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ABSTRACT

Morton Paglin recently proposed a new summary statistic, the "Paglin-Gini," which he uses to measure and analyze the level and trend of income inequality in the United States. In contrast with the standard Lorenz-Gini, which counts all income differences among living units in measuring inequality, the Paglin-Gini defines meaningful inequality to include only the differences in family incomes that are unrelated to the observed age-income profile. Paglin's measure indicates substantially less inequality in the United States than does the Lorenz-Gini. According to Paglin's measure, moreover, inequality has fallen considerably since World War II; other measures indicate very little change in inequality over this period.

In this comment we describe Paglin's procedure and challenge his measure on both computational and normative grounds. Paglin's interpretation of policy-relevant inequality and the implications of the Paglin-Gini for analyzing the equity of the transfer system are questioned. We conclude that the Paglin-Gini provides a misleading interpretation of the level and trend of income inequality in the postwar period.

THE MEASUREMENT AND TREND OF INEQUALITY: A BASIC REVISION: COMMENT

I.

In the September 1975 issue of the American Economic Review, Morton Paglin posits a new summary statistic, the "Paglin-Gini," which he uses to measure and analyze the level and trend of income inequality in the United States. In contrast with the standard Lorenz-Gini, which counts all income differences among living units in measuring inequality, the Paglin-Gini defines meaningful inequality to include only the differences in family incomes that are unrelated to the observed age-income profile. Paglin's measure indicates substantially less inequality in the United States than does the Lorenz-Gini. According to Paglin's measure, moreover, inequality has fallen considerably since World War II; other measures indicate very little change in inequality over this period.

Paglin is addressing an important problem. For the postwar period when the age distribution, the length of time spent in school, and the propensity of the young and the old to form their own households have all changed rapidly, the trend in the conventional Gini coefficient has no obvious normative interpretation. (However, it is often given one.) Unfortunately, Paglin's attempt to provide an index with a direct normative interpretation is not successful. The Paglin-Gini does not measure what it claims to measure, and, furthermore, its normative content is no clearer than that of the standard measure. No single measure of inequality is sufficient

without further analysis. A time series of inequality must be approached, like any other time series, with a well-specified, multivariate model.

After describing Paglin's procedure in section II, we challenge his measure in section III. In section IV, Paglin's interpretation of policy-relevant inequality is questioned, and in section V the implications of the Paglin-Gini for the equity of the transfer system are analyzed. Section VI is a summary of our critique.

II.

The calculation of the Paglin-Gini from any data on the size distribution of income is a straightforward matter, if same data show the relationship between age and income. Ranking age cohorts from lowest to highest mean income and cumulating the percentage of observations (for example, families, households) and the percentage of income in each cohort yields a Lorenz-type curve. The deviation of this curve from the 45-degree line of equality depicts the income inequality that is attributable to the relationship between age and income observed in the data. This inequality is measured by a Gini coefficient, which Paglin calls the Age-Gini. The Age-Gini measures the inequality that would exist if there were no variance around the mean income of each cohort but differences did exist among the means. Deducting the Age-Gini from the standard Lorenz-Gini yields the Paglin-Gini, which indicates the inequality that is attributable to the variation around the mean income of each cohort.

Paglin's purpose is to partition the area between the 45-degree line and the Lorenz curve into two parts: the inequality that to him is economically functional and, hence, of no concern for public policy, and the remaining inequality, which policymakers may or may not choose to alter, depending on normative judgments. We will refer to the latter type of inequality as nonfunctional or policy-relevant inequality. According to Paglin, functional inequality in this instance

> reflects society's need for varying income over the life cycle as well as other basic facts relating to productivity, investment in human resources, and the work-leisure preferences of households, but only in an average way insofar as these factors express themselves through the age variable (Paglin, 1975, p. 602).[1]

III.

The most serious objection to the Paglin-Gini is that it does not measure what it purports to measure. The decline in the Paglin-Gini between 1947 and 1972 supposedly

> reveals the decline in interfamily inequality of income, unobscured by changes in the age-income profile and in the age composition of the population (p. 605).

