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MEASUREMENTS OF WELFARE OVER TIME

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1-Introduction

During economic reform, it is likely that different groups of households may experience large changes in their welfare levels. Policy makers are increasingly concerned about the adverse consequences of programs of macroeconomic stabilization and structural adjustment on the income or consumption levels of vulnerable groups and hence on their welfare.

In order to assess the adverse effects of reform on welfare levels, it is necessary to be able to measure changes over time in income or consumption of various socio-economic groups. The currently applied methodology for measuring these changes is to make poverty comparisons using the notion of poverty line.

Welfare comparisons depend upon the chosen poverty line and measure. Many economists, have investigated the choice of poverty lines and poverty measures, but very few, have tried to assess the robustness of poverty comparisons. That is; to assess whether or not one obtains the same conclusions if the poverty line or the poverty measure has been varied. This is the main concern of this paper.

There is likely to be disagreement about the choice of poverty line in terms of its level and its structure. In this situation, we may only be able to make comparisons and not to measure differences, and comparisons may lead only to a partial rather than complete ordering. To get a complete ordering, poverty line may vary over a certain range and then, we can examine whether or not we obtain the same ranking for all poverty lines in the range. This may be achieved by expressing the chosen poverty measure as a function of poverty line all over its range.

Representing Lorenz curve of an expenditure distribution in its parametric form allows analyst to derive the associated cumulative frequency distribution and density, (Villasenor and Arnold (1989)). This representation is very useful in examining the robustness of poverty comparisons over time or among regions. Moreover, by these representations, poverty changes can be decomposed into growth and redistribution components, as suggested by Ravalllion (1992).

Sections 2 and 3 of this paper reviewed the already available literature about poverty lines and poverty measures. In section 4, the elliptical function of Lorenz curve is presented. Using household surveys, for Egypt, several models concerning Lorenz curve have been estimated, for 1974/75, 1981/82 and 1990/91 and for both urban and rural areas. The best model fitting the data appears to be the elliptical function. In section 5, the functional parametric form of Foster, Greer and Thorbecke (1984); FGT, poverty measures have been derived and comparisons of the curves of these measures over 1974/75 and 1990/91 period have been performed. Another measure for poverty comparisons, suggested by Pyatt et al (1992), namely; the generalized LC, was also considered. Section 6 provides decomposition of poverty measures into growth and redistribution component.

It is concluded that poverty has decreased over the period 74/75 -90/91, for both urban and rural areas, for any poverty measure and for any range of poverty line. There has been slight increase in poverty between 81/82 and 90/91, for urban areas, whatever the poverty measure or the poverty line used, while in rural areas, this was the situation for poverty lines above 60% of the mean per capita expenditure.

2-Poverty Lines.

Poverty measurements generally assume that there exists a pre-determined and well defined standard of consumption -called "poverty line" which must be reached if a person is not to be considered "poor".

An absolute poverty line is one which is fixed in terms of the living standards indicators being used and fixed over the entire domain of the poverty comparison. The most common approach in defining an absolute poverty line is to estimate the cost of a bundle of goods that satisfy the basic needs

Given that there is a degree of arbitrariness in the basic needs approach, an alternative way of setting a poverty line is to first identify as "the poor " the poorest x% of the population at some basic date or place, and use the corresponding consumption or income level for this percentile as the poverty line for comparisons.

Another way of setting a relative poverty line is to consider it at a constant proportion to mean expenditure or income.

The most important point in the above discussion is that , recognizing that a certain amount of arbitrariness is unavoidable in defining any poverty line in practice, one should be particularly careful about how the choices made affect the poverty comparisons.

Therefore, it is useful- in any poverty comparisons- to examine the chosen poverty measure over a certain range of poverty lines. Denoting the poverty line by Z, which may vary over a range (Z_{min}, Z_{max}), analysts should be able to represent the chosen poverty measure as a function of Z., then examine whether or not we obtain the same ranks for all Z in the range.

3-Poverty Measurements.

There are large literature on poverty measures. We shall focus on three measures given by Foster et al (1984). These are : the head count index, the poverty gap index and the severity of poverty index.

The head count index is a measure of the prevalence of poverty or incidence of poverty. It is given by

$$P_0 = q/n , \qquad (1)$$

where q is the number of individuals whose consumption or income is less than the poverty line, and n is the population size.

A better measure is the poverty gap, based on the aggregate poverty deficit of the poor relative to the poverty line. This gives a good indicator of the depth of poverty, as it depends on the distance of the poor below the poverty line. The poverty gap measure, P_1, is given by

$$P_1 = 1/n \sum_{i=1}^{q} (Z - Y_i)/Z , \qquad (2)$$

where Y_i denotes income or expenditure of the i-th poor individual.

A measure of the severity of poverty is given by P_2, whereby greater weight has to be given to the poorest units in assessing poverty. Thus,

$$P_2 = 1/n \sum_{i=1}^{q} \{(Z - Y_i)/Z\}^2 . \qquad (3)$$

For more details, see Kheir El-Din et al (1992).

4-Parametric Representation Of Poverty Measurements.

Suppose we do not know the poverty line Z, but we can be sure that it is not less than Z_{min} and it does not exceed Z_{max} Consider the three poverty measures mentioned above; namely, P_0, P_1 and P_2. Imagine the curve which is traced out as one plots P_0 on the vertical axis and the poverty line on the horizontal axis, allowing the latter to vary from Z_{min} to Z_{max}. This is simply the cumulative distribution function which can be thought of as the " poverty incidence curve"-- each point on the curve gives the proportion of the population consuming less than the amount given on the horizontal axis. If one calculates the area under this curve up to each point then one traces out the " poverty deficit curve" . Each point on this curve is simply the value of P_1 times the poverty line Z. If one again calculates the area under the poverty deficit curve at each point, then one obtains a new curve , which can be termed the " poverty severity curve", see Ravallion (1992).

