the vote of the General Assembly, where the Declaration on the Rights of Indigenous Peoples was met with a vote of 143 in favor, 4 against, and 11 abstentions. Notably, the four votes against the adoption came from white settler states, all with a strong indigenous presence in terms of political resistance to first world domination: Australia, Canada, New Zealand, and the United States. Many attribute the opposition of these states to governmental fears of secession and independence by indigenous peoples, which potentially threaten to disrupt the contiguous landmass of the settler nation-states that encompass them. However, the declaration specifically discourages any action that would dismember or impair the territorial integrity or political unity of sovereign independent states. Nonetheless, the declaration, which sets out the individual and collective rights of the world's 370 million indigenous persons, is the most comprehensive international instrument addressing the rights of indigenous peoples.

The declaration calls for the maintenance and strengthening of indigenous cultural identities, and emphasizes the right of indigenous peoples to pursue development in keeping with their own needs and aspirations. The declaration states that indigenous peoples have the right "to the recognition, observance and enforcement of treaties" concluded with states or their successors. It also prohibits discrimination against indigenous peoples and promotes full and effective participation in all matters that concern them.

SEE ALSO *American Indians; Fourth World; Genocide: Overview; Racial Hierarchy; Violence against Indigenous People, Latin America.*

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INEQUALITY

This composite entry will cover:

INEQUALITY: OVERVIEW

The English mathematician and philosopher Bertrand Russell (1872–1970) once commented: "If there were in the world today any large number of people who desired their own happiness more than they desired the unhappiness of others, we could have a paradise in a few years" (2009 [1950]). Despite Russell's observation, contemporary evidence indicates that, at best, human happiness is dictated by relative position of relative status; happiness is contingent on the perception of conditions that make for happiness in others (Pickett and Wilkinson 2009). To properly investigate inequality is to consider both the intellectual and material mechanisms that have operationalized the inequitable allocation of resources. The fundamental story of inequality is more good to some, less to others. These unequally distributed "goods" can be material, as necessities for survival (such as water, calories, and land), or abstract, as economic inputs or derivatives (such as labor, income, and wealth).

The intellectual scaffolding that propagates inequality is more than just a buttressing for a paradigmatic of scarcity: these rationalizations—scientific and otherwise—allow for inequality to be justified, and that justification creates mechanisms that predict inequality (Weintraub 2002). As a mathematical issue, an economic inequality is a way of naming and collecting groups such that they number greater than a (weighted) combination of available resources. As a sociological process—the separation and classification of people into categories—inequality can be null-racial (e.g., private against public), interracial (e.g., white against black), or intraracial (e.g., black against black). Lastly, as a physical construct, the apportioning of resources unequally can be economically realized (e.g., the pricing or costs of goods like health care, fees, and taxes), socially implemented (e.g., racially biased hiring and housing), or some either/or/and combination of both (e.g., salary and wage differentials).

Ultimately, inequality in goods and resources may be the critical predictor of stubbornly durable differences both within and across various ways of grouping people in human suffering: differences in the incidence of malady, morbidity, and mortality. Racial and ethnic inequalities—the segregated assignment of resources across groups defined by notional genealogical differences—are perhaps the most pervasive, frequently rationalized, and hermetic versions of the construct.

People do look different from one another, and as such, they can be easily classified on the basis of physical appearance. In stratified societies, racial hierarchies can be imposed in a straightforward way. The career of race-based stratification has been long, international, and indisputably inseparable from an overall historical pattern and program of exploitation. It is in this way—through the practiced ordering, valuation, and allocation of resources—that inequalities are imposed and maintained. Direct measurement of inequality can be restricted to a mathematical summary of measurable economic data; there are many methods for quantifying inequality, usually involving mathematical summaries of distributional distances. However, the mechanisms that *produce* unjust equality are manifold, inveterate, and often concealed.

DEFINING AND MEASURING INEQUALITY

This discussion of inequality begins with *inequity in distribution*, that is, as a measure of fairness or uniformity and not as a binary comparison of two quantities. A focus on the measurement of inequality is, then, a study of the ways to measure, order, and interpret *distributions* of goods on populations.

