DECOMPOSITION OF AN AGGREGATE MEASURE OF INCOME DISTRIBUTION

(Received August 21, 1978)

ABSTRACT. Aggregate Gini coefficients, which are measures of the inequality of the distribution of income, can be decomposed in terms of types of income, provided the constituent coefficients are defined over family units ordered according to their total income. This decomposition provides a valuable means of examining cyclical shifts affecting income equality. However, other decompositions associated with specific socio-economic or demographic criteria are shown to yield collective expressions which contain both the distributional coefficients for the particular subgroups into which the population is classified, and significant interaction terms. These interaction terms prevent the identification of a clear relationship between the overall distribution of income and the distribution of income for each of the specified subgroups. Further research in this area should focus on distributions within structurally homogeneous groups, using informal procedures for linking these distributions to form impressions of aggregate developments.

INTRODUCTION

The Lorenz curve and its attendant summary statistic, the Gini coefficient, have enjoyed many years of popular use in the description of income distributions by size of income. Indeed Morgan [1962] asserted that at the time he wrote, it “has generally been agreed, after much discussion, that the best single measure of inequality is the proportion of the triangular area on a Lorenz diagram which falls between the Lorenz curve and the diagonal, often called the Gini Index of concentration”. However this use has almost always been accompanied by criticism, usually on the ground that significant dynamic, socio-economic and demographic factors have been ignored in calculations so that the interpretation of the estimated Lorenz curve and its Gini coefficient is difficult whenever comparisons are made and meaningless otherwise. The most notable criticisms have been summarized by Garvy [1952] for the particular context that we shall stress below and by Paglin [1975, 1977] and Pyatt [1976] from alternative approaches. One primary shift in the focus of criticism during recent years stems from the greater availability of compatible data for the factors affecting incomes in terms of both size and sufficiency,
factors such as age, family size, education, number of earners, sex of family heads and experience of unemployment. Researchers are now able to add empirical substance to claims for the superiority of different techniques for measuring inequality.

Three approaches to amending the measures of inequality can be discerned. First, the reference line of perfect equality in incomes can be replaced by an alternative standard that reflects some important characteristics of the population over which the coefficient is calculated. Paglin [1975] illustrates how dynamic characteristics might be affected by the age of population units and life-cycle factors. A second approach restricts the use of the Gini coefficient to more homogeneous groups that can be delineated according to socio-economic or demographic criteria. There are two variants to this approach. One assigns data to sub-populations using the criteria directly and then treats each group separately. The second retains all data but amends them, for example, by use of family equivalent scales to reflect differences in family composition, or by extensions of earning periods to reduce the impact of factors associated with the variability of individual family incomes through time. Early examples of the first variant are provided by Fisher [1952a, b] and Morgan. Benus and Morgan [1975] describe some aspects of the second variant and cite earlier research that adopts such amendments to data.

Chart 1 illustrates the Gini coefficients that stem from the use of the first variant of this approach when Canadian families, in each of the given years, are assigned to six sub-populations according to the age of their heads. The graphs contained in this chart show distributional coefficients representing inequality of incomes within the six groups during the decade 1965–1975. These six graphs are ‘layered’ in the sense that, apart from families with young heads (aged less than 25 years when the Surveys of Consumer Finances were undertaken), their levels increase with the age of their heads. Thus income inequalities are apparently monotonically associated with age throughout the period described (apart from the young head exception). Many explanations of this layering effect can be suggested. In his early exploration of incomes for family heads in the United States, Morgan provides a list of potential influences before concluding that “extra earners tend to reduce inequality both within age groups and for the whole population, but... the major factors causing age differences in inequality... are the differential impact of less then full year work and some spreading of the earning rates