Therefore, parametric representation of P_0,P_1 and P_2 can be derived if the cumulative distribution function is expressed in its parametric form, then integrating it to give the poverty deficit curve and hence parametric representation of P_1 can be obtained. Integrating the function of the poverty deficit curve gives the function of the severity of poverty curve. One way of deriving the cumulative distribution function is to estimate the parametric Lorenz curve based on an expenditure survey and then obtain its associate cumulative distribution function.

4.1 Lorenz Curves.

The Lorenz curve(LC) provides a convenient tool to study income (or expenditure) distribution, [Villasenor et al (1989)]. Lorenz curve graphically displays the relation between the cumulative proportion of income (or expenditure) units ; households or individuals, and the cumulative proportion of income received when these units are arranged in increasing order. Several models has been proposed by Kakwani and Podder(1973) considering parametric families of LC's which will fit , reasonably well, sample LC's derived from actual data.

Very few models allow for explicit expression of both the Lorenz curve and the corresponding cumulative frequency distribution function. In addition, even when the sample LC's are in close agreement, serious shortcomings are observed in the fitting of the corresponding distribution function.

A- Elliptical Lorenz Curve.

Villasenor et al (1989), considered elliptical Lorenz curve which is derived from the general quadratic form given by:

$$ax^2+bxy+y^2+dx+ey+f=0, \quad (4)$$

where x denotes the cumulative proportion of households or individuals and y is the cumulative proportion of income or expenditure of units when they are arranged in increasing order, a,b.d.e and f are the parameters where; f=0 and e=-(a+b+d+1), so that equation(4) passes through (0,0) and (1,1). Solving equation (4) with respect to y, the quadratic Lorenz curve can be derived. It has the form:

$$y=L(x)=\{-(bx+e)+\sqrt{(\alpha x^2+\beta x+e^2)}\}/2\ , \quad (5)$$

or

$$y=L(x)=\{-(bx+e)-\sqrt{(\alpha x^2+\beta x+e^2)}\}/2\ , \quad (6)$$

where $\alpha=b^2-4a$ and $\beta=2be-4d$.

Villlasenor argued that the appropriateness of equation (5) for fitting income or expenditure distributions is questionable and it is reasonable to focus our attention only on equation (6). It contains hyperbolic's, elliptical or parabolic Lorenz curves when $\alpha > 0$, $\alpha < 0$ or $\alpha = 0$, respectively.

Equation (4) can be written in the form; $y(1-y)=a(x^2-y)+by(x-1)+d(x-y)$. With t=y(1-y), u=x2-y, w=y(x-1) and v=x-y, and given pairs of (x,y) of cumulative proportions of households or individuals and cumulative proportion of income (or expenditure) received, a linear regression produces Least Squares like estimates for a.b and d.

If F(Y) denotes the proportion of households or individuals who spend less than expenditure level ;Y. That is, F(Y) is the cumulative distribution function. The distribution function; F(Y), corresponding to L(x), can be derived from the relation: $L'(x)=F^{-1}(x)/\mu$, (where μ is the mean individual income or expenditure). It is given by:

$$F(Y)=\{-K(2Y/\mu+b)/\sqrt{(2Y/\mu+b)^2-\alpha}\}-\beta/\alpha, \quad (7)$$

where $K=\sqrt{(\beta^2-4\alpha e^2}/2\alpha$, $\beta=2be-4d$ and $\alpha=b^2-4a$.

B-Estimates of the Parameters of Lorenz Curve for Egypt

Several specifications of LC's have been estimated, for 1974/75, 1981/82 and 1990/91, using the Family Budget Surveys' data of 74/75 and 81/82 and the preliminary data of Income and Expenditure Survey of 90/91. Per capita expenditures have been used instead of incomes, therefore, data points are pairs of (x_i, y_i) of cumulative proportions of individuals and cumulative proportion of expenditure spent by those individuals. The specifications of LC's considered are the elliptical LC given by (6), the Beta function suggested by Kakwani et al (1973) which is given by:

$$L_1(X)=X^{\delta}\exp[-\eta(1-x)], \quad 1<\delta<2, \quad and \quad \eta>0. \quad (8)$$

and the well known classical Pareto LC given by:

$$L_2(x)=1-(1-x)^{(\gamma-1)/\gamma}, \quad \gamma>1. \quad (9)$$

Equations (8) and (9) can be restated in linear forms so that the least squares procedure can be used. Therefore, for each year of survey, for both urban and rural areas, and for each specification of Lorenz curve, Linear regression functions have been estimated. Hence, the parametric representation of Lorenz curves given by equations (6), (8) and (9) have been derived and the distribution function corresponding to L(x) and $L_2(x)$ have been obtained. $L_1(x)$ does not admit an explicit form of F(Y) and it should be obtained numerically.

Tables(1) and (2) illustrates the residual sum of squares of the fitted linear models, the sum of squares of errors of the fitted Lorenz curve and the sum of squares of errors of the cumulative distribution function -if it exists--for different specifications, for different years and for urban and rural areas. On the basis of these criteria, the best fitted LC for years 74/75, 81/82 and 90/91 and for urban and rural areas is the elliptical LC. The observed cumulative frequencies seem to be reasonably well fitted overall by the distribution functions corresponding to the fitted LC's.

