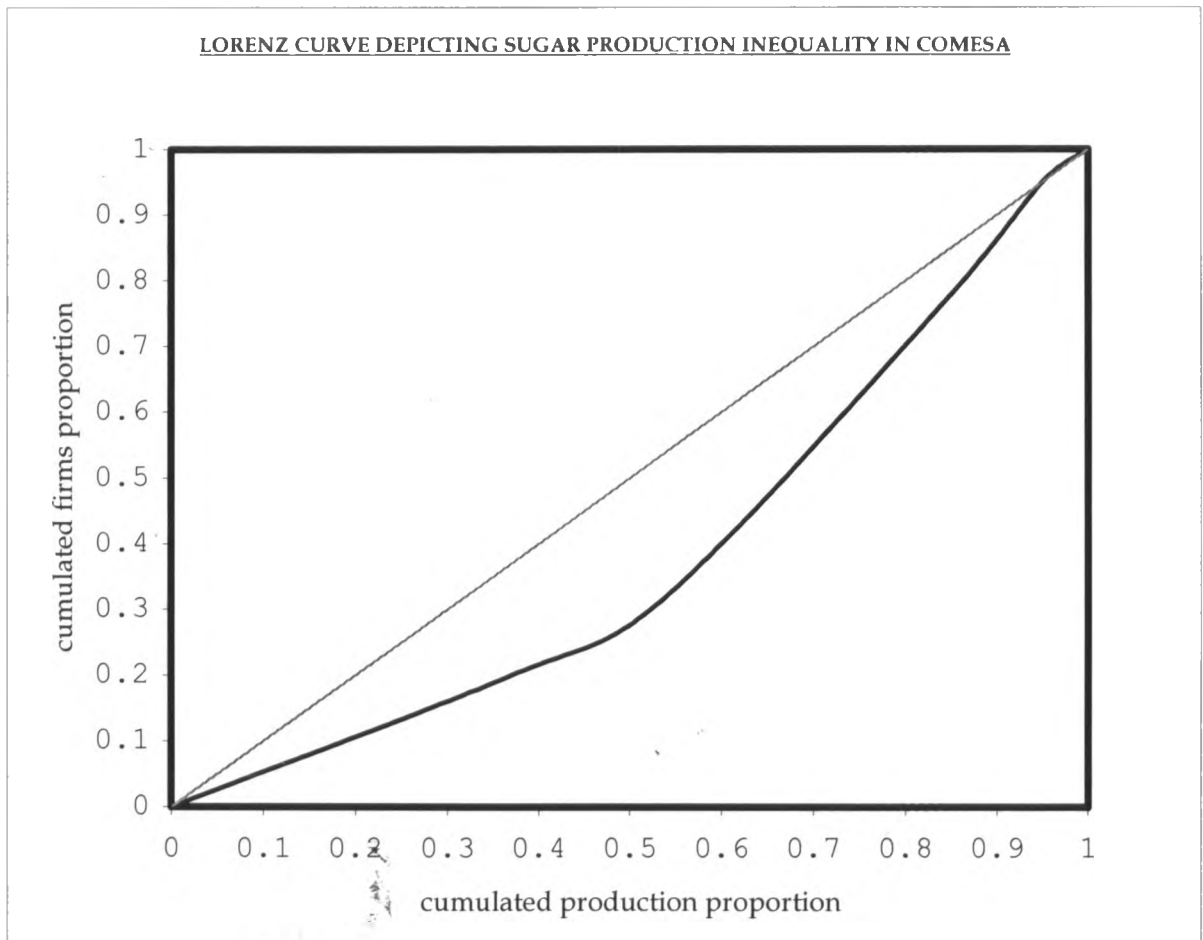
The Gini coefficient confirms the existence of production inequality in the sugar industry of COMESA. Its low value of 0.23 however indicates that this inequality is minimal. This low value of the Gini can be attributed to the figures given by Mauritius, which fall in the ‘upper domain’ of the Lorenz plane. We therefore bypassed it in constructing the Lorenz curve to arrive at a more conventional curve.

