『国際開発研究フォーラム』10（1998. 7）
Forum of International Development Studies, 10 (July 1998)

Income Inequality in Sri Lanka : A Disaggregated Analysis by Factor Incomes*

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Abstract

This paper analyzes the income inequality in Sri Lanka, applying disaggregated Gini coefficient, the elasticity of Gini coefficient with respect to factor incomes, and concentration curves, as well as conventional Gini coefficient and the Lorenz curve. There were four income inequality phases during the 1963-87 period. Income inequality declined during 1963-73, showing Sri Lanka as a welfare state among developing countries. But since 1973, there has been a reverse of this trend. It is difficult to justify liberalization policies as the main cause behind this situation. However, reduction in government subsidies, increase in foreign private transfers, decreasing share of labor income and increasing share of rent, dividends and interest could be identified as main reasons behind the rising income inequality in Sri Lanka. The effects of all these factors on total inequality are empirically examined in this paper. It is found that a 10 percent increase in foreign transfer share in total income will cause an increase in the Gini coefficient by 0.0014 in 1987. However, the government has policy options such as introduction of progressive tax system, augmentation of its transfers to poor people, provision of foreign job information for the poorest people, and promotion of labor-intensive technology to reduce income inequality in Sri Lanka.

1. Introduction

Two contradictory conclusions have appeared on relative income and expenditure inequality trend in Sri Lanka during the last three decades. As Glewwe (1986) summarized, income data from 1969/70 and 1980/81 surveys indicate that inequality has increased. Expenditure data from the same surveys indicate that inequality has declined both in the economy as a whole and within all sectors and ethnic groups. Therefore, to say which data set is appropriate for the analysis of inequality trend in Sri Lanka is rather an inductive question. For

*The first draft of this paper was presented in Professor Mitsuo Ezaki's seminar on development planning. Comments from Professor Mitsuo Ezaki and two anonymous referees are gratefully acknowledged. The usual disclaimer applies.

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example, it is purely inductive to explain relationship between economic growth and the distribution trend using those data in Sri Lanka. Therefore, traditional approach, which relates income inequality with other macroeconomic variables (growth, inflation, employment, trade, etc.) may not be alone appropriate for the analysis of distribution trend in Sri Lanka.

The literature on income distribution suggests that decomposition and disaggregation of inequality measurements are more helpful to understand the contribution of various components to the total inequality in any society. Total inequality can be expressed as a sum of "within-group" and "between group" inequalities by using decomposable inequality measure (Fields, 1979). In addition, total inequality can be broken down into weighted sum of inequality contributions of various income components by disaggregated analysis (Podder, 1993). However, Strong empirical evidence can be obtained by the decomposed or disaggregated inequality analysis. Several inequality measurements and variety of methodologies are available to decompose or disaggregate total inequality.

It is observed that income inequality has increased in some developing countries after liberalizing their economies. Free movement of factors of production has been identified as one of the causes behind this phenomenon. There is a widespread question to be asked : "Whether this phenomenon has appeared in Sri Lanka or not, after the introduction of liberalized economic policies in 1977." Glewwe (1986) examined the behavior of the size distribution of income and expenditure in Sri Lanka to answer this question by following Theil decomposition method. This paper attempts to provide a clear-cut answer to this question by analyzing factor income (functional distribution) inequality through the applications of disaggregated Gini coefficient, the elasticity of Gini coefficient with respect to factor incomes, and concentration curves.

This paper is organized as follows. The next section examines the measurements and methods to disaggregate income inequality by factor incomes. Section 3 describes the definitions, data and limitations of the paper. Section 4 presents the overall analysis of the economy-wide income distribution trend during the last three decades. Section 5 provides disaggregated analysis for income inequality by factor incomes. The final section summarizes the findings and concludes the paper.

2. Review of Measurements and Methods of the Disaggregation of Income Inequality by Factor Incomes

The Gini coefficient was originally introduced by Corrado Gini as a measure of dispersion in 1912. Since then the Gini coefficient has gained importance due to a variety of extensions

and their applications in both theoretical and empirical literature. One important aspect of the Gini coefficient is its relationship to the Lorenz curve, which is usually defined as the relationship between the cumulative proportions of income units and the cumulative proportions of income received when units are arranged in ascending order of their income. The larger deviation of the Lorenz curve from the egalitarian (45 degree) line indicates more income inequality. If there are two or more Lorenz curves in the same diagram, inner curves indicate less inequality in comparison to outer curves. This phenomenon is widely known as the Lorenz domination. If two or more Lorenz curves are crossing each other, the utilization of this concept is limited and one should thus use alternative inequality measurements.[1] Since the Lorenz curves do not cross each other in the case of Sri Lanka, this paper applies the Lorenz domination concept to explain the behavior of income inequality in section 4.

The Gini coefficient can be defined as the ratio of the area between the Lorenz curve and the egalitarian line to the area of the triangle below the egalitarian line. It varies between the limits of 0 (perfect equality) and 1 (perfect inequality). The greater the deviation of the Lorenz curve from the egalitarian line, the larger is the value of the Gini coefficient. Although there are various formulae to calculate the Gini coefficient, the following formula can be easily used with the grouped income or expenditure data :[2]

$$G=\sum_{i=1}^{n-1}(N_i/N)\cdot(Y_{i+1}/Y)-\sum_{i=1}^{n-1}(N_{i+1}/N)\cdot(Y_i/Y) \qquad (1)$$

where G=Gini coefficient, n=number of income classes,

N_i=cumulative number of income receivers, N=total number of income receivers,

Y_i=cumulative income, Y=total income,

so that, N_i/N=cumulative proportion of the number of income receivers,

Y_i/Y=cumulative proportion of income.

The Lorenz curve can be obtained by taking N_i/N data as the horizontal axis and Y_i/Y data as the vertical axis in two dimensional space.

The Gini coefficient and the Lorenz curve have been extended in various dimensions to discover more advanced inequality measurements in recent literature. Disaggregation of Gini coefficient is one important path in that operation. The Gini coefficient can be disaggregated by factor components and subgroup of population by using Gini concentration coefficients[3]. This paper focuses on the disaggregation of Gini coefficient by factor incomes to analyze income inequality in Sri Lanka.