Table 1 reveals that the Paglin-Gini confounds the effects of changes in interfamily inequality of income, changes in the age-income profile, and changes in the age composition of the population.

Row I of the table shows the actual 1972 Lorenz-Gini for census money income for all households in column 1, and the actual 1965 Lorenz-Gini in column 5. Columns 2, 3, and 4 show hypothetical Lorenz-Ginis, each of which holds constant one age-related source

Table 1. Lorenz and Paglin Gini Coefficients, 1965, 1972, and Hypothetical

		Actual 1972 (1)	Cohort Inequality Constant (2)	Age Distribution Constant (3)	Age-Income Profile Constant (4)	Actual 1965 (5)
I.	Lorenz-Gini	.4043	.4024	.3936	.3994	.3885
II.	Age-Gini	.2344	.2344	.2164	.2258	.2073
III.	Paglin-Gini	.1699	.1680	.1772	.1736	.1812

Sources: Computed using data from Current Population Surveys, 1965 and 1972, on census money income for all household units.

Column (1) Actual 1972: 1972 age-income profile, 1972 age distribution, 1972 within-cohort inequality.

Column (2) 1972 age-income profile, 1972 age distribution, 1965 within-cohort inequality.

Column (3) 1972 age-income profile, 1965 age distribution, 1972 within-cohort inequality.

Column (4) 1965 age-income profile, 1972 age distribution, 1972 within-cohort inequality.

Column (5) Actual 1965: 1965 age-income profile, 1965 age distribution, 1965 within-cohort inequality.

of the change in inequality. These three sources are the mean income by age cohort (the age-income profile, held constant in column 4); the number of households in each cohort (the age distribution, held constant in column 3); and within-cohort inequality (held constant in column 2). For example, the Lorenz-Gini in column 4 reveals how much inequality would have existed in 1972 if the age distribution and within-cohort inequality had been at their actual 1972 levels but the age-income profile had not changed since 1965. In this instance the hypothetical Lorenz-Gini (.3994) is less than the actual 1972 Lorenz-Gini (.4043), indicating that the change in the age-income profile increased income inequality between 1965 and 1972. The rest of row I tells the same story: Since each hypothetical Lorenz-Gini is less than .4043, each of the three components contributed to an increase in income inequality.

Comparing columns 1 and 2 shows that Paglin misperceives his measure. Rows II and III present the Age- and Paglin-Ginis for 1965, 1972, and the same hypothetical standardizations found in row I. The standardization of column 2, with both the age-income profile and the age distribution at their 1972 magnitudes but interfamily (within-cohort) inequality at its 1965 magnitude, shows a Paglin-Gini of .1680. Since the Paglin-Gini of column 1 exceeds that of column 2, the change in within-cohort inequality that occurred between 1965 and 1972 <u>increased</u> inequality. The same conclusion is reached when the Lorenz-Ginis of columns 1 and 2 are compared. Thus, the Paglin-Gini did not decline because of a decrease in interfamily inequality. While Paglin's procedure is designed to capture the effects of

changes in interfamily inequality, it actually aggregates the effects of changes in the age-income profile, the age distribution, and within-cohort inequality (by comparing columns 5 and 1).

IV.

Even if the Paglin-Gini did achieve its purpose, it is unclear what normative interpretation of it could be derived. A difficult problem is raised by Paglin's procedure of establishing each period's partition between functional and nonfunctional (or policy-relevant) inequality from that period's observed age-income profile. Presuming that some partitioning of inequality based on life-cycle considerations is meaningful does not imply that all changes in any of the determinants of the age-income profile should be exempt from a policy judgment or a policy response.