#### **RESULTS FOR THE CALCULATION OF THE GINI COEFFICIENT.**

Country	Proportion of production	Proportion of firms	Cumulated production proportion ( $X_i$ )	Cumulated firms proportion ( $Y_i$ )	$Y_{i+1} + Y_i$ (A)	$X_{i+1} - X_i$ (B)	A*B
EGYPT	0.37	0.20	0.37	0.20	0.2	0.37	0.07
SUDAN	0.17	0.12	0.54	0.32	0.52	0.17	0.14
MAURITIUS	0.16	0.41	0.70	0.73	1.05	0.16	0.20
ZIMBABWE	0.15	0.05	0.85	0.78	1.51	0.15	0.17
KENYA	0.10	0.17	0.95	0.95	1.73	0.10	0.09
ZAMBIA	0.05	0.05	1.00	1.00	1.95	0.05	0.10

*Source: ISO statistical bulletin and Author's own calculations*

One shortcoming with deriving the Lorenz curve is that the lowest production band contained 37 percent of the total production so that in plotting the Lorenz curve there are no points between 0 and 37 on the horizontal axis. This is to say almost the whole of the lower half of the curve had to be sketched in intuitively such that the detailed shape of the distribution at the lower end is somewhat uncertain. Mauritius figures are however included in the calculation of the Gini coefficient thus the low Gini and high graphical deviation of the Lorenz curve from the line of equality.





Some equality can be deduced from the lower end of table 1 as countries with 5 percent of total number of firms contributed 5 percent of total production. The Lorenz curve depicts this scenario as it lies on the line of complete equality as we pass the 90-percentage point on the vertical and horizontal axis.

A Gini of between 0.2 and 0.35 is considered to be relatively equitable and suggests that corrective measures need not be extensive in their time frame and varieties. It is evident that the market field is not level and cannot therefore be left entirely to the market forces without unfair negative consequences to some players.

The Lorenz curve, though a comparative tool, exhibits a level of inequality in the sugar industry of COMESA before the trade related provisions came into effect, and therefore imperfect competition is inferred. The curve had to be 'smoothed-out' as the figures given by Mauritius were completely outside the general trend. This extreme exhibited by Mauritius can be explained by the fact that Mauritius has numerous small-producing firms, which further puts to question the scale - argument advanced by sceptics of the Kenyan-sugar industry's competitiveness.

The skewness of the distribution of the concentration of production and firms can be deduced from column (4) and (5) of table 1; thus countries with 32 percent of firms account for 54 percent of total production. Conversely, countries with 68 percent of firms produce only 46 percent of total output. At the other end of the scale, countries with 22 percent of firms accounted for 15 percent of total production. Conversely, countries with 78 percent of firms produced 85 percent of total output.

It is further evident that Mauritius provides an interesting middle range. Including it to the lower half of countries with lower percentage of production makes this group of countries have a 30 percentage production share with a 27

percentage firm share - a 3 percentage point more than their equitable share. Conversely, if we include it with the upper half of countries with high percentage of production makes the group have a 70 percent output share from a 73 percent share of firms - a 3 percentage points less than their equitable share.

Mauritius with a 41 percent proportion of firms produces 16 percent of output, which roughly indicates that either they do not produce their fair share or the concept of scale economies does not apply. It was due to this discrepancy between production share and firms share that Mauritius had to be omitted in constructing the Lorenz curve.

The omission of Mauritius' figures from influencing the shape of the curve is justified even further by the fact that Mauritius chooses to export all of its domestic production to the European union which offers preferential treatment to agricultural and agro - based exports from African, Caribbean and Pacific (ACP) countries. In turn, it imports cheap sugar from international market to completely meet its domestic demand. It is therefore a unique case, which could as well have been left out of the analysis but for its position as a major producer of sugar in the region and its membership in COMESA.

### ***4.3 Conclusions and Recommendations***

As stated earlier, the aim of the study was to evaluate the structure of the market prevailing in the sugar industry of the COMESA region. The study has shown, from the available data, that 71 percent of trade in the sugar within COMESA is intra industry. Data on imports to and exports from Kenya indicate some years as having nil imports and exports. While this could be a true reflection of zero imports and exports, it could also be a case of missing data, in which case, it reduced the GL index.

According to new trade theories, a high IIT index is indicative of imperfect competition as the market structure, the extent of which, deducing from the low value of the Gini coefficient (0.23) is minimal. Therefore corrective measures should be developed in the short term and need not be numerous. The available options may be restricted by the fact that we are signatories to the World Trade Organisation's treaties such as the Uruguay round. The options are further narrowed down by membership to the common market.

We therefore propose that the relevant authority should reach an understanding with member states of COMESA on the sugar industry concerning exemption from the COMESA treaty until some underlying factors, which may not have emerged in this paper and others, have been investigated and documented. This understanding is necessary so as not to jeopardise the COMESA arrangement whose benefits are indeed numerous and massive. The distribution of production quotas to member countries with regard to existing number of sugar producing firms is an available option whose modalities could be worked out.