The most important factor associated with the Gini coefficient and the Lorenz curve is that the income data must be in the ascending order to obtain practical results. Otherwise income distribution literature renames results as the Gini concentration coefficient and concentration curve. The disaggregation of the Gini coefficient is mostly associated with the

factor income data, which may not be in ascending order. When a specific factor income is arranged in ascending order of the total income and the percentages of that factor income are plotted against the percentages of income units, it is possible to obtain concentration curve for relevant factor income. Concentration coefficient can be obtained by dividing the area between the egalitarian line and concentration curve by the total area of triangle below the egalitarian line. It is possible to obtain concentration coefficient by replacing specified factor income for Y_i in the Gini coefficient formula. For example, suppose labor income to be the source of k-th income. We can calculate concentration coefficient for labor income using the following formula.

$$C_k=\sum_{i=1}^{n-1}(N_i/N)\cdot(Y_{i+1,k}/Y_{.k})-\sum_{i=1}^{n-1}(N_{i+1}/N)\cdot(Y_{i,k}/Y_{.k}) \tag{2}$$

where C_k=concentration coefficient for k-th income (labor income),

$Y_{i,k}$=cumulative k-th income (labor income),

$Y_{.k}$=total k-th income (labor income),

$Y_{i,k}/Y_{.k}$=cumulative proportion of k-th income (labor income).

Concentration curve for labor income can be plotted by taking N_i/N data as the horizontal axis and $Y_{i,k}/Y_{.k}$ data as the vertical axis in two dimensional space.

Since specified factor income is in the ascending order of the total income, the concentration coefficient for that factor income can have either a positive or negative value, unlike the Gini coefficient. Furthermore, unlike the Lorenz curve, concentration curve can exceed the egalitarian line due to the above reason. Factor based concentration coefficients did not take negative values for Sri Lankan data, for the 1973, 1982 and 1987 years, as shown in section 5. Having in mind the above phenomenon, it is possible to review some properties of the disaggregation by factor components with the following relation in mind :

$$Y=\sum_{k=1}^{m}y_{.k} \tag{3}$$

The first is the relationship between factor-based concentration coefficients and total income-based Gini coefficient. Several methods have been attempted to relate factor income based concentration coefficients to the total income based Gini coefficient. Among others, Fields (1979) stated that relationship as follows :[4]

$$G=\sum_{k=1}^{m}\phi_k C_k \tag{4}$$

where G=Gini coefficient from total income, m=number of factors

C_k=concentration coefficient of k-th factor income

ϕ_k=share of k-th factor income in total income, (i. e., $Y_{.k}/Y$).

Therefore, according to Fields, the percentage share of the k-th factor in the total income inequality can be written as :

$$Q_k = \frac{\phi_k C_k}{G} * 100 \tag{5}$$

where Q_k is the part of total inequality due to the k-th factor income. According to Rao (1969), the same relationship can be expressed as :

$$G = \sum_{k=1}^{m} \frac{\mu_k}{\mu} C_k \tag{6}$$

$$Q_k = \frac{\mu_k}{\mu} C_k \frac{100}{G} \tag{7}$$

where μ = mean value of total income, and μ_k = mean value of k-th factor income. The Rao's mean income share (μ_k/μ) is replaced by the factor income share (ϕ_k) in the Fields analysis. The second is the extension by Podder (1993) of the Rao's analysis to the elasticity of the Gini coefficient with respect to k-th factor income :[5]

$$\eta_k = \frac{1}{G}\left[\frac{\mu_k}{\mu}(C_k - G)\right] \tag{8}$$

where η_k = the elasticity of the Gini coefficient with respect to k-th factor of income under the assumption of constant C_k.

The advantage of using formula (8) is that the sign of η_k indicates either the negative or positive effect of the k-th factor on the total income inequality. In other words, if the k-th factor is present, the sign indicates whether the total income inequality increases or decreases. Also, the elasticities provide us a clear picture of the relative importance of different factor incomes with respect to total inequality of the society as a whole.

One important limitation of η_k is the assumption of constant C_k. When the share of the k-th factor in total income is increased or decreased, the income inequality within factors will be constant. Therefore, the analysis of section 5, which compares inequalities among factor components by drawing concentration curves for each factor income, is subject to this constraint.

3. Definitions, Data and Limitations

The data used in this study have been obtained from the *Report on Consumer Finances and Socio Economic Survey*, published by the Central Bank of Sri Lanka in 1974, 1983, 1984 and 1993. Surveys are conducted in the year 1973, 1978/79, 1981/82, 1986/87, but no such kind of survey is available for the 1988-1997 period in Sri Lanka. The 1986/87 survey was the latest one when this study was began. Therefore, this paper will not be able to present income inequality analysis after the 1987. Since the last survey was conducted 10 years after the introduction of liberalized economic policies, it is quite reasonable to provide an assessment on the impact of the drastic policy change on income distribution in Sri Lanka using the

1987 data.

The sample size of the survey is 8,000 households in 1987. Sri Lanka has 9 provinces, which include 24 administrative districts. Surveys have been conducted for all districts and provinces in 1973 and 1982. However, surveys have not been conducted in the Northern and Eastern provinces after 1983 due to the civil war. Those two provinces represented 14.8 percent of total population and 28 percent of land area of Sri Lanka in 1997. Survey data after 1983 report only for 7 provinces, which include 17 administrative districts. Since income distribution behavior in the Northern and Eastern provinces have not structurally changed during the 1973-1982 period (according to other publications), this study assumes the normal behavior of income inequality among all regions after 1983.

This paper is based on one-month income of income receivers. An income receiver is defined here as 'A person who has received an income from any source whatsoever (employment, transfer, rent, own business, dividend etc.) during the six months immediately prior to the date of visit was treated'. Surveys also provide data on expenditure units. Expenditure units-based data are not used to explain inequality due to disaggregation difficulties.

Total income is classified into 8 factor incomes in this paper ; namely, two types of labor income (income from the main occupation and that from the subsidiary occupation), rent, dividends, interest, gifts, pensions, and other sources. Gifts, pensions, and other transfer incomes are considered as the transfer income from domestic sources in the 1981/82 and 1986/87 surveys. Furthermore, foreign transfer income is considered as a different income source in those two surveys. Imputed values for home garden are considered as the separate factor income in 1981/82 and 1986/87 surveys. However, classification of total income into factor income sources is limited by data availability.

4. The Overall Behavior of Income Inequality in Sri Lanka

Sri Lanka has been widely known as a slow-growing, well-distributed economy among developing countries[6]. Achievement of egalitarian state in the early 1970's was due to government intervention efforts. Fields (1980, p. 195) states, "Unlike Taiwan, in which we see that poverty alleviation and inequality reductions are due to growth, in Sri Lanka declining poverty and inequality are due to redistribution." Primary income distribution measurements of Sri Lanka for the last three decades are presented in Table 1, whereas Gini coefficients for various subgroups of population are presented in Table 2. These data were obtained from the Central Bank of Sri Lanka, *Report on the Consumer Finances and Socio Economic Surveys* conducted in 1973, 1978/79, 1981/82, 1986/87. According to those data, it is possible to identify four phases of income inequality in Sri Lanka during the 1963-1987

period.