This point can be illustrated with a simple heuristic model. Assume that the set of underlying determinants of the measured P-reference line in any year is exhausted by

a. The distribution of inherent physical and mental capabilities, by age;

b. The returns to "learning-by-doing" (experience), by age;

c. The returns to investments in human capital, by age;

d. Income transfers, by age;

e. Returns from physical capital, by age;

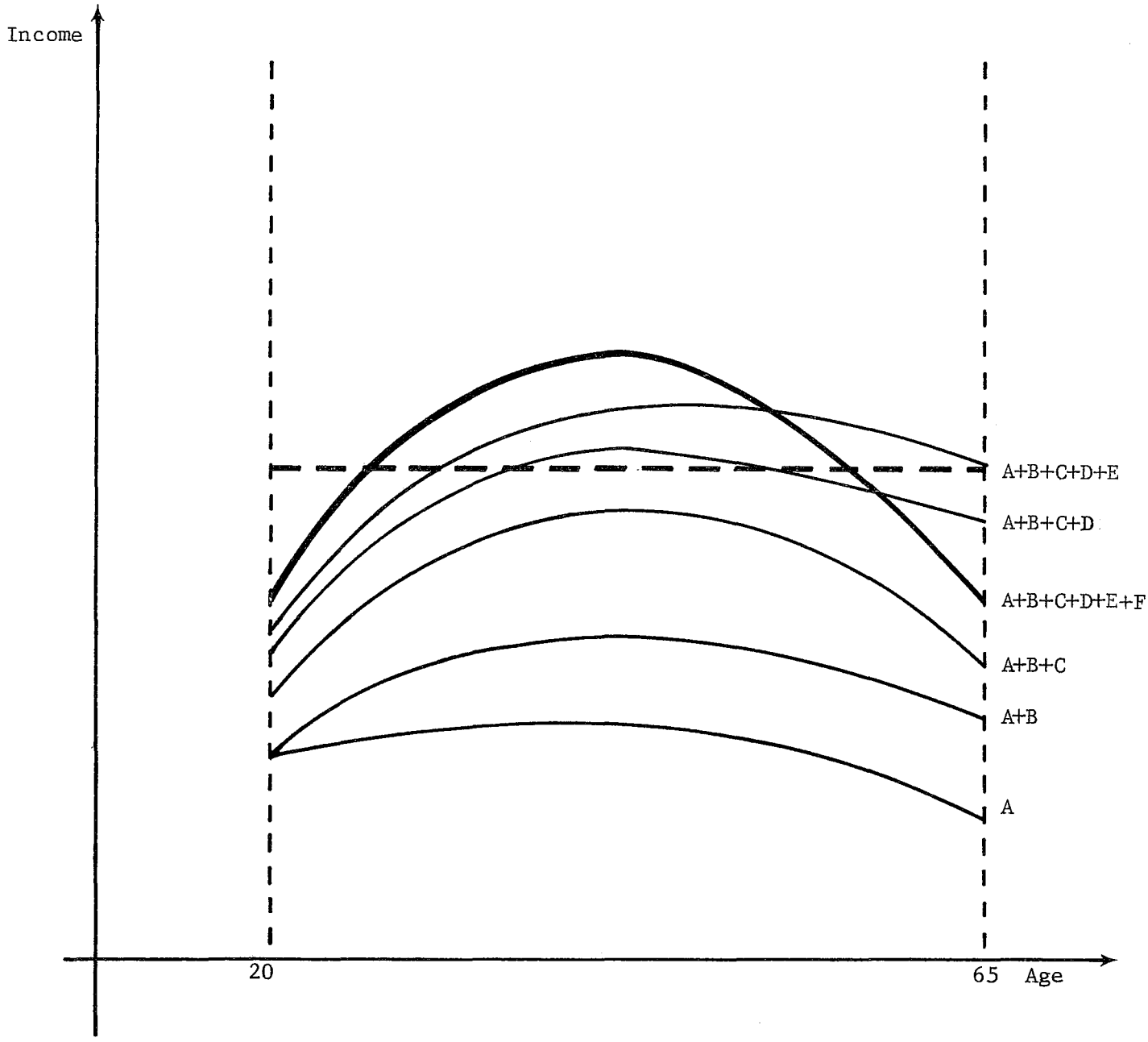
f. Earnings effects of labor-leisure choices, by age; and

g. Distribution of families, by age.