Table(1) The Residual Sum of Squares for Linear, Lorenz and Distribution Function for Urban Areas

		SSE(LINEAR)	SSE(LORNZ)	SSE(F(Y))
90/91	L(x)	5.895564E-6	1.365924E-5	.3.950737E-
90/91	$L_1(x)$	7.436016E-2	3.124532E-2	no F(Y)
90/91	$L_2(x)$	.3.5761E-2	1.017306E-2	278.0192
81/82	L(x)	6.961382E-5	3.657867E-4	.6.148897E-
81/82	$L_1(x)$	.1.92219E-2	.4.9379E-3	no F(Y)
81/82	$L_2(x)$	3.779853E-1	4.368758E-2	277199
74/75	L(x)	1.874880E-5	3.527158E-5	6.916148E-2
74/75	$L_1(x)$	1.746421E-1	4.360312E-2	no F(Y)
74/75	$L_2(x)$	2.898171E-2	9.57333E-3	1541.444

Table(2) The Residual Sum of Squares for Linear, Lorenz and Distribution Function for Rural Areas

		SSE(LINEAR)	SSE(LORNZ)	SSE(F(Y))
90/91	L(x)	1.017769E-6	7.496314E-6	3.288420E-2
90/91	$L_1(x)$	2.356939E-2	1.342689E-2	no F(Y)
90/91	$L_2(x)$	3.991021E-2	5.771579E-3	150.7919
81/82	L(x)	2.033854E-5	4.494521E-4	2.195198
81/82	$L_1(x)$	6.600970E-3	1.851147E-3	no F(Y)
81/82	$L_2(x)$	8.632179E-1	3.750432E-2	159744
74/75	L(x)	.5.48716E-6	6.95476E-5	4.07862E-2
74/75	$L_1(x)$	4.192109E-2	1.343695E-2	no F(y)
74/75	$L_2(x)$	2.654628E-2	8.645848E-3	552.2444

The parameters of Lorenz Curves given by equations (6), (8) and (9) are shown in tables (3), (4).

Table(3) Parameters for Different Curves for Urban Areas

	a	b	d	δ	η	γ
90/91	.799474	1.15223	.272708	1.11690	.987639	2.35914
81/82	.842998	-1.2227	.269683	1.09886	.993068	2.97632
74/75	.73334[illegible]	-0.9254	.34504	1.2464	.71674	2.2178

Table(4) Parameters for Different Curves for Rural Areas

	a	b	d	δ	η	γ
90/91	.879975	-1.5658	.170773	1.10594	.719586	3.06395
81/82	.933764	-1.6384	.147099	1.04824	.653547	4.58104
74/75	.871208	-1.4833	.192189	1.22877	.550339	2.84715

4.2-Poverty Indices as a Function of the Poverty line.

The parametric Lorenz curves and the corresponding distribution functions can be used to represent any of the three poverty measures (FGT)-- discussed above- as a function of the poverty line, mean per capita expenditure and the parameters of the Lorenz curve. That is, instead of poverty line being a single number, consider the widest range of all possible poverty lines from the lower expenditure level, Z_0, to the maximum possible level, Z_{max}.

The general class of poverty measures can be written in the form:

$$P_\alpha(Z,u,L) = \int_{Z_0}^{Z} (1-Y/Z)^\alpha \; f(Y)\, dY, \qquad (10)$$

where Z is the poverty line, μ is the mean per capita expenditure and L represents the parameters of LC.

The poverty indices, P_0, P_1 and P_2 are then obtained when $\alpha = 0$, $\alpha = 1$ *and* $\alpha = 2$, respectively.

The curve representing the poverty incidence index is simply defined by the values taken by the cumulative distribution function over the relevant interval.

Thus, the poverty incidence curve is F(Z) as Z varies from Z_0 to Z_{max}. For elliptical Lorenz curve, given by equation (6), F(Z) is given by equation (7). Each point on the curve gives the proportion of the population spending less than the amount given on the horizontal axis. If one calculates the area under this curve up to each point -- by means of integration- then one traces out the poverty deficit curve. Hence the poverty deficit curve is defined by:

$$D(Z) = \int_{Z_0}^{Z} (Z-Y) f(Y)\, dY = \int_{Z_0}^{Z} F(Y)\, dY. \qquad (11)$$

Let $U = (2Z/\mu + b)$, $V = \sqrt{(2Z/\mu + b)^2 - \alpha}$, $U_0 = (2Z_0/\mu + b)$ and $V_0 = \sqrt{(2Z_0/\mu + b)^2 - \alpha}$. For elliptical Lorenz curve, D(Z) is given by:

$$D(Z) = -K\mu/2\{V - V_0\} - \beta\{Z - Z_0\}/\alpha. \qquad (12)$$

As Z varies from Z_0 to Z_{max}, the poverty gap index --which is the depth of poverty index- at any poverty line can be obtained directly from the points on the poverty gap curve using the fact that:

$$P_1 = D(Z)/Z. \qquad (13)$$

If one again calculates the area under the poverty deficit curve at each point, -- by integrating D(Z) from Z_0 to each point Z- then one obtains the severity poverty curve. It is defined by:

$$S(Z) = \int_{Z_0}^{Z} (Z-Y)^2 f(Y)\, dY = \int_{Z_0}^{Z} D(Y)\, dY. \qquad (14)$$

For Lorenz curve given by (6), S(Z) has the form:

$$S(Z) = -K\mu^2(U*V - U_0*V_0)/8 + K\mu^2\alpha\{\ln(U+V) - \ln(U_0+V_0)\}/8 + K\mu V_0(Z - Z_0)/2 - \beta(Z - Z_0)/4\alpha \qquad (15)$$

Therefore, the severity of poverty index ; P_2, can be calculated using equation (15) for any poverty line in the range Z_0 to Z_{max}. It is given by:

$$P_2 = S(Z)/Z. \qquad (16)$$

5- Poverty Comparisons Over Time .

When we plot the cumulative frequency distribution in different dates; 1 and 2 and find that the curve for date 1 is everywhere above that for date 2, we may conclude that the incidence of poverty is higher in date 1 than in 2, no matter what the poverty line or measure is . Besides, the area under the curve of date 1 up to any point (poverty line) will be greater than that of date 2, therefore, the depth of poverty is greater in date 1 than in date 2. The same conclusion can be derived with respect to the severity of poverty measure.