Normative versus Objective Inequality Much of the story lies in the definition of what is "unequal." Inequality can be *normative* as a dual of social welfare or *objective* as a measure of variation or difference in some distribution. The distinction is between the valuation of inequality and the measurement of it (see Sen 1967). Certainly there is also a dichotomy between perceived and real inequality. Some research highlights the strong dependence between economic and emotional inequality (see Pickett and Wilkinson 2009), while other authors point out that socioeconomic and psychosocial inequalities may be situationally unevenly tolerated (see Fukuyama 2008).

These distinctions—between the economic and econometric—have been addressed fully elsewhere (Atkinson 1970; Sen 1997). For the purposes of this entry, to measure inequality is to numerically quantify the *distributional* apportionment of a resource or good. The operational definition of inequality in this entry is, first, a measurement of distributional fairness or uniformity and, second, a socioeconomic quality.

A Notation for Clarity Let a quantity of some "good" (money, water, food) be x_i indexed by i, the *ith* person. Consider a population of size N people in, say, a town, state, country; the amount each person has collected is represented by the vector $\mathbf{x} = (x_1, \ldots, x_N)$.

Typically, measurements of inequality are univariate (*scalar*) and increasing as the argument of the function, that is, the *distribution* of $\mathbf{x}$ becomes less uniform. A uniform distribution for $\mathbf{x}$ is one where the entire population $i = 1, \ldots, N$ has the same quantity of x, that is, $x_1 = x_2 = x_3 \ldots x_N$, distributional utopia or dystopia, again depending on axiom of choice. (By statistical definition, the maximum entropy is reached on a *uniform* distribution and the minimum on a *singular* distribution, where one person has everything. Beyond econometrics, the maximum entropic state may or may not be favorable, depending upon the setting.) In terms of an ordering of the incomes, $\mathbf{x}_{()} = ({}_{(1)}, \ldots,$ with $x_{(1)}$ ranked 1 as the smallest, a uniform distribution could have any arbitrary ranking.

Consider a measurement of inequality as a quantity calculated upon observed samples of populations, or data, and notice that the ordinary *empirical cumulative distribution function* (ECDF)—a functional or tabular listing of ordered (increasing) values with corresponding cumulative frequencies defined across the domain of $\mathbf{x}$—while not necessarily increasing, holds all the necessary information for calculating inequalities.

$$F_N(x) = \frac{1}{n}\sum_{i=1}^{n} num.\ of\ x_i's \leq x \qquad (1)$$

$$F_N(x) = \frac{1}{n} max_p\ s.t.\ \{x_{(p)} \leq x \leq x_{(p+1)}\} \qquad (2)$$

The ECDF in the first equation calculates the observed probability that a person in the population $i = 1, \ldots, N$ has no more than income level x. When this number is low even at high incomes, it suggests a *right skewed* or *regressive* income distribution, where few people have the highest incomes. The ECDF (or some function of it) holds all of the distributional information, though more subtly than typical measures of inequality. Essentially, the ECDF is an ordered list of incomes with associated observed frequencies. Most measurements of inequality are either *moments* or weighted averages of this ranked list, like the Lorenz curve and Gini index, or *derivatives* of it, like the Theil index (see Gini 2005 and Gastwirth 1972 for the Gini index, Lorenz 1905 for the Lorenz curve, and Theil and Uribe 1967 for the Theil index; other popular measures of inequality are described in Atkinson 1970 and Hirschman 1964 [Herfindahl]).

The ECDF, and thus measurements of inequality, are *statistics* or functions of data—in this case, incomes of members of a population. It is desirable that a measurement of inequality yield a compelling and useful illustration of an income distribution. Figure 1 illustrates a limitation of the graph of the ECDF: all of the distributional information is present, though not in a form directly comparable with uniformity/equality or between groups. On observed data—almost always a sample from a population that is not fully observable—the ECDF is an estimator of the true distribution. The objective measures of inequality discussed below are also estimators, statistics on observed data, for unobservable population quantities. (In this entry, these statistics are treated as functions on equiprobable random samples: that is, for a population or data of size N, each observed person or item has [observed] frequency of $1/N$. In the real world, there is a big difference between theory and measurement; a conversation about these differences can be found in Gastwirth 1972.)

