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Welfare Implication of The Removal of Subsidies on Selected Commodities.

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I.Background and Introduction

A range of commodities had been under government subsidy for more than a decade in Ethiopia until 1992. The change of government and the subsequent shift in economic policy has led to a series of price liberalisation and deregulation measures since then. The distortion created by the subsidy schemes in the goods market and hence the loss in efficiency cannot be doubted. However, complete liberalisation does not rule out the imposition of indirect commodity taxes on a range of commodities in the market to raise revenue to the government.

Public economics deals with the issue of optimal commodity taxes in consideration of the efficiency and equity implications of commodity taxes in order to raise a given amount of revenue to the government.[1] The widely and frequently applied method of investigating and empirically estimating the issue of optimal commodity taxes is through the specification of a social-welfare function that is assumed to be maximized by the government in raising the revenue through commodity taxes. This approach requires the specification and estimation of complete demand systems and from these to generate the underlying indirect utility functions that form the basis of the social-welfare functions. In addition data on tax rates may have to be extracted from input-output tables of the economy.

The complexities of this approach and the data requirements has for long prohibited its application in developing countries, particularly in countries like Ethiopia where input-output data have not been built for use. Recently Yitzhaki and Slemrod (1991) and Yitxzhaki and Lewis (1996) have introduced and developed a method convenient enough to be applied in developing countries using household level budget studies employing the powerful concept of Marginal Conditional Stochastic Dominance Rule (MCSDR) derived from concentration curves.

This paper attempts to apply the MCSDR methodology for Ethiopian data sets on selected commodities and is organised as follows: Section II introduces the methodology and dat sources, Section III presents the results and Section IV is summary and conclusions.

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[1] See Atkiinson and Stiglitz (1980) for the theoretical discussion of optimal commodity taxes.

II.Methodology and Data Sources

2.1. Concentration Curves and Tax Reform

Concentration curves were the most extensively used tools in the early years of planning exercise in India. Since then, their empirical properties have been investigated for application to such areas as public economics, and welfare economics.

Concentration curves are generalized forms of the popular summary measure known as the Lorenz curve[2]. In many planning exercises, and issues of economic growth, the distribution of expenditure on various goods across a spectrum of household characteristics renders valuable insights to policy options. Mahalnobis introduced the concept of concentration curves whose properties were illustrated and rigorously discussed by Roy, et al (1959); and later Kakwani (1980) provided proof of some of the empirical properties, and recently Yithaki and Slemrod (1991) used them to analyze issues of marginal tax reform in a revenue-neutral setting.

Roy et al (1959) defined that a " concentration curve" for a commodity C gives the percentage 100q of the total consumption of the commodity c consumed by the poorest 100p percent of the population"[3], or in the words of Yitzhaki and Slemrod (1991: 481) " the concentration curve is a diagram similar to the Lorenz curve. On the horizontal axis, the households are ordered according to their income, while on the vertical axis describes the cumulative percentage of the total expenditure on specific commodity that is spent by the families whose incomes are less than or equal to specified income level". These definition of a concentration curve embody the income effects; and Rao et al (1959) introduced relative concentration curves to normalize the effects of differences in purchasing power so that the effect of differences in preferences for various commodities can be neatly captured.

Kakwani (1980)[4] proved important theorems pertaining to concentration curves of which the following may be reproduced for the purpose of this paper:

i. If the income elasticity of commodity i, E_i is greater than the income elasticity of commodity j, then, the concentration curve for i lies above the concentration curve for j;

ii. The concentration curve for commodity i will be above (below) the egalitarian line if, and only if E_i is less (or greater) than zero for all income level greater than zero.

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[2]We need to distinguish this expression from Bishop et al () where the Lorenz curve is rescaled by a constant factor. Here the Lorenz curve is understood to be a special case of concentration curves.

[3]Roy et al, (1959), op cit pp 481

[4]Kakwani (1980), op cit, pp165-166.

iii. The concentration curve for commodity i lies above below) the Lorenz curve if, and only if , E_i is less (greater) than unity for all income greater than zero.