If the two curves intersect, then we know that some poverty lines and some poverty measures will rank the distributions differently to others. We may consider other measures that reflect the depth of poverty such as P_1. A fall in poverty requires that the P_1 curve, is nowhere lower for the earlier date at all points up to Z_{max} . Alternatively, one can restrict the range of poverty lines to smaller range, such that the two curves do not intersect within this range.

5.1 Comparisons for Egypt Over the Period 74/75 - 90/91.

In order to compare poverty in 1974/75 and 1990/91 with respect to 1981/82, the curves for equations (7), (13) and (16)-- at constant prices of 1981/82- with the estimated parameters of the corresponding year (as shown in tables (3) and (4)) were plotted, over the range of 35% and 100% of the mean per capita expenditure of 1981/82. These curves were derived using the Household Budget Surveys of 1974/75 and 1981/82 and the priminary results of the 1990/91 Survey. It should be noted that the parameters of these curves were those of Lorenz Curves and hence they do not change when we use constant prices, as the data points for estimating these parameters were percentages rather than absolute values.

For urban areas, as shown by figures (1), (2) and (3), the curves do not intersect. However, the shift is not uniform, we cannot say that poverty has changed by certain percent. But we can agree about the direction of the change in poverty. Regardless of the poverty line chosen, the head count index has decreased between 1974/75 and 1981/82. The same conclusions hold for P_1 and P_2, indicating that not only the proportion of poor individuals has decreased during this period, but the depth and severity of poverty has also declined. On the other hand, curves of the three measures, for 1990/91, are everywhere slightly above those for 1981/82. This indicates that there has been a slight increase in poverty whatever the poverty measure and the poverty line used.

Figure (1) : P0 for Urban Areas

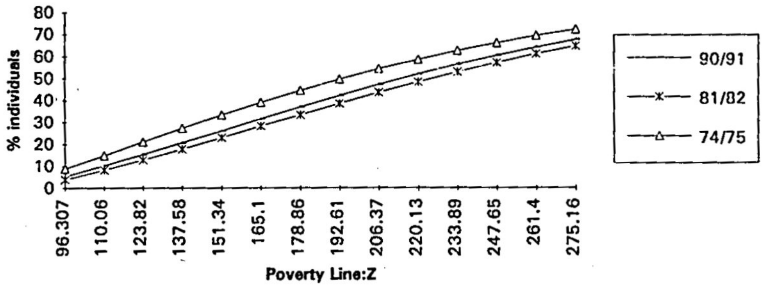
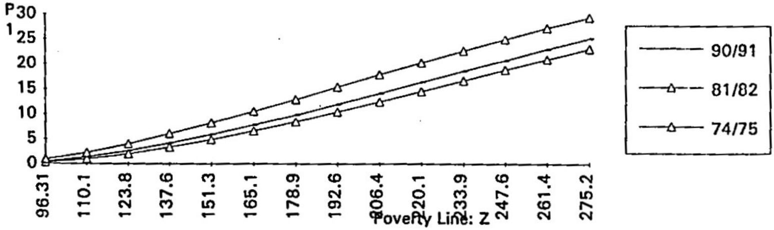
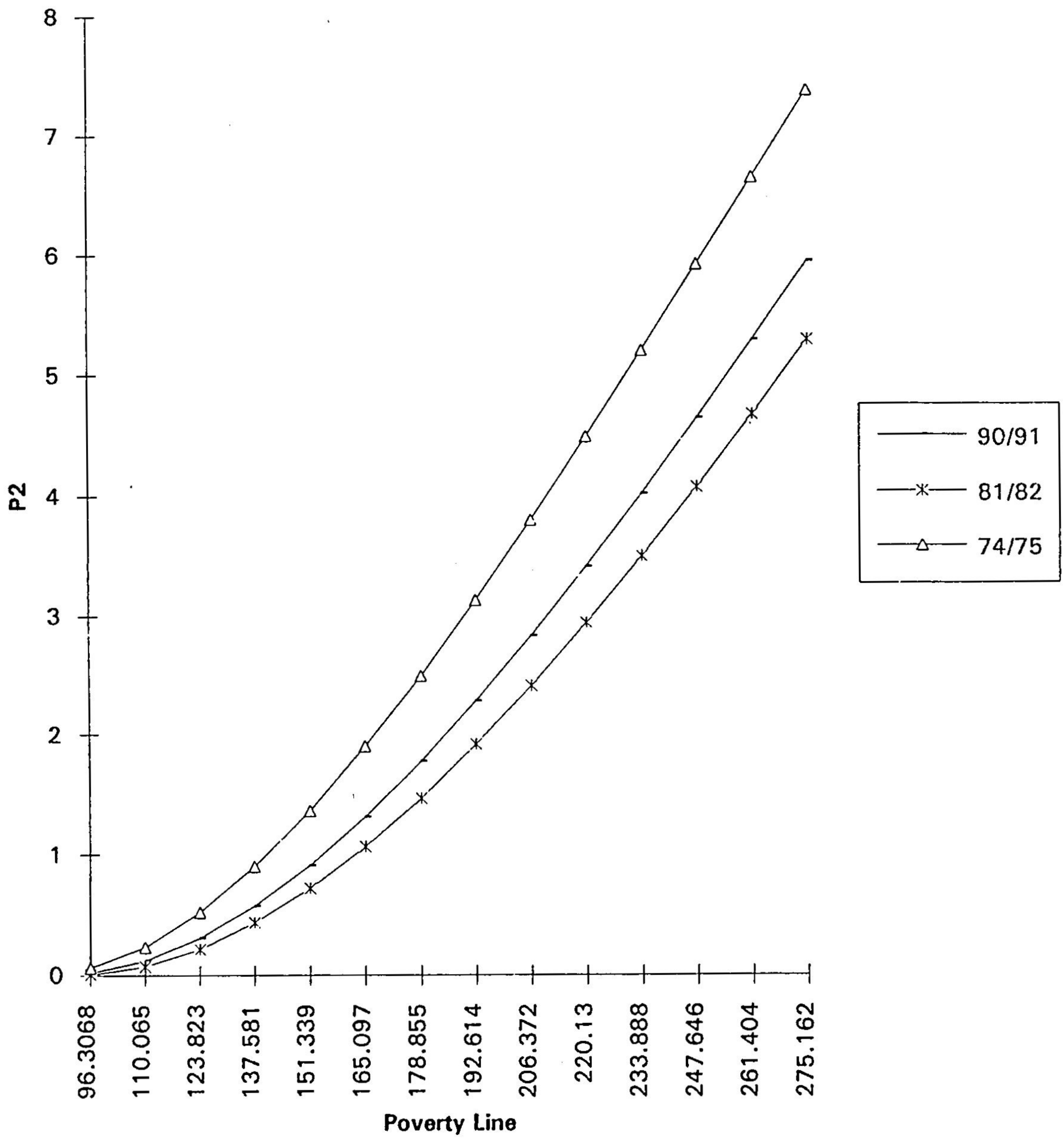