The Lorenz Curve The empirical Lorenz curve is a version of the empirical cumulative distribution transformed to highlight the proportion of a total held at each share of the population. Contrast the Lorenz curve with the cumulative

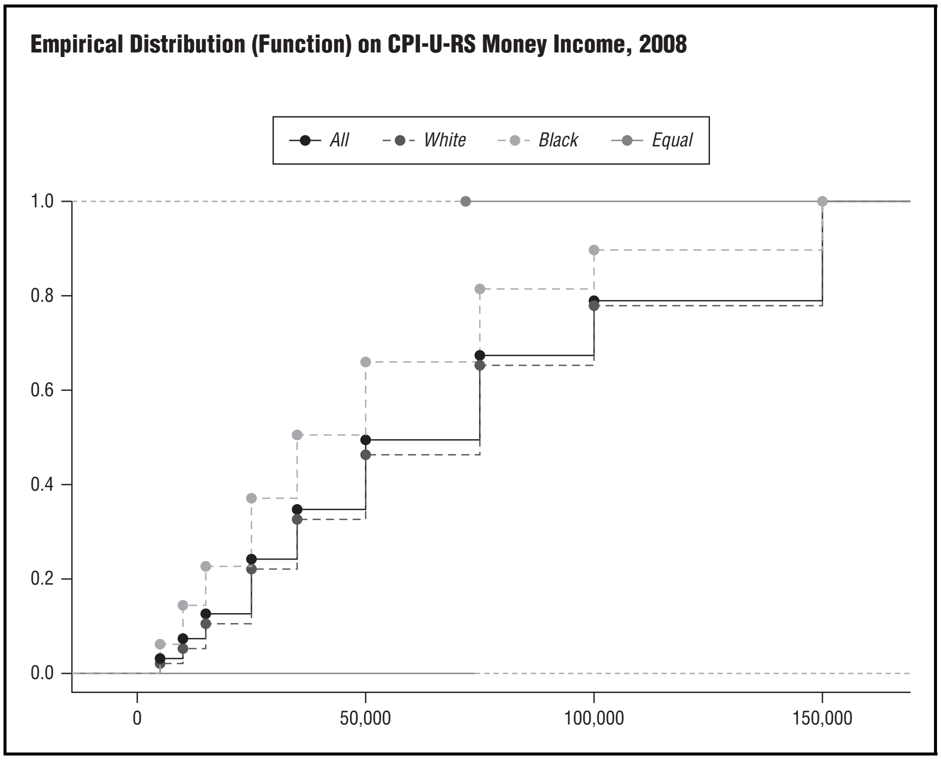

Figure 1. *The solid lines at the top and bottom of the chart are an ECDF for a hypothetical uniform distribution where every household in the population has the weighted (by CPI binning) mean household income. The ECDF completely specifies the distribution; the fraction of households having less than or equal to the income on the x-axis is the height of the curve on the y-axis. Generally, the fraction of black households is increasingly less than white households as income increases: the ten-percentage-point difference at \$10,000 of income or less increased to a twenty-point difference at \$50,000 of household income. The CPI-U-RS right censors—here via aggregating—distributional information above \$100,000. The \$150,000 cutoff used in the graph is arbitrary. A steeper ECDF, as a rule of thumb, suggests more households at lower income levels. Notice that the ECDF curve for blacks is steeper than that for whites.* DATA FROM THE US CENSUS BUREAU, 2011 STATISTICAL ABSTRACT

distribution function (CDF): the CDF yields the proportion of the population that has income less than or equal to each value. The Lorenz curve is a function that takes the unit interval, [0, 1] from the proportion of total income to the proportion of the population. The CDF, in this setup, is a function on the real numbers, [0, ∞], to the unit interval—from amount of income to the proportion of the population.

The Lorenz curve is:

$$L(p) = (N \cdot \bar{x})^{-1} \sum_{i=1}^{\lfloor Np \rfloor} x_{(i)} \quad (3)$$

$$= (N \cdot \bar{x})^{-1} \sum_{i=1}^{\lfloor Np \rfloor} F_N^{-1}(i/N) \quad (4)$$

on a ordered sample of incomes, $\mathbf{x}_{()}$, with sample mean, $\bar{x} = \frac{1}{n} \sum_{i=1}^{p} x_{(i)}$. The value of the curve *L*(*p*) at percent *p* is the total income held by *p* percent of the population. The total income at *p* percent can be calculated directly from the inverse of the empirical CDF; since the empirical CDF holds the fraction of the population at each income (i.e., the quantiles), its inverse is just the quantile associated with each fraction. This is illustrated in equation 3.