It follows therefore, that if the concentration curve of a commodity lies above the egalitarian, it is an inferior commodity, if the concentration curve lies between the Lorenz curve and the egalitarian line, it is a necessary commodity, and if the concentration curve lies below the Lorenz curve, the commodity is luxury.

Yitzhaki and Slemrod (1991) made an insightful use of concentration curves in the realm of public economics to analyze issues of tax reform. It is rather becoming conventional in the literature to look into the structure of indirect tax systems, and the possibility of reform by maximizing social-welfare function of the community subject to a government revenue constraint[5]. This approach presupposes the knowledge of Indirect Utility Function of the community, and thus the respective demand systems in order to be of any empirical use. When one looks at the severe limitations that developing countries face to meet the data requirements of this approach, then, the search for an alternative method remains a very compelling one. In this respect, the Marginal Conditional Stochastic Dominance Rules (MCSD) developed by Yithaki and Smlerod (1991) using the concept underlying concentration curves can be considered as a significant step to that end.

MCSD is defined as a state where " if the (shifted) [due to tax incidence] concentration curve of one commodity is above the (shifted)concentration curve of another commodity, then, the first commodity dominates in the sense that a small tax decrease in the first commodity accompanied by a taxi increase in the second (with revenue remaining unchanged) increases social welfare functions..... In other words, if and only if concentration curves do not intersect will all additive social-welfare functions show that the tax change increases welfare. We refer to these rules as Marginal Conditional Stochastic Dominance Rules"[6]. Normally this proposition would have required the plotting of n(n-1)/2 curves, which for a sufficiently large number of commodities becomes cumbersome. The Gini-coefficient has been used to identify a class of easily computable necessary conditions for welfare dominance via the translation into income elasticities. This condition states that the income elasticity of commodity i be lower than that of commodity j for commodity i to dominate commodity j in the event they are subject to an indirect tax.

We may show the above relations explicitly using the concentration ratio or index concept which is defined as one half of the area below the 45_0 line minus the concentration curve. That is,

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[5]see Atkinson (1970) for the specification of a social-welfare function, Ahmad And Stern (1984), King (1983), Cragg (1991) for empirical application and Deaton (1979, 1981) for the implication of additive preferences to optimal commodity taxes.

[6]Yitzhaki and Smelord (1991), op cit, pp 482

$$= Cov[X_i, F(y)] / m_i \quad \ldots\ldots\ldots (7)$$

where c_i is half of the concentration ratio, m_i is the mean expenditure on commodity i, X_i is total expenditure on commodity i, and F(y) is the cumulative distribution of income. Therefore, the area between the concentration curve of commodity i, and the concentration curve of commodity j can be written as:

$$c_i - c_j = [(b_i/S_i) - (b_j/S_j)]\, G_y, \quad \ldots\ldots\ldots (8)$$
$$where, b_i = Cov[X_i, F(y)] / Cov[y, F(y)], \wedge S_i = m_i / m_y$$

m_y stands for mean income or expenditure. Here the efficiency implication of the tax reform is assumed to be neutral that is there is no gain or loss.[7] We may interpret b_i/S_i as the weighted average income elasticities of commodity i, the weight being here the Gini-coefficient-implied welfare function, and is a nonparametric estimator of the slope of the regression line of S_i on y.[8] Thus for commodity i to dominate commodity j the weighted income elasticity of commodity i should be larger than for commodity j. The weighting scheme employed here is the Gini-index which also implies a specific form of social-welfare function. In fact, we can further broaden the weighting scheme by using the notion of the extended Gini index which is given by:

$$G(\alpha) = -\alpha\, Cov[y, 1 - F(y)^{\alpha - 1}] / m_y, \quad \ldots\ldots (9)$$

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$G(\alpha)$ where α is a parameter chosen by the investigator. The Gini is a special case of $G(\alpha)$ where, α is 2. The higher is α the greater is the emphasis on the bottom of the income distribution.