Figure 1 depicts the likely effect on the age-income profile of determinants a through f.[3] Holding constant tastes for work among age-cohorts (at, say, the average for the population), inherent capabilities (a) would be likely to give the age-income profile a slight peak, because of declining capabilities after some age. The addition of work experience (b) would tend to increase income with age until the marginal return to experience fell to zero. Similarly, the returns to education (c) would add income at all ages, but especially at young and middle ages, increasing the peakedness of the profile. To the extent that public income transfers (d) and returns from nonhuman capital (e) favor the old relative to young and middle-aged cohorts, the income line would rise throughout, but become less sharply peaked. Finally, adding variations in hours worked due to leisure-income preferences (f) would lead to a decrease in expected income for aged cohorts and to increases for the young and middle-aged, contributing substantially to the peakedness of the age-income profile.[4] The cumulative effect of all these variables would lead to the observed age-income profile--the heavy line A+B+C+D+E+F. The more peaked the age-income profile, the higher the Age-Gini. The P-reference line calculated from the age-income profile reflects one additional variable--the distribution of units by age (g). The heavier the concentration of units with incomes far from the average income over all ages (represented by the dotted horizontal line), the higher the Age-Gini.

This, then, is the sort of framework that underlies the derivation of the P-reference line and Paglin's partitioning of inequality into that which is functional and that on which normative

Figure 1



Components of the Age-Income Profile

policy judgments must focus. Because his partitioning is an annual exercise, it can be stated that any change in variables a through f leading to increased peakedness in the age-income profile, or any change in the age distribution toward cohorts whose expected income is above or below the mean, will cause an increase in functional inequality (the Age-Gini), an increase in the Lorenz-Gini, and an indeterminate effect on the Paglin-Gini.

Table 1 also illustrates the problems posed by such an approach for evaluating the historical record. Row I indicates that each of the three components contributed to an increase in income inequality, since each Lorenz-Gini is less than .4043. Row III tells a story that conflicts with that of row I. For example, column 4 shows that if the 1965 age-income profile had persisted to 1972, the Paglin-Gini for 1972 would have been .1736 rather than the observed .1699. This means that the observed change in the profile reduced inequality as measured by the Paglin-Gini. A similar contradiction holds for the change in the age distribution (column 3). These contradictions arise because a change in any of the components alters both the Lorenz-Gini and the Age-Gini. In particular, in these two cases the Age-Gini increases by a greater absolute amount than does the Lorenz-Gini. By Paglin's own criterion, to believe the evidence of row III rather than that of row I requires accepting that the relatively large rise in the Age-Gini captures a functional source of growing inequality that is not apparent when the same effect is simply standardized out of the Lorenz-Gini (as in row I). If this is accepted, then the significant contradiction in Table 1, the one Paglin emphasizes, can also be accepted. Specifically, this contradiction is that

inequality increased (from .3885 to .4043) as conventionally measured but decreased (from .1812 to .1699) when "appropriately" measured.

Suppose that a transitory change in the pattern of returns to experience causes increased peakedness of the profile. In particular, assume that this increase results from a rise in the minimum wage law, a consequence of which is that large numbers of young workers face intermittent unemployment. Assume further that the increased steepness of the profile raises the Age-Gini more than the Lorenz-Gini. Does Paglin really wish to claim that these circumstances reduce the degree of inequality with which policymakers should be concerned? Paglin's method requires an affirmative answer to this question. The burden of demonstrating why the answer should be affirmative falls on him.

V.

Another issue raised by Paglin's paper concerns the use of measures of inequality for evaluating the effectiveness of public income-transfer programs. This matter has both normative and empirical aspects, which we will consider in turn.