Figure 2 P1 For Urban Areas



Figure(3): P2 For Urban Areas

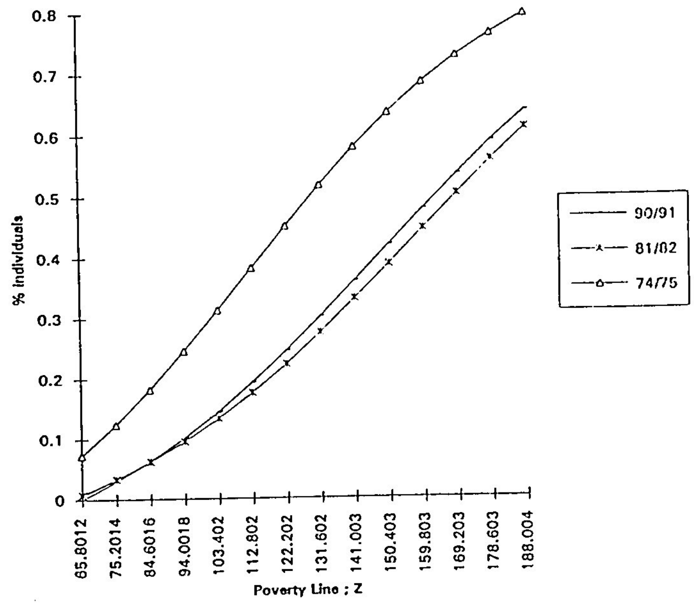


For rural areas; figures (4), (5) and (6) represent curves of different measures for those areas. The curves of all poverty measures, for 1974/75, are every where above those of 1981/82 and 1990/91. This suggests that poverty has decreased during the period 1974/75 and 1981/82 and also between 1974/75 and 1990/91 whatever the poverty line used and irrespective to the poverty measures. The cumulative frequency curves of 1990/91 and 1981/82 intersect at the expenditure level of LE80 (at 1981/82 prices). That is the percentage no of individuals spending less than LE80 is higher in 1981/82 than 1990/91. This indicates that if one defines a poor individual as one who spends less than LE80, then he may conclude that the percentage number of. poor individuals is higher in 1981/82. This suggests that poverty is more severe in 1981/82 which will be reflected in the poverty deficit curve. However, expenditure at this level is very little and less than 4% of the population spent less than it. If we restrict our analysis for poverty lines between LE80 and LE188, we can be sure that poverty has slightly increased between 90/91 and 81/82. Moreover, curves of P_1 intersect at LE103, which represents 55% of mean per capita expenditure of 81/82. This means that below expenditure level of LE103, the poverty gap of the poor individuals is higher in 1981/82 than 1990/91, which again reflects the fact that the depth of poverty for the very poor individual is greater in 1981/82 compared to 1990/91.

Not only the depth of poverty for the poorest individuals is greater in 1981/82 than 1990/91, but the severity of poverty is also higher, as indicated by the severity of poverty curves (figure(6)) of the two dates. These two curves intersect at expenditure level of LE112, which means that poverty is more severe in 1981/82 than in 1990/91 among individuals whose per capita expenditure is less than LE112, while the severity of poverty is lower in 1981/82 for expenditure levels above LE112.

To sum up, for poverty lines less than LE80, which represents 42% of mean per capita expenditure of 1981/82, the proportion of individuals who spend less than LE80 as well as their depth and severity of poverty have been decreased in 1990/91 compared to 1981/82. But if the chosen poverty line is between LE80 and LE103, P_0 (the percentage number of poor individuals) is higher in 1990/91 while the depth and severity of poverty are lower. That is, although the number of poor individuals who spend less than LE103 is lower in 1981/82, the gap between their expenditure level and LE103 is higher. Therefore, there was more equity among expenditure levels in 1990/91 compared to 1981/82 for individuals who spent less than LE103. This may reflect the importance of considering the P1 measure of poverty alongside with P_0 in any poverty comparisons. If the poverty line lies between LE103 and LE112, one may conclude that the depth of poverty is higher in 1990/91 compared to 1981/82 while the severity of poverty is lower, which again shows that the problem of poverty, among lower expenditure groups, is more severe in 1981/82. For any poverty line above expenditure level of LE112, which represents 60% of mean per capita expenditure in 1981/82, poverty has slightly increased between 1981/82 and 1990/91 regardless of the chosen poverty line or poverty measure.