2.2. The Data

The data used in this study is taken from the Urban Socio-economic Survey conducted jointly by the Department of Economics, Addis Ababa University and Department of Economics, Gootenberg University in seven urban sites covering the years 1994, 1995 and 1997. The successive rounds of the survey administered questionnaire to households identified in the 1994 survey. Thus, the survey has socio-economic information on a panel of identical

[7] see Appendix A for details

[8] see Yitzhaki and Slemrod (1991), op cit , pp 487.

households over a range of three years. It is evident that this survey is superior from other budget surveys in providing reliable information on issues of poverty, particularly in analysing the changes in poverty over time.

The urban sites selected are representative of the total urban population of Ethiopia. These are Addis Ababa (the capital), Awassa, Bahir Dar, Dessie, Dire Dawa, Jimma and Mekele.In addition, the selected towns and the capital city reflect the diverse urban livelihood systems by which it is easier to compare the linkages the urban sector has with the rural sector and the influence of administrative structures and agrarian policies.

The socio-economic background of these sites have implications to issues of poverty and inequality at the household level. Towns like Dire Dawa, Awassa and Jimma thrive mainly on the trade of coffee and chat, both important export crops in Ethiopia. In addition, Dire Dawa is a route to trade activities with Djibouti. Thus, the poverty profile constructed in these towns represent adequately the situation in smaller towns located in the south and south-eastern parts of the country. Bahir Dar is a town that has seen rapid growth over the last twenty years in the northern part of the country. It represents the prosperous cereal growing region of the country and has a number of processing and manufacturing enterprises. The town is also an attraction to tourism so that the service sector is quite visible as compared to other provincial towns. Dessie and Mekele represents the low-income, relatively deprived part of northern Ethiopia.

The presence of provincial administration in a town has significant influence in terms of household income, infrastructure, growth, etc. in Ethiopia. The sites are also capable of demonstrating such aspects. Addis Ababa, Bahir Dar, Mekele, Awassa are centres of national and regional administrative offices, respectively. In contrast, Dire Dawa, Dessie and Jimma are not any more centres of provincial administrative offices. Over all the sites are representative of the diverse features of urban Ethiopia.

The survey covered 1500 households in 1994. Samples from each of these urban centres were selected by allocating the predetermined sample size in proportion to the total population of the selected urban centres in 1991 as projected by the Central Statistical Authority. Accordingly, 900 households in Addis Ababa, 126 in Dire Dawa, 73 in Awassa, 101 in Dessie and 100 in each of the rest of the towns were sampled. All *woredas* (districts) in each of the urban centres and 50% of the *kebeles* (urban dwellers' association, the lowest administrative units) selected randomly from each *wereda* were surveyed. The sample for the urban centre is allocated to each *wreda* proportional to the *woreda* population, which is further allocated to the selected *kebeles* once again in proportion to the total population of the selected *kebeles* in a *woreda*.

Before the respondent households were located, the selected *kebele* administrations were contacted and a list of residences by excluding buildings occupied by business, administrative units and unoccupied houses on the basis of the house number registrations available in the *kebele* offices was prepared. This list served as a source of identifying the households for the sample on the basis of systematic sampling procedure. The sample thus leaves out the homeless, tenants, residents of government-owned houses.

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The data collection was conducted by administering a detailed questionnaire on socio-economic features of households. The food and consumption expenditure data was collected on the basis of a one-week and 30-days recall period. For some food items that households would have to buy in bulk, like cereals, pulses and spices, sample households were asked to state the quantities of these food items they purchased in the 30 days preceding the date of interview and how much were their expenditures. For all types of commodities, respondents were asked if their consumptions constituted food form own harvest, obtained as gift, loan, or aid and to specify quantities consumed from such sources.