Implicit in Paglin's measure of inequality is a criterion for judging the effectiveness of income transfers, if the objective of such transfers is to reduce inequality. An income transfer is "Paglin-efficient" only if it reduces the variation of income within an age cohort; transfers that involve intercohort redistribution are by definition "Paglin-inefficient." Thus, given a fixed amount of income to be redistributed, the largest decrease in inequality,

as measured by the Paglin-Gini, can be obtained only through strictly intracohort transfers.

A criterion for judging the effectiveness of income transfers is also implicit in the Lorenz-Gini. Any transfer from a household with high current income to one with low current income is Lorenz-efficient without regard to the age of the household head. To the extent that the current income of the young and the old are downward-biased measures of economic welfare, Lorenz-efficient transfers may be thought to be actually inefficient. Paglin's measure avoids this problem but creates another. To the extent that current income is an accurate measure of economic welfare, what are often considered desirable transfers are Paglin-inefficient.

The difference between Lorenz-efficient and Paglin-efficient transfers is illustrated in Table 2. The first panel depicts a hypothetical economy of six units divided equally between two age cohorts. The young cohort has a mean pretransfer income of $150; the old cohort, a mean of $50. The second panel shows the same economy after $150 of Paglin-efficient transfers have been made. (The numbers in parentheses are the positive and negative transfers). These transfers achieve complete Paglin-equality, with all individuals within an age cohort having the mean income of that cohort. Notice that in this Paglin-efficient transfer program, the young individual with $150 of pretransfer income pays no taxes, while the old individual with only $90 of income pays $40 in taxes. The income range falls from $250 to $100. The third panel depicts a more conventional tax-transfer system designed to eliminate both high and low income extremes, regardless of age. Again the total transfer budget is $150.

Table 2. Alternative Transfer Systems

	Individuals 1	2	3	Age Cohort of Mean Income
I. Pretransfer Income				
Young	$40	$150	$260	$150
Old	$10	$50	$90	$50
II. Posttransfer Income (after $150 of Paglin efficient transfers)				
Young	$150 (+$110)	$150 (0)	$150 (-$110)	$150
Old	$50 (+$40)	$50 (0)	$50 (-$40)	$50
III. Posttransfer Income (after $150 of conventional transfers)				
Young	$90 (+$50)	$120 (-$30)	$150 (-$110)	$120
Old	$80 (+$70)	$80 (+$30)	$80 (-$10)	$80

The highest taxes are imposed on those with the most income; those with the least income receive the largest transfers. Through this scheme, the mean income of the young cohort is reduced and that of the old cohort is raised. Indeed, Paglin-equality is achieved for the old cohort, and the range of incomes is reduced from $250 to $70. By Paglin's criterion, the transfer system represented in the second panel is efficient; that in the third panel is not. However, the transfer system in the third panel achieves a greater reduction in Lorenz-inequality than does that in the second panel. More importantly, it does so without taxing away more income from poor individuals than from those with higher incomes. Which of these two outcomes is preferred depends on the precise meanings of "young" and "old." If "young" and "old" meant ages 35-45 and 45-55, the Lorenz standard might be preferable, since current income would approximate permanent income. However, if "old" meant age 65 and older, Paglin-efficiency might be appropriate.

In this context, it should be noted that, as calculated, the Age- and Paglin-Ginis incorporate transfers that are by definition Paglin-inefficient, since Paglin's income concept is census money income.[5] For example, in 1972, mean pretransfer income of families headed by aged males was $5337, while mean census money income was $8372. Public cash transfers have grown from a few billion dollars in 1947, the first year of Paglin's time-series analysis, to a level 20 times that amount in 1972, the last year of his analysis.[6] Because the bulk of this growth has been in age-related Social Security benefits, the shape of the age-income profile over time has been significantly affected. Consequently, Paglin's income profiles

are based on an inappropriate definition of income, which biases his conclusions about the trend of inequality in the postwar period.