The first is the reduction in income inequality during the 1963-1973 period. As far as the whole economy is concerned, the income share of the low-income group increased while that of high-income group decreased. The income share of the bottom 40 percent of income receivers increased from 12 to 15.7 percent while that of the top 20 percent declined by 10 percent. The Gini coefficient declined from 0.49 to 0.39 (or by 20 percent) in this period[7]. The Gini coefficient has declined in urban and rural sectors as well as most of education level classes. All these indices indicate the declining income inequality in Sri Lanka in the 1963-1973 period. Fields (1980) has identified government intervention as the main reason behind the reduction of inequality in this period. High government subsidies on food, expansion of free education and health facilities were the causes that generated equitable income distribution until 1973.[8] Economic policy was based on import substitution and basic need improvement objectives in the early 1970's. The river-based agricultural development projects were implemented to improve rural agricultural production in this period. Furthermore, export-oriented estate plantation agriculture (production of tea, rubber and coconut) was heavily taxed to recover high cost of social expenditures in Sri Lanka (Oshima, 1987 p. 237). As a result, a part of the high-income receivers' income was transferred to the low-income receivers, while the government was directly supplying basic needs (e. g., education and health) to all income groups.

As regards to the second period of income inequality phases, an increase in income inequality can be identified during the 1973-1978 period. Income receivers Gini coefficient increased by 28 percent for the overall economy. The lowest 20 percent income receivers' share declined from 15 to 12 percent while the fifth quintile income receiver's share increased from 45 to 54 percent. It is possible to identify Lorenz domination phenomenon in the 1973-

Table 1 Basic Measurements of Income Distribution in Sri Lanka 1963-1987

Item	1963	1973	1978/79	1981/82	1986/87
Mean Income (in SL Rupees)	134	228	606	1108	1817
Quintile			**Percentage of Income**		
Lowest 20 %	3.87	4.97	3.76	3.62	3.54
Second 20 %	8.13	10.08	8.37	7.94	7.79
Third 20 %	12.37	15.85	13.3	12.21	12.48
Fourth 20 %	20.78	23.21	20.46	19.22	19.45
Highest 20 %	55.25	45.24	54.09	56.8	56.74
Quintile 5/1	14.28	9.1	14.38	15.69	16.02

Source : *Report on Consumer Finances and Socio Economic Surveys*, 1973, 1978/79, 1981/82, 1986/87.

Table 2 Income Receivers Gini Coefficients for Sectors, Gender and Levels of Education in Sri Lanka, 1963-1987

Sub group of population	1963	1973	1978/79	1981/82	1986/87
1. **Sector and Gender**					
Sri Lanka	0.490	0.387	0.497	0.510	0.522
Urban	0.491	0.407	0.510	0.541	0.533
Rural	0.442	0.372	0.491	0.493	0.498
Estate	0.272	0.371	0.325	0.321	0.313
Male	—	0.367	0.474	0.514	0.509
Female	—	0.421	0.493	0.465	0.507
2. **Level of Education**					
No Schooling					
(i) Illiterate	0.432	0.374	0.461	0.442	0.409
(ii) Literate	0.381	0.371	0.384	0.393	0.438
Primary	0.343	0.370	0.474	0.480	0.465
Secondary	0.432	0.371	0.483	0.510	0.510
G. C. E. (O/L)*	0.402	0.352	0.464	0.491	0.500
G. C. E. (A/L)**	0.400	0.482	0.582	0.580	0.497
Undergraduates	—	—	0.34	0.192	—
Graduates & Post Graduates	0.491	0.341	0.476	0.380	0.459

*General Certificate of Examination (Ordinary Level)=Junior high school final examination
**General Certificate of Examination (Advanced Level)=Senior high school final examination
—indicates that data are not available.
Source : *Report on Consumer Finances and Socio Economic Surveys*, 1973, 1978/79, 1981/82, 1986/87.

78 period, as shown in Figure 1. The Lorenz curve for 1978 is found clearly outside the Lorenz curve for 1973.

Several reasons can be identified to justify the increasing inequality trend in the 1973-1978 period. First, since there are no data between the 1973-1978 period, it is not possible to determine the precise time of this trend's reversal. Second, Lakshman (1997) has identified structural and institutional changes, nationalization of some private companies in 1975 and the introduction of liberalization policies in 1977 as the major influential causes behind the increasing inequality during this period. However, liberalization policies were introduced by the budget speech in November, 15, 1977 and implemented since 1978. Income data collected are for the 1978/79 period. Therefore, it is difficult to justify liberalization policies as the major cause for the rising income inequality in this period.[9] Third, since the government was prepared to reduce various subsidies under the international pressure, people may have underreported their income in official surveys to have the opportunity to enjoy those subsidies for a long term.[10] This argument may have support from the reducing inequality trend of expenditure data in the same surveys. Fourth, many factors contributed to the slow

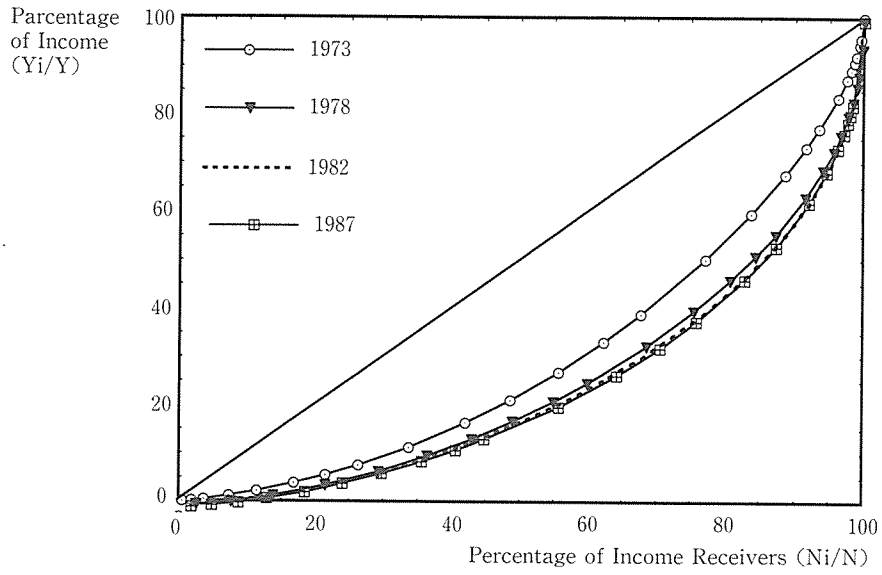


Figure 1 Lorenz Curves for Income Receivers in Sri Lanka, 1973-1987

growth rate and high inequality in this period. They include the reduction in government food subsidies, oil crisis, high inflation, reduction in the world prices of tea, rubber and coconut, stagnated industrial sector due to strong import substitution policy, inefficient government enterprises and very small private-sector participation. Because of a slowdown in GDP growth, equitable approach could not be continued in Sri Lanka. However, a rise in inequality in the 1973-1978 period was accompanied by a reduction of rural and urban poverty in Sri Lanka resulting from government intervention (Field, 1980).