In addition to the consumption data, expenditure on clothing, furniture, and household equipments, energy, personal care goods, medical care, education, ceremonial expenses, taxes and contributions, purchase of building materials, rent and other non-durable, rent and other non-durable non-food items was obtained for the month before the date of interview as well for the last year. Households were asked if they have covered medical or educational expenditures of individuals outside the household during the last month., and if anyone from outside the households has paid for the health care of any household member. Expenditure on local and long distance transport was collected for the last seven days before date of interview.

3.Results (preliminary).

The direction of tax reform can be inferred from concentration curves and the necessity and sufficent conditions can be obtained also from the estimates of income elasticities based weighted by a Gini-coefficient. Here Figure 1 gives concentration curves for commodities that had been receiving subsidy and also bore heavy taxes prior to 1992. These are bread, cigarette and liquour, kerosene and electricity.

The preliminary result indicates that for nearly all other commodities, except may be for cigarette and liquors welfare can be improved if the government subsidises any one of the commodities and impose an income tax, in other words, subsidy on any of these commodities can be financed by a direct income tax. On the other hand, within commodities, it is very likely that Kerosene is the commodity that deserves subsidy as compared to other commodities, followed by bread and electricity.

We note that all commodities however have an income elasticity less than q except for Transport in Figure 2 (see Figure 3). The conclusion is that most of the commodities that had been subsidised in the past were necessities and that there is still a room for maintaining some of the subsidies in the context of improving welfare and reducing poverty, provided the budgetary implications are not significant. The above methodology is appealing since it assumes a revenue neutral scenario.