There is a further point. Paglin accepts the different age-income profile in census money income in each year as socially optimal. Because public transfers are included in this income defintion, Paglin rejects the optimality of the age-income profile generated by the market. Yet he gives no explanation of why this particular combination of the market and political decisions should yield the optimal profile.[7] If the observed profile is to be relied on as a norm, a more consistent position would be that either the market alone or the market plus all political decisions would yield a superior measurement. Apparently the ready availability of published data has dictated Paglin's choice of an income concept. This is a slim reed on which to base a reformulation of the definition and measurement of nonfunctional inequality.[8]

VI.

For both normative and computational reasons, then, we reject the new measure of inequality proposed by Paglin, and with it his conclusions that "estimates of inequality have been overstated by 50 percent and the trend of inequality from 1947 to 1972 has declined by 23 percent" (p. 608). We have argued that his decision to base a definition of nonfunctional inequality on annual age patterns of posttransfer income (as opposed to pretransfer or "full" income) is arbitrary, lacks a rationale, leads to biased estimates of the trend of postwar inequality, and eliminates the usefulness of his measure as a gauge of the redistributive effect of income-transfer policies.

Paglin's new measure of inequality is not unique, since

> once we cast aside the socially unrealistic 45 degree line of equality, we are free to generate new reference lines corresponding to explicit and reasonable definitions of equality, equity, and Pareto optimality (p. 599).

An inequality measure that allows for life-cycle variations is appealing. However, we have argued that such a standard requires an explicit judgment about the optimal life-cycle pattern, and that relying on the annually observed pattern is unsatisfactory. Indeed, as we have tried to make clear, even if the Paglin-Gini were successfully measured, its normative underpinnings would be at odds with conventional notions of equity.

Notes

[1]Paglin recognizes that others may choose a partition different from his age-related partition. Paglin's approach, it should be noted, was proposed and rejected over two decades ago by Garvy (1952). Paglin provides no explanation for his explicit choice of age as the basis for defining functional or optimal inequality, although there may be one. Variations of income with other variables such as family size may also be economically functional.

[2]Gini coefficients are insensitive to multiplicative transformations. For example, the hypothetical Lorenz-Gini of column 4 is derived as follows: (a) Begin with the 1972 distribution of households in each income class and the share of aggregate income in each class by cohort. (b) Multiply the income shares for each cohort by the ratio of 1965 cohort mean income to 1972 cohort mean income. This produces the 1965 age-income profile without altering interfamily inequality (the cohort-specific Gini coefficient) or the distribution of households among cohorts. Another hypothetical Gini, based on the 1965 distribution, could have been reported in column 4. However, for none of the standardizations of Table 1 do the alternative hypotheticals produce an index number problem.

[3]Determinant g does not influence the age-income profile. However, because it is used to weight observations on that profile in calculating the P-reference line, it is reflected in the Age-Gini.

[4]The oversimplicity of this scheme becomes obvious at this point. Labor-leisure choices depend not only on tastes but also on the incentives created by other determinants, notably d. A more complete model would account for these interdependencies.

[5]Census money income includes wages and salaries, dividends, interest, rents, and cash transfers, but excludes capital gains, in-kind transfers, the services of owner-occupied housing, benefits of publicly provided goods and services, and taxes.

[6]In the 1972 Current Population Survey, public transfers totalled 76 billion, more than 10 percent of market-generated income flows.

[7]In the age-income profile used by Paglin, nonwage income, influenced in part by inherited wealth, is also included. Presumably Paglin would not wish to include income differences stemming from differences in inherited wealth in his category of functional inequality; but to the extent that income from inherited wealth is not age-neutral, his empirical procedure does just that.

[8]Alternatively, Paglin could employ the Age-Gini of pretransfer income in deriving the P-reference curve and then subtract it from the posttransfer Lorenz-Gini. This two-step comparison, however, could not be calculated from published data, and a major advantage of the Paglin measure would be lost. Furthermore, Garvy (1952) has demonstrated that the subtraction of Gini coefficients from separate underlying distributions is uninterpretable.

References

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