In the third phase of income inequality behavior, further increase of income inequality can be identified in 1978/79-1981/82 period. Income receivers' Gini coefficient marginally increased by 5 percent, while the income share of the lowest 40 percent income receivers has marginally declined from 12.1 percent to 11.6 percent. The income share of the highest 20 percent income receivers increased up to 56.7 percent. This can be identified with the help of the behavior of Lorenz curves as shown in Figure 1. The Lorenz curve for 1978 was seen completely lying inside the Lorenz curve based on the 1982 data. Lakshman (1997) has identified the creation of job opportunities for new entrants of labor force as one important cause behind the rise in income inequality in this period. This is because new workers at the beginning of their working life may receive low wages, and the average number of income receivers per family may increase due to a rise in employment opportunities. Since the unemployment rate declined from 24 to 12 percent in this period, it is possible to accept this reason. However, the increase in inequality during the 1978-1982 period was less in

magnitude and negligible in comparison to that in the 1973-1978 period. Thus, the existing inequality trend continued. In other words, it is difficult to generalize the argument that liberalization policies have caused to generate more income inequality in Sri Lanka.

In the fourth phase of income inequality behavior, it is possible to identify stagnation of income inequality in the 1982-1987 period. This can easily be identified from the behavior of the Gini coefficients, quintile shares of the income and the Lorenz curves as shown in Table 1 and Figure 1. The Lorenz curve for 1982 lies on top of the Lorenz curve for 1987.

Since income and expenditure data are not available, it is too early to comment on the 1987-1997 period. However, an increase in the GDP growth rate and considerable reduction in the unemployment rate in the 1990's might lead to the beginning of an inequality-decreasing phase again. However, marginal movements in inequality and economic growth rates may not be important in the long-run development path. Although economic policy was centered towards the outward orientation and the rapid growth, the eradication of poverty and the march towards the egalitarian society are very important objectives in the long run. These two objectives are directly related to the functional distribution of income in outward-oriented countries. This happens because free movement of factors of production affects the determination of the level of income inequality in such countries. Therefore, disaggregation of total inequality by factor income is very important.

5. Disaggregation of Income Inequality by Factor Components in Sri Lanka

This section is based on our own empirical findings. Total income is divided into 8 factor components and their contribution to total income inequality in 1973, 1981/82 and 1986/87. Table 3 summarizes the empirical results of equations (1), (2), (4), (5) and (8) defined in section 2 for the survey data of 1973. The income share of each factor is presented in the second column of Table 3. Labor income contributed more than 78 percent of total income in Sri Lanka in 1973. This implies that Sri Lanka is a labor-abundant country. In other words, labor is relatively cheap in comparison to other factors of production. Income from main occupation and sub-occupation represented 65 and 13 percent respectively. Following that, income source from gift including government transfers to the poor people represented 12 percent of total income. Government transfers were reordered as the second highest income source in 1973. This phenomenon was special to the economy of Sri Lanka, suggesting that development policies in the early 1970's were welfare oriented. Furthermore, income from rent contributed by 5 percent. All other income sources have negligible contribution.

The third column of Table 3 shows the Gini concentration coefficients by factor incomes. The Gini coefficient for total income is given in the last row of that column. A relatively low

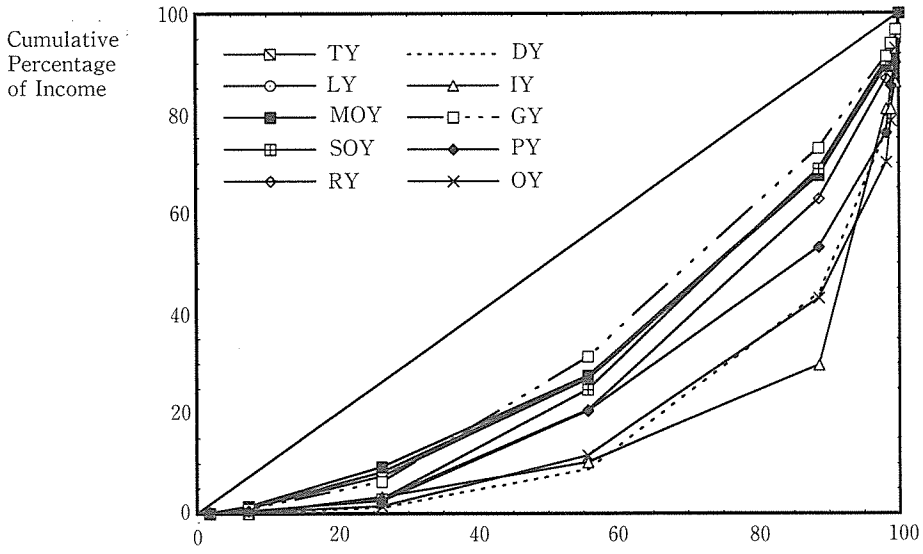
Gini coefficient indicates low income inequality in Sri Lanka in 1973. However, income inequality differs considerably across factor income sources. Labor income and rent income were relatively equally distributed, thereby concentration curves of those factors lay inside in comparison to interest, dividends, pensions and other income sources based concentration curves, as shown in Figure 2. Income receivers from interest income, dividends and other sources were mostly concentrated in the very high income ranges. By contrast, income receivers from main occupation and gifts (including government transfers) were mostly concentrated in the lowest income ranges.

The share of each concentration coefficient in the total Gini coefficient (in a sense total inequality) is presented in columns 4 and 5. The last figure of column 4 represents the Gini coefficient for total income, as shown in equation (4). Column 4 shows that the main occupation income represents a large part of income inequality in absolute terms. This was due to large share of that income source in the total income. This can be further explained by using the data in column 5, which gives factor inequality shares (FIS). FIS can be defined as each factor's percentage share in the total income inequality measured by the Gini coefficient. For example, income from main occupation contributed 63 percent to the total Gini coefficient in Sri Lanka in 1973. Although rent income was 5 percent of the total income, its share in the Gini coefficient was 6 percent. This implies that rent income was rather unequally distributed in Sri Lanka. Interest income behaved similarly. However, as shown in section 2, FIS [equation (5) or (7)] can be interpreted in a number of ways. Therefore, it is difficult to obtain conclusions by using only this index.