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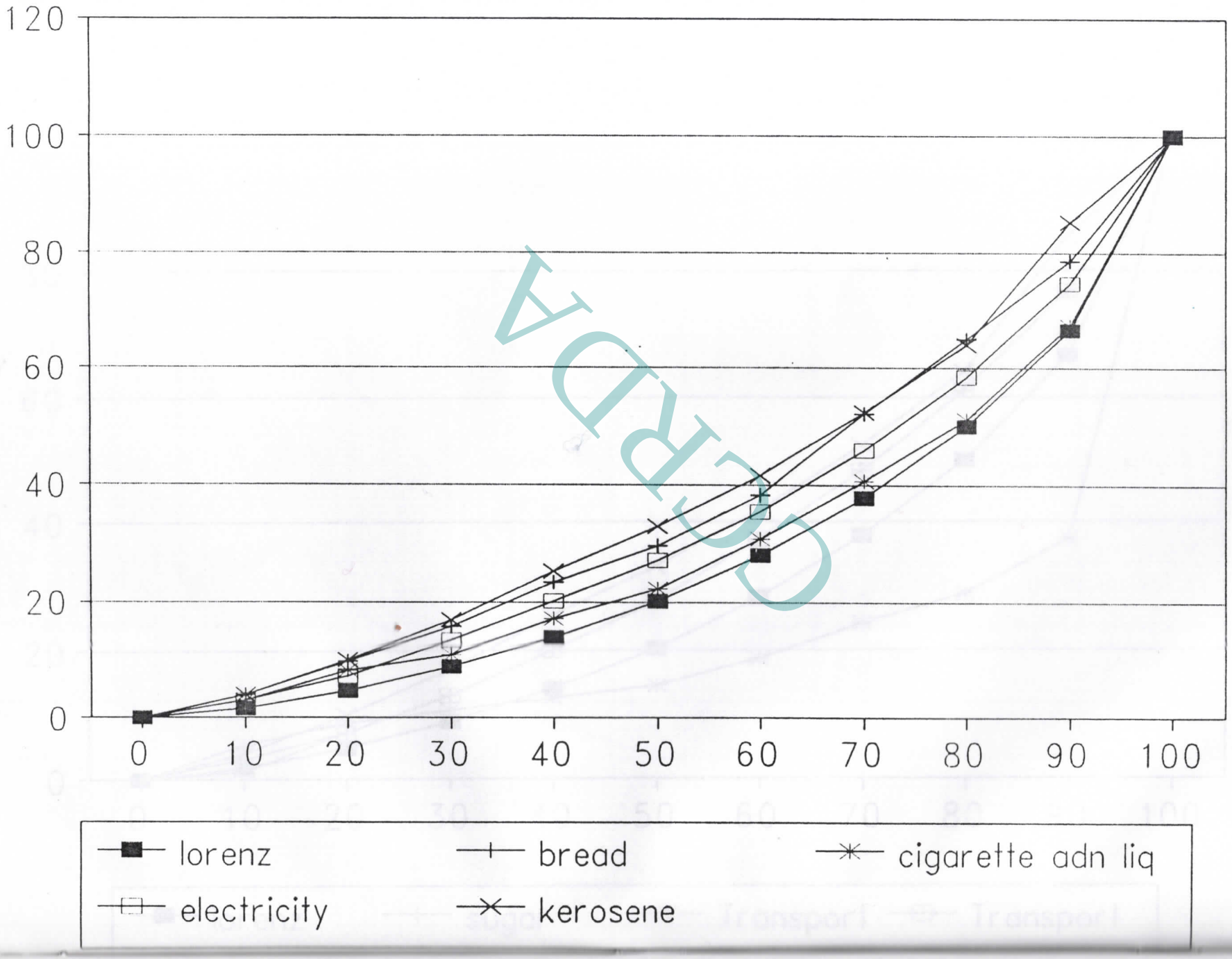
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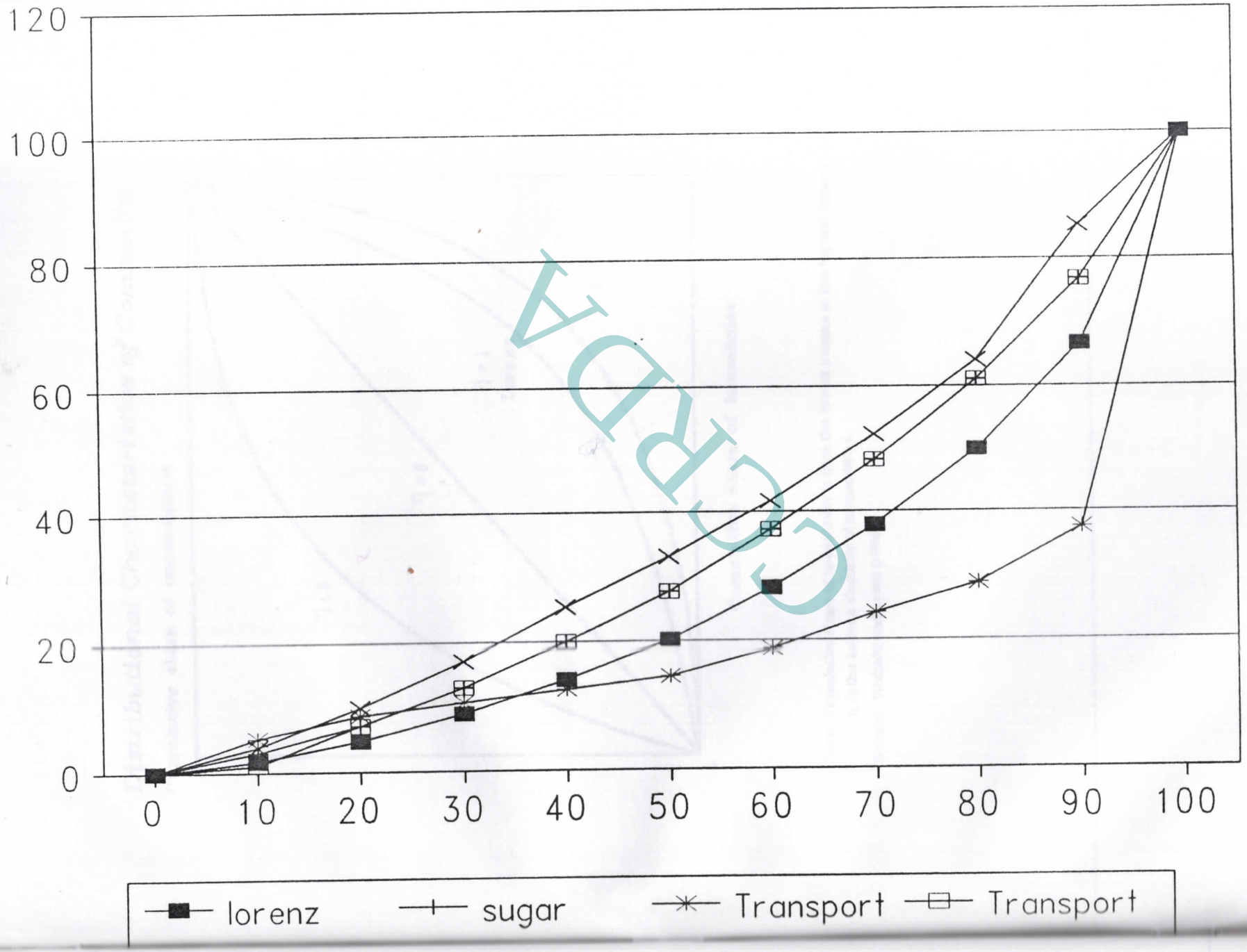
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Fig. 1