Figure (4) : P0 For Rural Areas



Figure(5): P1 for Rural Areas

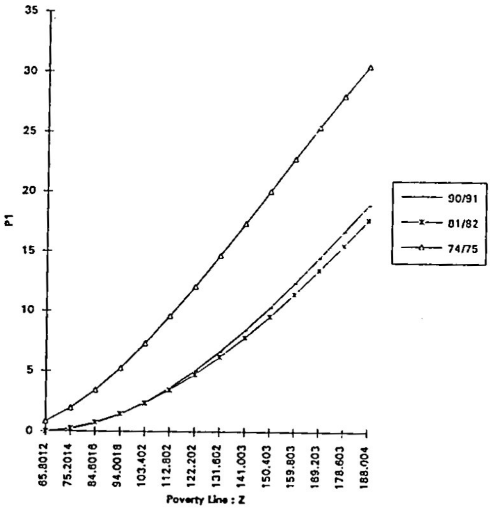
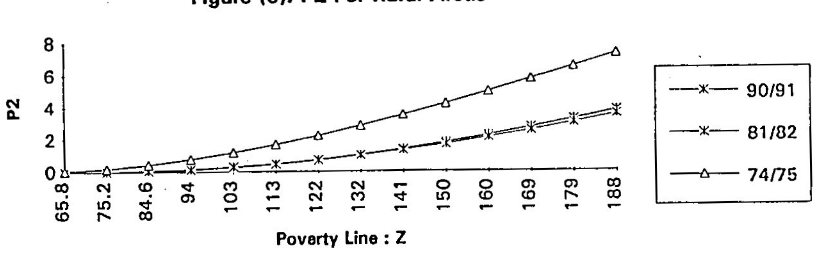


Figure (6): P2 For Rural Areas

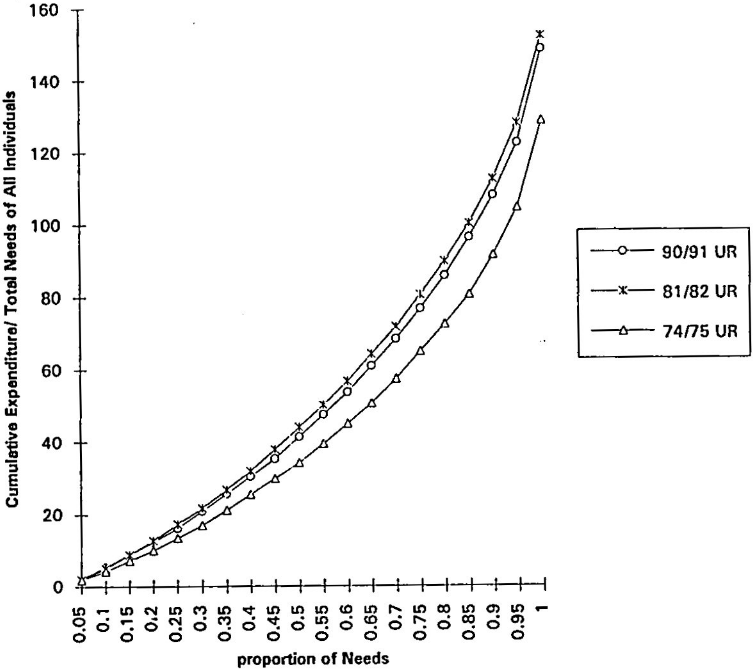


5.2- Another Measurement of Poverty Changes Over Time.

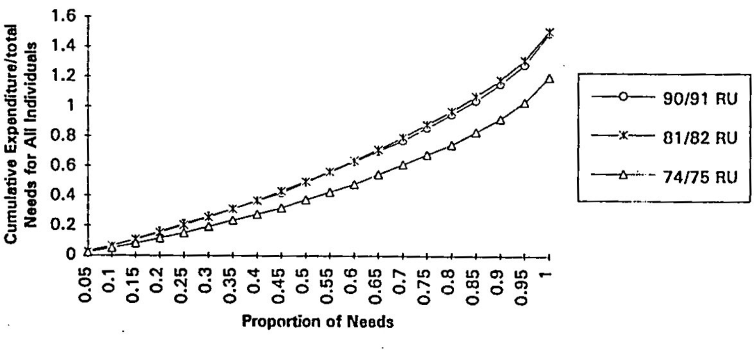
Another approach for assessing welfare changes over time was proposed by Pyatt et al (1992) who suggested to use the generalized Lorenz Curve. It has the same general shape as the ordinary Lorenz curve except for the rescaling the vertical axis by the average living standards (total expenditure/ total needs of all individuals). The implication of this rescaling is that the generalized LC combines the information provided by the mean welfare level and the ordinary LC, which suggests that it may be more suitable than each of these taken individually for making welfare comparisons. In comparing poverty in population for different dates, the same interpretation of cumulative distribution function curve holds. That is, if the generalized Lorenz curve for individuals at date 1 lies everywhere above that defined for date 2, then it follows that the individuals in date 1 were better off than in date 2.

Figures (7) and (8) show the plotted Generalized Lorenz Curves for 1974/75, 1981/82 and 1990/91, using 1981/82 prices and considering that the basic needs of an individual is that given by Korayem(1987). With respect to this chosen poverty line, there were large improvements in the living standards, for both urban and rural areas, between 1974/75 and 1981/82. While the curves of 1981/82 and 1990/91, for both urban and rural areas were very close until the points correspond to 35% and 44% of individuals, respectively. After these points, the curves of 1981/82 are slightly above that of 1990/91, which indicate slight deterioration in welfare levels between 1981/82 and 1990/91.

Figure (7): Generalized Lorenz Curves For Urban Areas



Figure(8): Generalized Lorenz Curves For Rural Areas



6-Decomposing a Change in Poverty; Growth and Redistribution Components.

It is sometimes of interest to ask ; how much of any observed change in poverty can be attributed to change in the redistribution of living standards as distinct from growth in average living standards.