The Gini Index The empirical Gini index is a function from an observed distribution to a scalar on the unit interval. The Gini coefficient returns the scaled "concentration" of a distribution defined as the ratio of observed distance from equality to the maximum distance from equality. This distance is just the area between the 45° line Lorenz curve for a uniform distribution and the observed Lorenz curve divided by 1/2—the area between a uniform Lorenz curve and a singular Lorenz curve—on the space of the Lorenz curve, the unit square [0, 1] x [0, 1]. The Gini coefficient is one, its maximum, on a singular

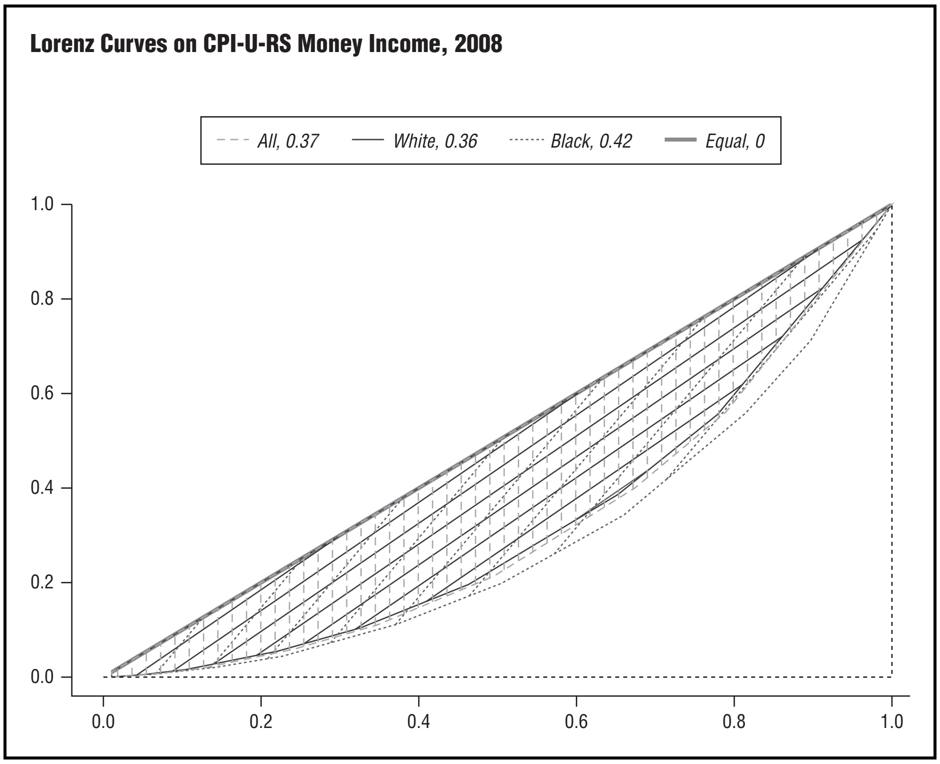

Figure 2. *The solid diagonal line is on a hypothetical uniform distribution where every household in the population has the weighted (by CPI binning) mean household income. The Lorenz curve is completely specified by the (empirical) distribution function; the fraction of total income held by* p *proportion on the* x*-axis is the height of the curve on the* y*-axis. The greater the area between the 45° line and the Lorenz curve, the greater the income concentration. The maximum possible concentration—a population where the income is fully concentrated in one person—is 1/2: the area in Lorenz space under the 45° line. A maximally concentrated population has a Gini of one; the Lorenz curve is the dotted black line. Estimated Gini indexes by "white" and "black" racial identification on the binned CPI-U-RS in the legend.*

distribution—one where all of the "good" in a population is held by one person. The minimum, zero, is returned on a uniform distribution—one where everyone in a population holds an equal amount of the good.

There are many ways to calculate Gini's index on a sample **x**; the coefficient is also defined as a function of the mean deviation, for example. It is illustrative to write it as a function of the Lorenz curve, showing the connection between the univariate Gini, the Lorenz curve, and the observed distribution function as a measure of inequality.

$$G = \frac{\frac{1}{2} - \sum_{p=1/N}^{N} \frac{1}{N} L(p)}{1/2} = 1 - 2\frac{1}{N}\sum_{p=1/N}^{N} L(p) \qquad (5)$$

$$= 1 - 2\frac{1}{N}\sum_{p=1/N}^{N} (N \cdot \bar{x})^{-1} \sum_{i=1}^{\lfloor Np \rfloor} F_N^{-1}(i/N) \qquad (6)$$

with F_N^{-1} the *inverse* of the observed distribution function: the function that returns the *pth* quantile of the observed data. In this way (colloquially speaking), the ordered observed data $\mathbf{x}_{()}$—which is the list $1/N$, $2/N$, ..., joined with the smallest, next largest, ..., largest amounts of the good—generates all of the inequality information for these measures.