Table 3 Effects of Factor Income on Income Inequality in Sri Lanka, 1973

1	2	3	4	5	6	7	8
Income Components	Factor Share-% ϕ_k*100	C_k	$\phi_k C_k$	$FIS = \frac{\phi_k C_k * 100}{G}$	$C_k - G$	$\phi(C-G)$	η_k
1. Labor Income	78.71	0.3797	0.2989	77.19	-0.0075	-0.0059	-0.0152
(i) Main Occupation	65.77	0.3723	0.2449	63.24	-0.0149	-0.0097	-0.0253
(ii) Sub Occupation	12.94	0.4172	0.0540	13.94	0.0300	0.0039	0.0103
2. Rent	5.27	0.4733	0.0250	6.44	0.0861	0.0045	0.0117
3. Interest	0.09	0.6859	0.0077	2.00	0.2603	0.0002	0.0007
4. Dividends	1.20	0.6475	0.0006	0.15	0.2988	0.0031	0.0080
5. Gifts	12.18	0.3391	0.0423	10.93	-0.0481	-0.0060	-0.0155
6. Pension	1.53	0.5286	0.0081	2.10	-0.1414	-0.0022	-0.0056
7. Other sources	0.73	0.6397	0.0046	1.20	-0.2525	-0.0018	-0.0047
Total Income	100.00	0.3872	0.3872	100.00	0.0000	0.0000	0.0000

Data Source : *Central Bank of Sri Lanka, Report on Consumer Finances and Socio Economic Survey*, 1973



TY=Total Income
LY=Labor Income
MOY=Income from Main Occupation
SOY=Income from Sub-Occupation
RY=Income from Rent
DY=Income from Dividends
IY=Income from Interest
GY=Income from Gifts
PY=Income from Pensions
OY=Income from Other Sources

Data Source : *Central Bank of Sri Lanka, Reprot on Consumer Finances and Socio Economic Survey*, 1973.

Figure 2 Relationship Between Total Income and Factor Income Distribution in Sri Lanka, 1973

The signs of column 6 figures imply which direction each income source will affect the total inequality. A negative sign implies reducing inequality while a positive sign shows increasing inequality. Thus, labor income (specially income from main occupation) and gifts were inequality reducing, showing that the presence of these income sources in total income would make total inequality lower than what it would be in their absence. This necessarily implies that an increase in the labor income share and government transfer share would reduce total income inequality in Sri Lanka. By contrast, the rest of the sources may cause to increase income inequality when proportional shares of those factors in the total income are increased.

It may be possible to have a better idea by looking at the 7th column in Table 3. It shows the change in the Gini coefficient resulting from a proportionate change in each factor income, assuming that each factor's concentration coefficient is fixed.[11] Figures in that column show the effect of a small proportionate change in each income source on the Gini coefficient of the whole society. For example, a 10 percent increase in labor income [$\mu_k/\mu = 0.1$] will lead to a reduction in Gini Coefficient by 0.0006. An increase in income from main occupation and government subsidies will reduce total Gini coefficient. On the contrary, an

increase in income from sub-occupation, rent, interests, dividend, pension and other income will increase Gini coefficient. For example 10 percent rise in the mean rent income will increase the Gini coefficient from 0.3872 to 0.3877 in Sri Lanka. It is possible to calculate each factor's contribution to changing Gini coefficient by using the figures of column 7.

The last column of Table 3 shows the elasticity of Gini coefficient with respect to each factor income under the assumption of fixed concentration coefficient. Similar to column 7, the elasticity figures of column 8 are clear indicators of the relative importance of income sources on the extent of increasing or decreasing total inequality. If the elasticities are high and positive, then their contribution to inequality is high. As shown in the last column of Table 3, income from main occupation has a relatively high inequality-reducing tendency in Sri Lanka, i. e., 25 percent reduction in Gini coefficient for 1 percent increase in that income (with no change in concentration coefficient).

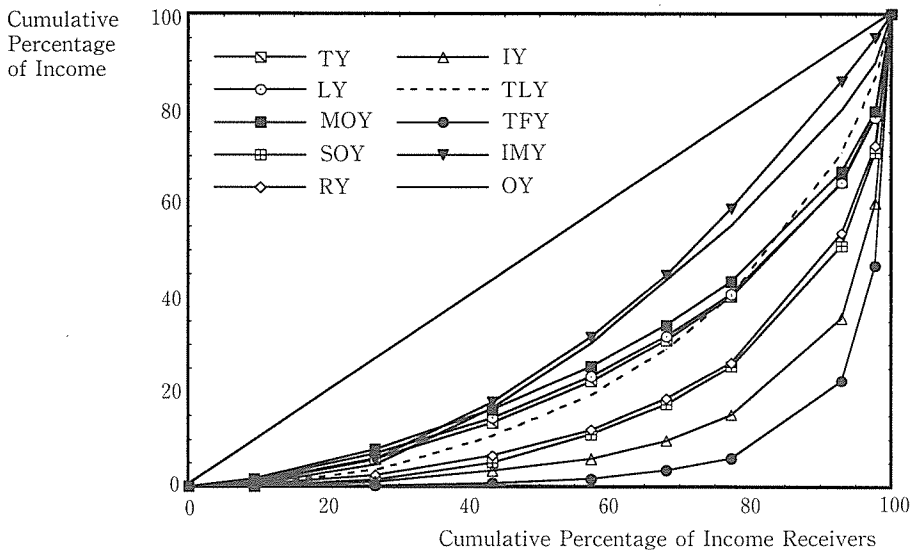
Table 4 presents empirical results for equation (1), (2), (4), (5) and (8) for the survey data in 1981/82. It shows that total income inequality measured by the income receivers Gini coefficient increased during 1973-1982. The Gini coefficient increased by 33 percent in this period. Changes of relative importance of factor incomes in the total income and changing behavior of concentration coefficient directly affected this situation.