Ravalllion (1992) proposed a simple decomposition for any change in measured poverty which allows one to quantify the relative importance of growth versus redistribution. The change in poverty is decomposed as the sum of growth component (the change in poverty that would have been observed if the LC had not shifted), a redistribution component (the change that would have been observed if the mean had not shifted), and a residual.

A change in poverty between two dates 1 and 2 is given by:

$$P_{(2)}-P_{(1)}=G(1,2)+D(1,2)+R(1,2), \qquad (17)$$

where,

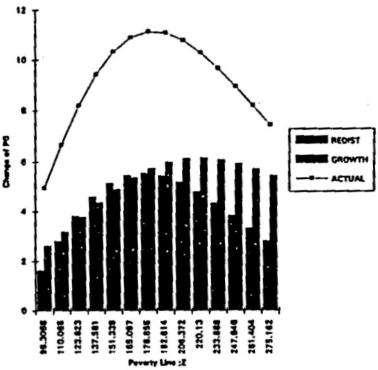
$$G(1,2)=P(Z,\mu_2,L_1)-P(Z,\mu_1,L_1), \text{ and}$$

$$D(1,2)=P(Z,\mu_1,L_2)-P(Z,\mu_1,L_1).$$

In other words, the growth component is the difference between the two poverty indices of the two dates if the parameters of Lorenz curve have not been changed and therefore, the change is due to changes in the mean per capita expenditure; μ. While the redistribution component is the difference between poverty indices of the two dates if the mean ;μ, had not been changed and hence, changes are due to changes in the parameters of lorenz curve.

Figures(9-20) demonstrate changes in the three measurements of poverty , for urban and rural areas, between 1974/75 and 1981/82 and 1990/91 and 1981/82. These figures represent also the decomposition of the changes into growth and redistribution components. Obviously, changes in poverty measures between 1981/82 and 1990/91 were due mainly to redistribution components. This may be due to the small difference between mean expenditure of the two dates (LE269.5 and LE275.2 for urban areas and LE186 and LE188 for rural areas). Generally, the growth components increase as Z increases and they are always positive, while redistribution components have the same signs and orders of magnitude as changes in poverty indices. Considering changes in poverty measurements between 1974/75 and 1981/82, we observe that, changes in mean expenditure have greater contributions in changes in all poverty measures for both urban and rural areas.

Figure (9) : Change of P0 Between 1974/75 and 1981/82 and Its Growth and Redistribution Components, Urban



Figure(10): Actual Change of P1 Between 1974/75 and 1981/82 and Its Growth and Redistribution Components; Urban

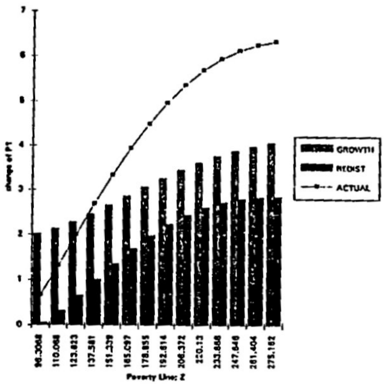


Figure (11) : Actual Change of P2 Between 1974/75 and 1981/82 and Its Growth and Redistribution Components ; Urban

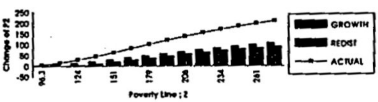


Figure (12): Actual Change of P0 Between 1974/75 and 1981/82 and Its Growth and Redistribution Components : Rural

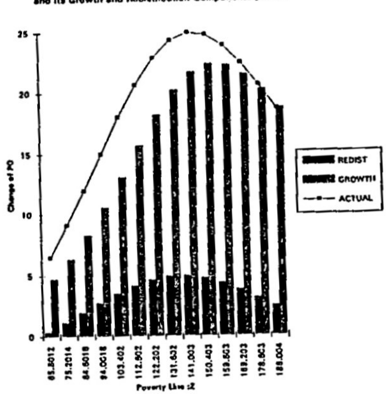


Figure 13 : Actual Change of P1 Between 1974/75 and 1981/82 and Its Growth and Redistribution Components ; Rural

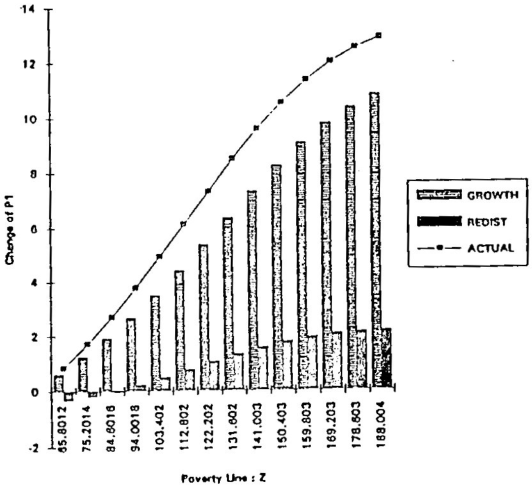


Figure 14 Actual Change of P2 Between 1974/75 and 1981/82 and Its Growth and Redistribution Components ; Rural