In the mean time Kenya should endeavour towards increasing the output of the existing sugar firms to at least cover domestic demand as this will also level the ratio of Kenyan firms' share and production share.

#### ***4.4 Areas of Further Research***

There are matters, which were not tackled completely or effectively in this paper. It is important to further understand and evaluate the different kinds of protective measures available to policy makers, their effects and applicability in instances of regional integration. The 'unfair' trade practices applied by member countries of an integrating region, their effect and how to eliminate them should be investigated. Lastly, a comprehensive cost analysis of imperfect competition will breakdown some of the shortcomings existing in this work.

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## APPENDIX

### Sugar production in the year 2000 (in metric tonnes)

Country	Production
Egypt	1,450,000
Mauritius	603,561
Zimbabwe	571,289
Zambia	190,000
Sudan	679,850
Kenya	401,984

*Source: ISO statistical bulletin July 2002 issue vol. 61 no. 07*

Country	Sugar Factories	TCD
Egypt	1.Kom	13000
	2.Guirga	6000
	3.Edfu	7500
	4.Armant	8500
	5.Kous	12000
	6.Deshkan	9000
	7.Nagar Hamady	12000
	8.Abou - Korkas	5500
All factories except Kom Ombo and Armant carry out refining of raw sugar TCD – tones of cane per day		
Sudan	1. Kenana	387000
	2. Alguneid	71696
	3. New Alpha	86378
	4. Sennar	64522
	5. Assalaya	54196
Zimbabwe	1. Hippo Valley Estate	
	2. Triangle Ltd.	
Each factory has an installed capacity of 350,000 MT of sugar per year.		
Zambia	2 factories that are privately owned by Zambia sugar PLC. The two factories have a total installed capacity of 200,00 MT per year.	



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Zambia	2 factories that are privately owned by Zambia sugar PLC. The two factories have a total installed capacity of 200,00 MT per year.	

Mauritius	<b>North</b>	
	1.Beau – plan	28000
	2.Belle-vue / Mauricia	55000
	3.Mon-Loisir	41000
	<b>South</b>	
	4.Bel-Ombre	18000
	5.Britannia	25000
	6.Mon-Tresor/mon-Desert	31000
	7.Riche-en-Eau	34000
	8.Rose-Belle	21000
	9.Saint-Felix	15000
	10.Savannah	35000
	11.Union/Saint-Aubin	31000
	<b>East</b>	
	12.Deep-River/Beau-Champ	54000
	13.Constance & La-Gaiete	29000
	14.Flacq United Estates Ltd.	71000
<b>West</b>		
15.Medine	50000	
<b>Central Plateau</b>		
16.Highlands	24000	
17.M-D/Alma	34000	

Source: sugar in Mauritius 1997

*MT – metric tones*

Source (for countries other than Mauritius) KSB report on fact finding mission to COMESA countries – 2001

		MT
Kenya	Mumias	220000
	Chemelil	80000
	Nzoia	70000
	Sony	60000
	Muhoroni	50000
	Miwani	30000
	West Kenya	20000

Source: KSB yearbook of statistics - 2000

## **SUGAR EXPORTS FROM KENYA TO COMESA COUNTRIES**

<b>Year</b>	<b>Amount</b>
1995	17220
1996	24478
1997	25050
1998	-
1999	-
2000	2088
<b>Mean</b>	<b>11473</b>

*Source: KSA yearbook of statistics (2002)*

Notes:

Exports before 2001 were destined to countries within COMESA. After Kenya signed the ACP-EU sugar protocol in 2001, all of Kenya's exports were destined to the European union market.

## **SUMMARY OF KENYA SUGAR IMPORTS FROM COMESA BY COUNTRY OF ORIGIN (TONNES)**

<b>COUNTRY OF ORIGIN</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
<i>(a) COMESA FTA* countries</i>						
Madagascar	0	300	0	0	0	0
Zimbabwe	0	0	1344	0	0	2127
Malawi	0	0	0	0	0	1008
Sudan	0	0	16500	4991	0	0
Zambia	0	0	0	0	0	0
Egypt	0	0	0	0	0	0
Sub-total	0	300	17844	4991	0	3135
<i>(b) COMESA Non- FTA countries</i>						
Mozambique	0	0	0	6058	0	0
Swaziland	0	0	0	0	0	0
Sub-total	0	0	0	6058	0	0
<b>Total</b>	<b>0</b>	<b>300</b>	<b>17844</b>	<b>11049</b>	<b>0</b>	<b>3135</b>

**Mean Imports = 5388**

*Source: Kenya Sugar Board yearbook of sugar statistics 2002.*

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\* FTA: Free Trade Area.

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