The relative share of factor incomes changed from 1973 to 1982 in Sri Lanka. The importance of labor income and domestic transfers have declined, while foreign transfers, rent income, interest income, imputed values for home garden, and income from other sources have increased during this period. The most declined factor share was associated with labor

Table 4 Effects of Factor Income on Income Inequality in Sri Lanka, 1981/82

1	2	3	4	5	6	7	8
Income Components	Factor Share-% ϕ_k*100	C_k	$\phi_k C_k$	$\frac{\phi_k C_k * 100}{G}$	$C_k - G$	$\phi(C-G)$	η_k
1. Labor Income	69.43	0.4973	0.3450	67.68	-0.0128	-0.0089	-0.0175
(i) Main Occupation	59.31	0.4664	0.2764	54.24	-0.0437	-0.0259	-0.0508
(ii) Sub Occupation	10.12	0.6781	0.0686	13.46	0.1680	0.0169	0.0333
2. Rent	6.12	0.6561	0.0402	7.87	0.1460	0.0089	0.0175
3. Interest & Dividends	2.36	0.7778	0.0184	3.59	0.2677	0.0063	0.0124
4. Transfers-Domestic	6.68	0.5204	0.0347	6.81	0.0103	0.0007	0.0014
5. Transfers-Foreign	3.03	0.8706	0.0264	5.17	0.3605	0.0109	0.0214
6. Home garden-imputed	6.28	0.3459	0.2171	4.26	-0.1642	-0.0103	-0.0202
7. Other sources	6.10	0.3846	0.0235	4.60	-0.1255	-0.0077	-0.0150
Total	100.00	0.5101	0.5101	100.00	0.0000	0.0000	0.0000

Data Source : *Central Bank of Sri Lanka, Report on Consumer Finances and Socio Economic Survey*, 1981/82



TY=Total Income
LY=Labor Income
MOY=Income from Main Occupation
SOY=Income from Sub-Occupation
RY=Income from Rent
IY=Income from Interest (IY=IY+DY)
TLY=Transfers from Domestic
TFY=Transfers from abroad
IMY=Imputed Income from Home Garden
OY=Income from Other Sources

Data Source : *Central Bank of Sri Lanka, Reprot on Consumer Finances and Socio Economic Survey*, 1981/82.

Figure 3 Relationship Between Total Income and Factor Income Distribution in Sri Lanka, 1981/82

income. Income from main occupation declined by 6 percent. The following reasons could be identified as main causes behind the declining share of labor income in this period. First, the survey has included imputed values from home garden under the labor income in 1973 and separated it in the 1982 and 1987 surveys. The survey indicated that imputed values for home garden was nearly 3 percent of total income in 1973. Second, some government industries (operating under loss in the import substitution period of 1970-77) were privatized after the introduction of new policies in 1977. As a result, some regular employees lost their main income source. Third, economic activities shifted after the new economic policies were centered to the service sector, which resulted in an increase of rent, interest and dividends in comparison to regular occupation income.

The relative importance of domestic transfer of income has clearly declined due to rationalization of food subsidy programs directing to the poorest people after the introduction of the liberalized economic policies in 1977. This may have accelerated the decline in the poorest share of income in size distribution. Therefore, income inequality was associated with the reduction in government transfers to poor people in Sri Lanka during the 1978-82 period.

The share of foreign transfer of income has relatively increased after 1976. This is because labor laws were reformed by the government in 1976, providing opportunities for Sri Lankans to work in foreign countries. As a result, a large number of Sri Lankans worked in foreign countries, mainly in the Middle East in the early 1980's. Therefore, private foreign transfers increased in volume and became an important source of the total income during the 1977-1982 period. Net private transfers from abroad represented 1 percent of GDP in 1977 and 6 percent of GDP in 1982.

As mentioned above, labor income and income from gifts (including government transfers) were inequality-reducing factors in 1973. Relative importance of these two factors declined in the 1973-1982 period. Moreover, the elasticity of the Gini coefficient with respect to rent income exhibited inequality-increasing behavior in 1973. However, the relative importance of rent income increased in 1982, resulting in an increase in the, relative income inequality in 1982 in comparison to 1973.

The size of the concentration coefficients for factor incomes (provided in column 3 of Table 4) is also important. Concentration coefficients of foreign transfers, interest and dividends, rent as well as sub-occupation show high values in 1982. This implies unequal distribution of those factor incomes. Income from home garden, main occupation and other sources were equally distributed in comparison to other factors.

Figure 3, which represents concentration curves for all factor incomes, can be used to explain relative income inequality among factor components. Private foreign transfers shows a highly unequal distribution in 1982. Concentration curves for foreign transfers, income from interest and dividends, income from rent lie close to the outer boundary. Imputed value for home garden and main occupation are shown by the relatively low-bend concentration curves. These two factors were more equally distributed in comparison to distribution of total income. Since 85 percent of householders are living in their own houses and another 10 percent are living in rent-free houses in Sri Lanka, a fair distribution of home gardens was not a strange phenomenon.

According to the data in Table 4 (column 6 or 7), labor income, income from main occupation, imputed values for home garden, and income from other sources were showing inequality reducing behavior in 1982. The rise of these incomes and their shares will decrease income inequality in society as a whole. In contrast, the rising income and its share of subsidiary occupation and foreign transfers will affect the increase in income inequality in Sri Lanka. The lack of information was the main reason behind this phenomenon. Especially, information on employment opportunities in foreign countries were concealed and ordinary people must go through private agencies to receive this information in Sri Lanka. It is difficult to find foreign jobs without paying considerable amount of fees, afforded only by

rich people, to job agencies. In addtion, Sri Lankan workers in foreign countries also provide job information to their relatives, causing foreign transfers of income to be remunerated mostly to rich people. As a result, the rich become richer, while the poor become poorer.

Table 5 summarizes the empirical results of equation (1), (2), (4), (5) and (8) for the 1987 survey data. As shown in the second column of Tables 4 and 5, relative importance of factor components did not change considerably during the 1982-1987 period. This resulted from stagnation of economic activities due to civil war in North and Eastern regions. Labor income share has marginally declined in this period. Quite interesting changes were observed because of the increase in the relative importance of rent, domestic and foreign transfers in total income. Relative share of domestic transfer of income also increased due to the emergence of civil war in 1983. Government transfers alone accounted for 4 percent of total income in 1987. Within the rent income category, rent income from movable properties increased in the 1982-1987 period. This was due to privatization of government bus service and increase in the number of taxies (especially three wheelers) in this period.