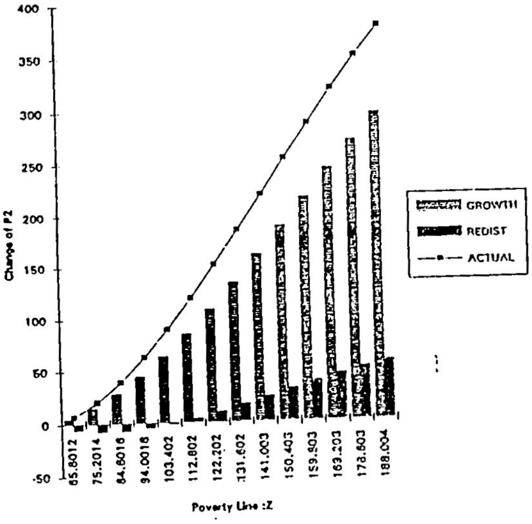
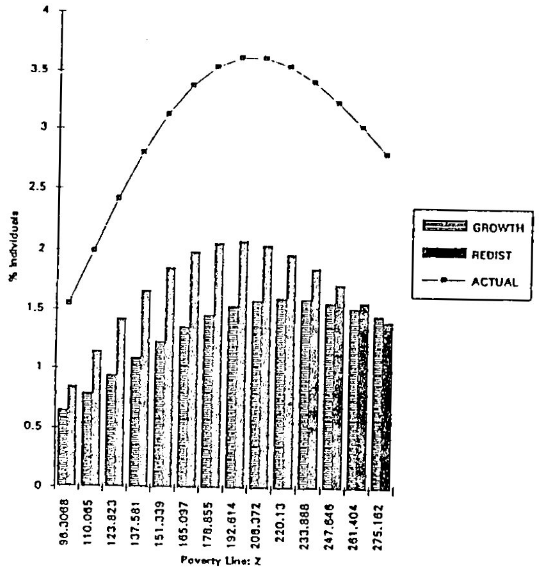


Figure (15): Actual Change In P0 Between 1990/91 and 1981/82 and Its Growth and Redistribution Components ;Urban



Figure(16): Actual Change of P1 Between 1990/91 and 1981/82 and Its Growth and Redistribution Components ; Urban Areas

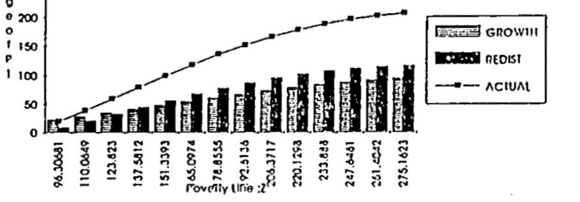


Figure (17) : Actual Change of P2 Between 1990/91 and 1981/82 and Its Growth and Redistribution Components ;Urban

Figure 18: Actual Change of P0 Between 1990/91 and 1981/82 and Its Growth and Redistribution Components ; Rural

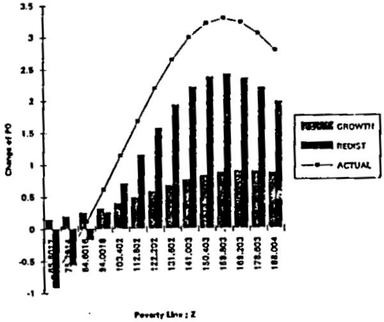


Figure 19: Actual Change of P1 Between 1990/91 and 1981/82 and Its Growth and Redistribution Components ; Rural

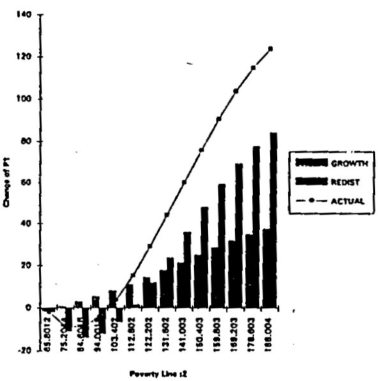
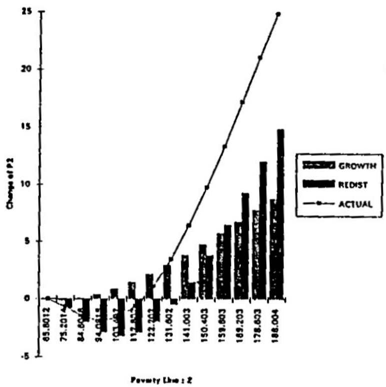


Figure 20: Actual Change of P2 Between 1990/91 and 1981/82 and Its Growth and Redistribution Components ; Rural



7-Conclusion and Remarks.

The choice of poverty line and poverty measures-- on which any poverty comparisons are based- are matters about which views may vary. Therefore, representing the class of poverty measures, given by Foster et al (1987), as a functions of poverty line are very useful. These representations allow also for decomposing any change in poverty measures into growth and redistribution components.

For purpose of poverty comparisons in Egypt , several models for Lonerz Curve have been fitted for 1974/75, 1981/82 and 1990/91 and for urban and rural areas, using surveys conducted in these years. The best fitted curves for all years and all regions were the elliptical Lorenz Curve. Measurements of poverty (FGT) -- for the previously mentioned years- in terms of any poverty line were derived. Poverty has decreased between 1974/75 and 1981/82 for both urban and rural areas, whatever the chosen poverty line or poverty measure. There are slightly deterioration in the living standards in urban areas between 1981/82 and 1990/91, regardless of the used poverty line or measure. While, for rural areas, the ranking between 1990/91 and 1981/82 differs depending on the expenditure level of the chosen poverty line and on the poverty measure used. If the chosen poverty line is less than LE80(42% of mean per capita expenditure), we conclude that poverty has decreased between the two dates regardless of the poverty measure used. A completely different conclusion may be derived if the chosen poverty line is greater than LE112(60% of mean per capita expenditure). Based on any poverty measure and on poverty lines higher than LE112, poverty has slightly increased during the period under consideration. If the poverty line lies between LE80 and LE112, the conclusion will depend on the chosen poverty line and measure.

The above discussion indicates that, in any poverty comparisons, expressing poverty measures as parametric functions of poverty line is very important to obtain complete ordering of two dates rather than partial comparisons when our analysis is based only on a single poverty line or one poverty measure.

The parametric representations of poverty measures allow for decomposing any observed change in poverty into changes in the distribution of living standards (redistribution component) and changes in the growth in living standards. For Egypt, and for the period 1974/75 and 1981/82. changes in any poverty measure were mainly due to changes in the average living standards. While the redistribution of living standards were the main component in changes of any poverty measure between 1990/91 and 1981/82.

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