For a uniformly distributed population, where all persons have equivalent income:

- the observed distribution function is a 45° line from the origin.
- the Lorenz curve is a 45° line from the origin to the right-hand corner of the unit square.
- the Gini coefficient is zero.

For a singularly distributed population, where one person holds all the income:

- the observed distribution function is a step function: zero everywhere but at the total income where it reaches 1.
- the Lorenz curve is the lower and right sides of the unit square.
- the Gini coefficient is 1.

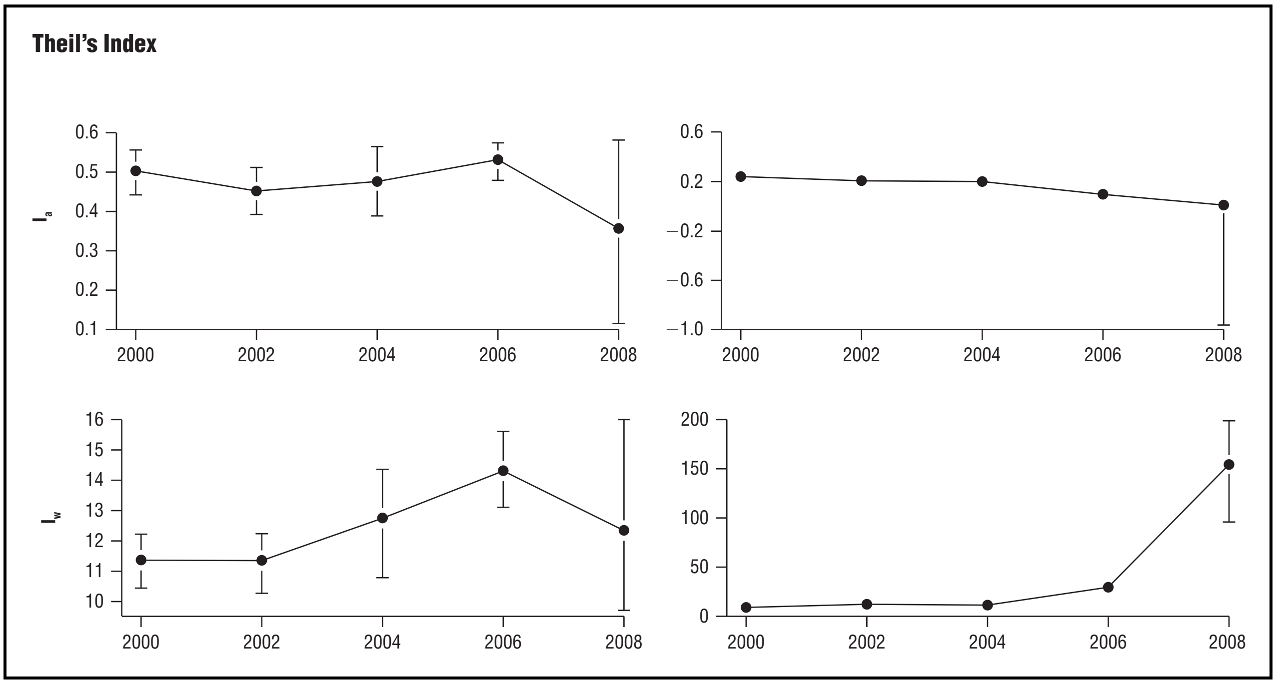

Figure 3. *Illustration of Theil's index calculated on wealth (left-hand column) and income (right-hand column) using the University of Michigan's Health and Retirement Survey (HRS) data: 2000, 2002, 2004, 2006, and 2008. The upper row is the across term; the lower row is the within term. Both terms are fixed by log base* b = $min(\bar{x}_g/\bar{x})$, *the ratio of the poorer (black) group sample mean to the overall mean. The small number of observations in 2008 (n = 724) inflate the (estimate of) standard error—via ordinary bootstrap. Across-group inequality appears to be stable or decreasing from 2000 to 2008; within-group inequality appears to be increasing from 2000 to 2006. Confidence bars are at 95 percent significance.*