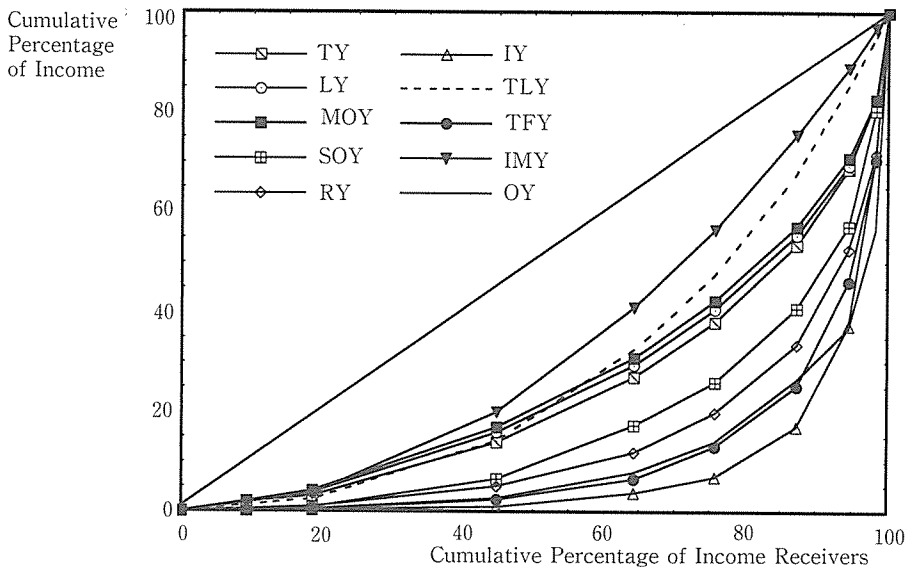
As shown in columns 6 and 7 of Table 5, negative signs in labor income, income from main occupation, domestic transfers, and imputed values for production of home gardens indicate inequality reduction ability of these factors. Therefore, increases in these income sources lead to a decrease in total inequality in Sri Lanka.

Foreign transfer income was unequally distributed among income receivers in 1987. The concentration coefficient for foreign transfers show the highest positive value in that year. This can easily be identified by looking at Figure 4, which presents all concentration curves

Table 5 Effects of Factor Income on Income Inequality in Sri Lanka, 1986/87

1	2	3	4	5	6	7	8
Income Components	Factor Share-% ϕ_k*100	C_k	$\phi_k C_k$	$FIS=\frac{\phi_k C_k*100}{G}$	C_k-G	$\phi(C-G)$	η_k
1. Labor Income	65.74	0.4910	0.3228	62.86	-0.0308	-0.0203	-0.0388
(i) Main Occupation	58.67	0.4703	0.2759	52.88	-0.0516	-0.0302	-0.0580
(ii) Sub Occupation	7.06	0.6633	0.0469	8.98	0.1415	0.0100	0.0192
2. Rent	10.18	0.7220	0.0735	14.08	0.2002	0.0204	0.0391
3. Interest & Dividends	1.42	0.8479	0.0121	2.31	0.3260	0.0046	0.0089
4. Transfers-Domestic	10.65	0.4365	0.0465	8.91	-0.0853	-0.0091	-0.0174
5. Transfers-Foreign	5.07	0.7910	0.0401	7.69	0.2692	0.0137	0.0262
6. Home garden-imputed	6.25	0.3417	0.0213	4.09	-0.1801	-0.0113	-0.0216
7. Other sources	0.69	0.7999	0.0055	1.05	0.2781	0.0019	0.0037
Total	100.00	0.5218	0.5218	100.00	0.0000	0.0000	0.0000

Data Source : *Central Bank of Sri Lanka, Report on Consumer Finances and Socio Economic Survey*, 1986/87.



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Data Source : *Central Bank of Sri Lanka, Reprot on Consumer Finances and Socio Economic Survey*, 1986/87.

Figure 4 Relationship Between Total Income and Factor Income Distribution in Sri Lanka, 1981/82

for the year 1987. Since the concentration curve of foreign transfer lies outside of the normal Lorenz curve (TY curve), an increase in outward migration (assuming a proportional increase in remittances) leads to an increase in income inequality in Sri Lanka. As far as sector-wise observation is concerned, foreign transfer income is seen highly concentrated among the urban and rural income receivers in comparison to estates sector's income receivers. This phenomenon was generated by such factors like differences in education attainments, information availability, and social and cultural attitude in the three sectors. There are some reasons behind the stagnation of inequality in the 1982-87 period. First, the civil war started in 1983, thereby foreign investments, total output, and employment show weak performance in this period. Second, foreign transfers in absolute terms have declined due to factors like low wages and, less demand for labor in Middle East countries and others. Third, government implemented large-scale projects to recover from the civil war effects and promote private-sector activities, increasing its spending in this period.

A brief comparison of changes in the concentration coefficients and the elasticities with respect to factor incomes will be worthwhile. Table 6 summarizes the concentration coefficients and the elasticity of Gini coefficient with respect to 7 factor incomes for the 1973

Table 6 Changes in the Concentration Coefficients and Factor Income Elasticities in Sri Lanka, 1973-1987

Income Components	Concentration Coefficients C_k			Elasticities η_k		
	1973	1981/82	1986/87	1973	1981/82	1986/87
1. Labor Income	0.3797	0.4973	0.4910	-0.0152	-0.0175	-0.0388
(i) Main Occupation	0.3723	0.4664	0.4703	-0.0253	-0.0508	-0.0580
(ii) Sub Occupation	0.4172	0.6781	0.6633	0.0103	0.0333	0.0192
2. Rent	0.4733	0.6561	0.7220	0.0117	0.0175	0.0391
3. Interest	0.6501	0.7778	0.8479	0.0088	0.0124	0.0089
4. Transfer-Domestic	0.3391	0.5204	0.4365	-0.0155	0.0014	-0.0174
5. Transfers-Foreign	—	0.8706	0.7910	—	0.0214	0.0262
6. Home Gardens*	—	0.3459	0.3417	—	-0.0202	-0.0216
7. Other sources	0.6397	0.3846	0.7999	0.0047	-0.0150	0.0037
Total Income	0.3872	0.5101	0.5218	0.0000	0.0000	0.0000

—Data were not available, *Imputed Values

Data Source : Central Bank of Sri Lanka, *Report on Consumer Finances and Socio Economic Surveys* 1973, 1978/79, 1981/82, 1986/87

-1987 period. It may be observed that almost all of the concentration coefficients (except for other sources) jumped from 1973 to 1981/82, resulting in a significant increase in the Gini coefficient, but they were fairly stable from 1981/82 to 1986/87. Therefore, for the 1980's changes in factor shares made more influential effect on total income inequality in comparison to changes of absolute values in concentration coefficients.

Except the domestic transfers, the signs of the elaticities did not change during the whole period. The positive sign of the elasticity of the Gini coefficient with respect to domestic transfers in 1982 seems to be caused by a reduction in food subsidies to the poor people after the introduction of liberalization policies. Meanwhile, other government transfers such as health care and education were continued.

In terms of elasticities, the inequality-reduction effect of labor income (income from main occupation) is highly significant in Sri Lanka. There are three reasons behind this phenomenon. First, agricultural workers constituted a large percentage of the economy. The agricultural sector represents more than 50 percent of total employees, where income was relatively low and equally distributed. In particular, tea, rubber and coconut based plantation workers were receiving relatively equal income. Second, wage differences were not high among different subgroups of population ; i. e., educated-uneducated, male-female, urban-rural or by ethnic groups Third, the relatively large government sector in total employment has led to maintain income differences lowest among the working population.