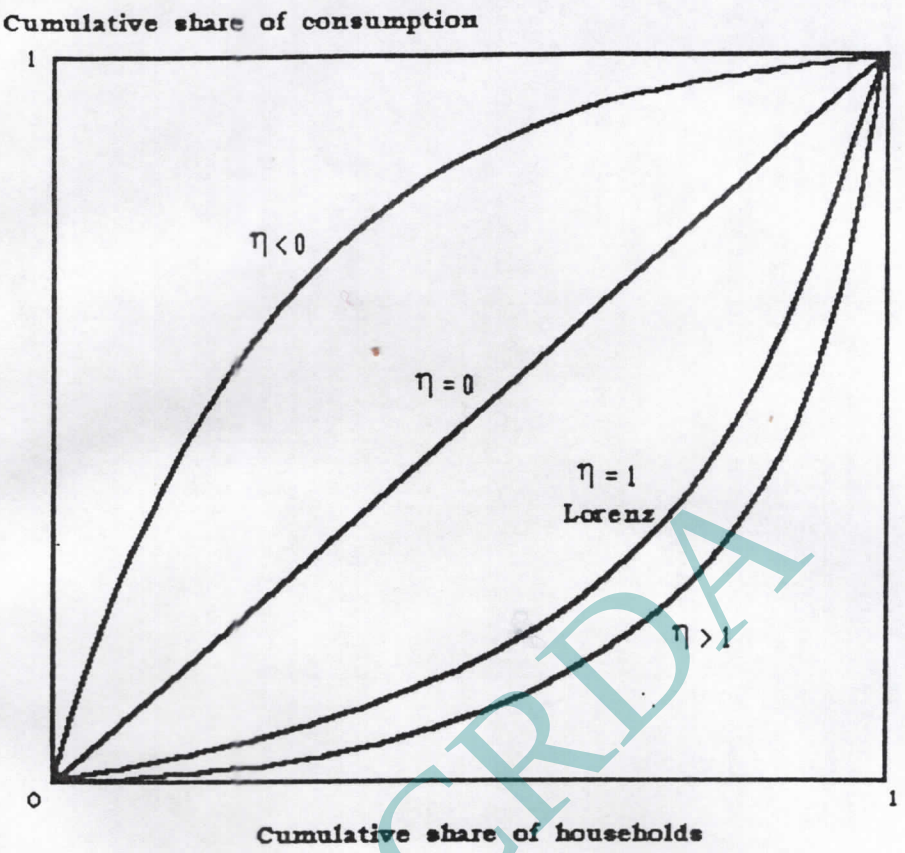

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Fig 2


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Transport

Distributional Characteristics of Commodities



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Note: Cumulative share of households is from the lowest income to the highest income.
η is the income elasticity of commodities.

Source: Yitzhaki and Lewis (1996)