The Theil Index Theil's index as a measure on an observed population of N total individuals is:

$$T = N^{-1}\sum_{i=1}^{N} r_i \log r_i = N^{-1}\sum_{i=1}^{N} \frac{x_i}{\bar{x}} \log \frac{x_i}{\bar{x}} \tag{7}$$

with $r_i = \frac{x_i}{\bar{x}}$. The data $\mathbf{x} = (x_1, \ldots, x_n)$ are typically, though not necessarily, incomes. Theil's index is a measure of distributional inequality, but not a direct function of a frequency distribution. Each ratio r_i is the distributional "share" at observation-person i, the fraction of "good" for individual i with respect to the sample mean $\bar{x}$. "Shares" greater than one are permissible values.

Theil's index is a version of Claude Elwood Shannon's entropy statistic, H—which *is* a function on a frequency distribution (see Shannon 1992, chap. 1). Shannon's entropy reaches a maximum on uniform distributions; Theil's index can be represented as the difference between this maximum and the observed magnitude of entropy

$$T = N \log_b (N) - H \tag{8}$$

and as such increases as distributional inequality rises. Theil's index is popularly represented as

$$T = \sum_{j=1}^{m} p_j r_j \log_b r_j + \sum_{j=1}^{m} p_j r_j T_j \tag{9}$$

with

$$T_j = n_j^{-1} \sum_{i \in g_j} r_{ij} \log_b r_{ij}, \tag{10}$$

on m discrete, that is, completely separable, groups, g_1, …, each with n_j members - $N = \Sigma_j n_j$. Each r_j is defined as above but with "shares" apportioned to group j; p_j is the observed frequency of group j, the relative cardinality of group j; r_{ij} is the conditional share of the "good," measured by $\mathbf{x}$, for individual i, given membership in group g_j. This version yields a straightforward *decomposition*, or partitioning, of the contributions of across-group (the first term on the right in equation 9) and within-group (the second term on the right in 9) inequality to overall population inequality. This partitioning is used and explained in Conceicao and Galbraith (2000) and Darity and Deshpande (2000).