An increase in the share of property income will raise income inequality in any economy,

where property income tax is not widely used. Therefore, Sri Lanka should impose a progressive tax system to maintain income equality. In particular, tea, rubber and coconut based plantation workers were receiving relatively equal income. Second, wage differences were not high among different subgroups of population ; i. e., educated-uneducated, male-female, urban-rural or by ethnic groups Third, the relatively large government sector in total employment has led to maintain income differences lowest among the working population.

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6. Summary and Concluding Remarks

The overall income inequality measured by income receivers Gini coefficient declined during 1963-73. This was caused by an extremely high degree of government intervention to the economy by emphasizing basic needs and import-substitution policies. But this trend was reversed after 1973. Liberalization was not the main influential factor behind this trend reversal because it started in 1978. Factor income shares changed during the 1973-1987 period. The relative importance of labor income (income from main occupation) and government transfers was high in 1973. The elasticities of the Gini coefficient with respect to these two income sources have negative signs in 1973, 1981/82 and 1986/87, reflecting their inequality-reducing behavior. However, relative shares of these two factors declined in the 1980's, which might have caused a rise in income inequality. An increase in the share of labor income lead to the reduction in income inequality at least for the 1980's with fairly stable concentration coefficients. This suggests that providing more employment opportunities for unemployed people and underemployed people will generate more equitable income distribution in Sri Lanka. Foreign transfer income was not considered as an important source of income in 1973. The reform of the immigration laws in 1976 led to an increase in private foreign transfers. The most apparent outcome of this change was the increasing tendency in income inequality. The more foreign transfers to Sri Lanka led to the more unequal income distribution. Property income (interest income, dividends and other sources) was mostly concentrated among the very high income receivers while labor income (main occupation) and government transfers were concentrated mostly in the lowest income receivers. This has been illustrated by the shapes of concentration curves of these factors.

There are some important policy implications from the findings of this paper. If policy makers wish to emphasize equal income distribution, they should try to generate more employment opportunities for unemployed people by following labor-intensive technology in

Sri Lanka. If the government's goal is to reduce inequality, it should provide information on foreign labor market as well as institutional facilities and job training to the low income receivers. Furthermore, there should be an appropriate progressive tax system for labor income (based on sub-occupation income) and property income. In addition, the government can increase domestic transfers to poor people to generate equal income distribution. However, liberalization and deregulation policies may contradict the last implication.

The Sri Lankan economy started to recover in the early 1990's, causing some changes in the recent inequality trend. This study could not provide income distribution analysis for the 1990's because of lack of data. This is left as a future research area on this topic. Furthermore, we used only disaggregated Gini coefficient to analyze functional income distribution in Sri Lanka. It may be useful to follow Theil type decomposition of size distribution with this type of functional analysis to understand the total income distribution.

Notes

1) Fields (1980) provide detailed explanation on this point.

2) Alternative formulae to calculate Gini coefficient are available in Anand (1983).

3) See, for example, Fei, Ranis, and Kuo (1978), Podder (1993), and Pyatt (1976).

4) We can derive the relation in the following way :

$$G=\Sigma\frac{N_i}{N}\cdot\frac{Y_{i+1}}{Y}-\Sigma\frac{N_{i+1}}{N}\cdot\frac{Y_i}{Y} \qquad \text{equation (1)}$$

$$=\sum_{i=1}^{n-1}\frac{N_i}{N}\sum_{k=1}^{m}\frac{Y_{i+1,k}}{Y}-\sum_{i=1}^{n-1}\frac{N_{i+1}}{N}\cdot\sum_{k=1}^{m}\frac{Y_{i,k}}{Y}$$

$$=\sum_{k=1}^{m}\left(\sum_{i=1}^{n-k}\frac{N_i}{N}\cdot\frac{Y_{i+1,k}}{Y}-\sum_{i=1}^{n-1}\frac{N_{i+1}}{N}\cdot\right)$$

$$=\sum_{k=1}^{m}\frac{Y_{.k}}{Y}\left(\sum_{i=1}^{n-1}\frac{N_i}{N}\cdot\frac{Y_{i+1,k}}{Y_{.k}}-\sum_{N}^{n-1}\frac{N_{i+1}}{N}\cdot\frac{Y_{i,k}}{Y_{.k}}\right)$$

$$=\sum_{k=1}^{m}\frac{Y_{.k}}{Y}\cdot C_k \qquad \text{equation (2)}$$

$$=\sum_{k=1}^{m}\phi_k C_k \qquad \text{equation (4)}$$

5) Equation (8) can be obtained by taking total derivative of equation (6) with respect to μ_k, assuming that C_k is constant and substituting results to the normal elasticity formula, $\eta_k=\frac{dG}{d\mu_k}\times\frac{\mu_k}{G}$. See Podder (1993 p. 53-54) for the proof, but we can derive equation (8) in the following way. Taking up only the k-th factor, we get. Then, total differentiation with respect to μ_k gives :

$$dG=(C_k/\mu)\cdot d\mu_k-(\mu_k/\mu^2)\cdot C_k\cdot(\partial\mu/\partial\mu_k)\cdot d\mu_k$$
$$=(C_k/\mu)\cdot d\mu_k-(G/\mu)d\mu_k \quad (\partial\mu/\partial\mu_k=1)$$
$$=(C_k-G)/\mu\cdot d\mu_k$$
$$dG/d\mu_k=(C_k-G)/\mu$$
$$\eta_k=\frac{dG}{d\mu}\times\frac{\mu_k}{G}$$
$$=\frac{C_k-G}{\mu}\cdot\frac{\mu_k}{G}$$
$$=\frac{1}{G}\left[\frac{\mu_k}{\mu}(C_k-G)\right]$$

6) Explanations on this point are available in Fields (1980), Isenman (1980), UNDP (1997), and many others.

7) Furthermore, Lorenz curve for 1973 is found clearly inside the Lorenz curve for 1963

8) This phenomenon was further analyzed by Isenman (1980, 1986).

9) There was a strong pressure from the World Bank, IMF and some other donor organizations to reduce government subsidies late 1970's (World Bank, 1986). On the other hand, the new government was ready to obtain huge amount of loans from international organizations to implement liberalization policies. (Dunham and Kelegama, 1997).

10) Glewwe (1986, 1988) has shown that inequality reducing behavior of this period by expenditure-based Theil decomposition approach.

11) Mathematically, column 7 results are obtained by the following formula : $\mu_k\frac{dG}{d\mu_k}=\frac{\mu_k}{\mu}(C_k-G)$ which is an interim equation to derive the elasticity of Gini coefficient [equation (8)]

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