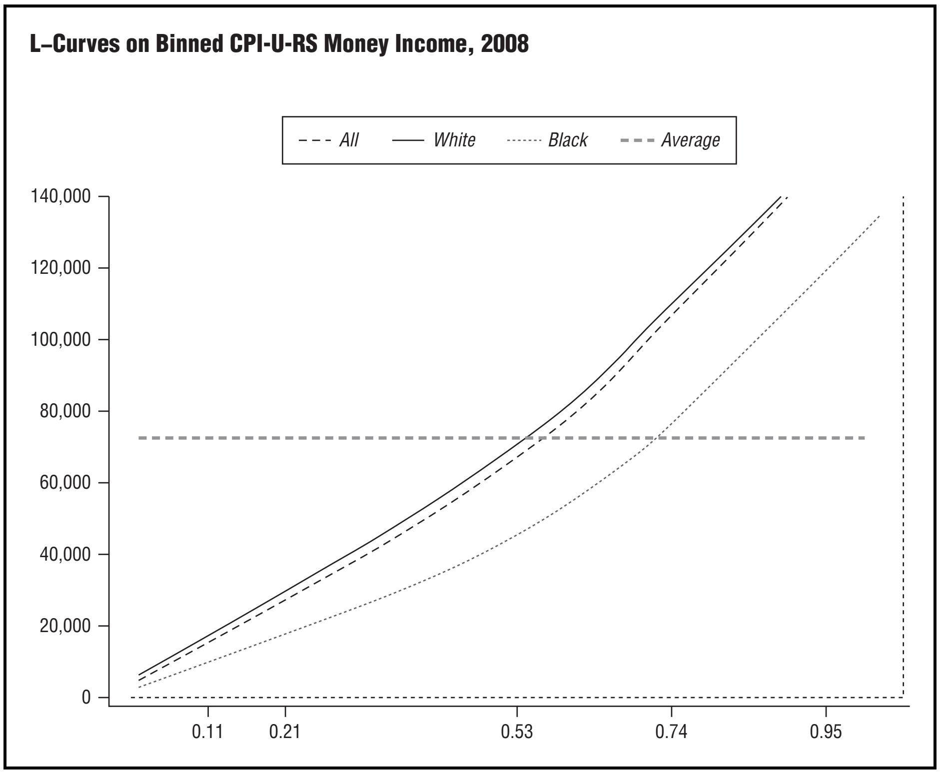

Figure 4. *The horizontal line is the binned mean of the data; the dotted backward L is a singular distribution, where all the income is assigned to one individual. The true L-curves for US money incomes are closer to the dotted line: the US Census Bureau money income data are right-censored—truncated above $100,000. See Burkhauser, Feng, and Jenkins 2009.*

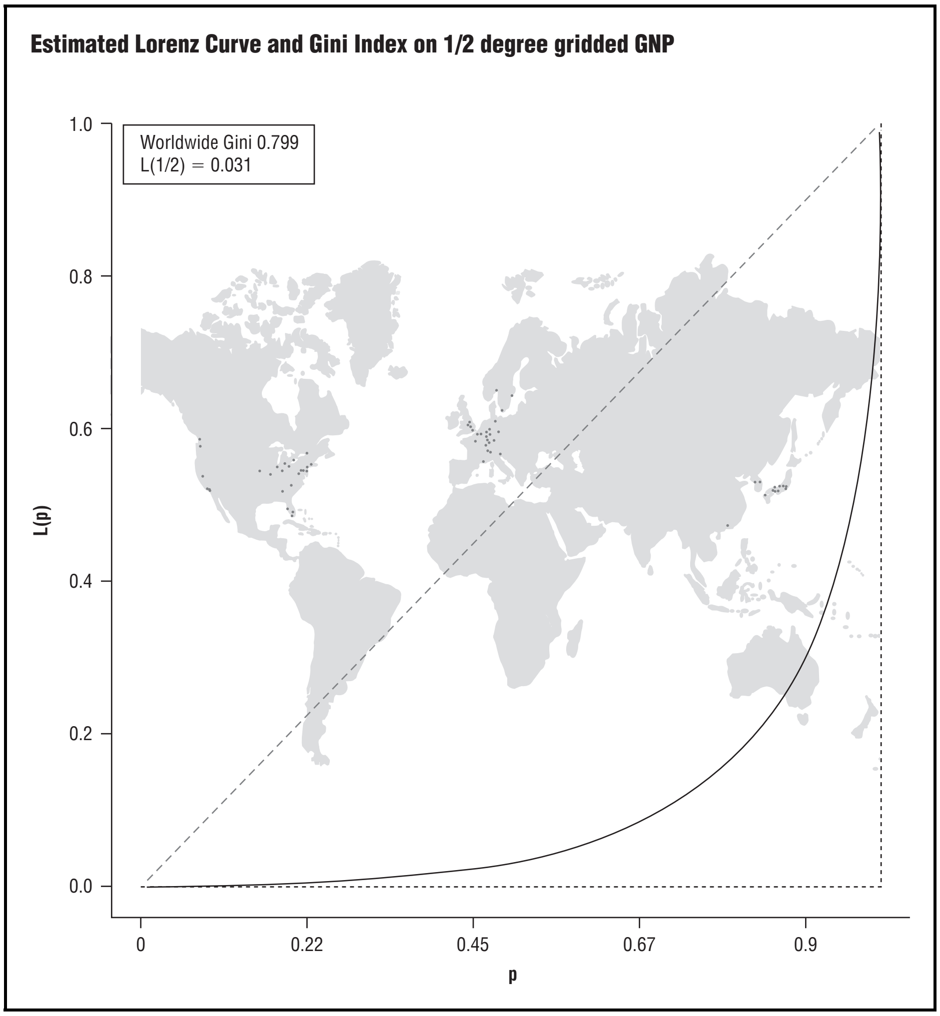

Figure 5. *Estimated Lorenz curve and Gini coefficient on 0.5° gridded GNP (from World Bank hotspots report) superimposed over a heat map of the data. The world distribution of GNP is staggeringly unequal; most of the world is very poor relative to few places of extreme wealth. The diagonal line is the Lorenz curve at equality; the dotted black line is the curve at perfect inequality. The ratio of the area between the green line and unbroken black line and the total area below the green line is the Gini coefficient.* DATA FROM ARNOLD ET AL. 2005.

Theil's index reaches its maximum, $N\ log_b(N)$, on a population where one individual holds all the resources and its minimum on an equal distribution of resources across all persons. Theil's index has also been symmetrized (i.e., rescaled) so that these extrema are just zero and one. See Talih and Borrell (2010) for an illustration of this on dental-health data.

Inequality as a Statistic The equations for the cumulative distribution function and Lorenz curves, (2) and (3), yield point estimates for shares of goods at fractions of the population. Essentially, these are the quantiles and rescaled quantiles of the observed population. The equations for the Gini and Theil indices, 5 and 7, yield *average* estimates of distributional shares. Essentially, these are weighted averages of the amount of the good assigned to each member of the population, over, at most, N observed quantiles.

Typically, N is some relatively small fraction of some population that is not completely observable; the data $\mathbf{x}$ are a sample, and the above equations for the curves and indices are *point estimates* of the true distribution of the population. The fact that (even) these objective measurements of inequality are point or

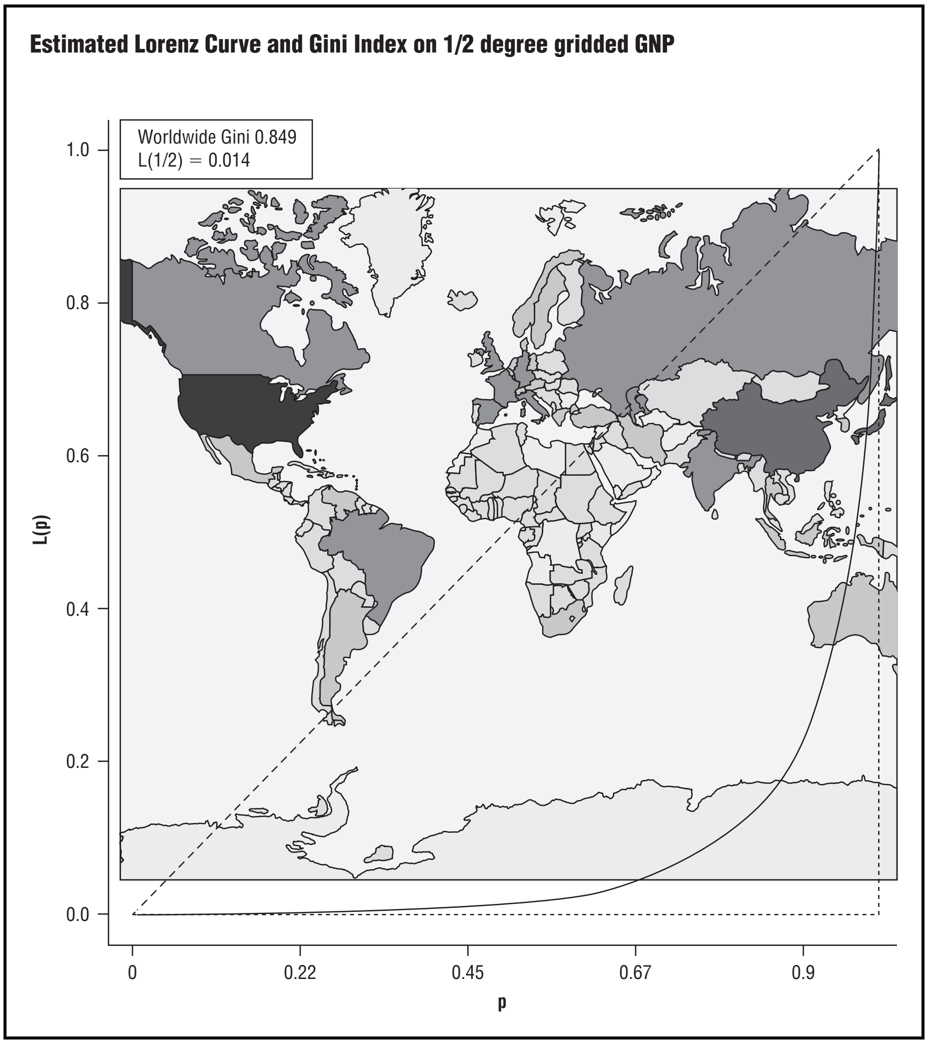

Figure 6. *Estimated Lorenz curve and Gini coefficient on country-level GNP for 2011 superimposed over heat map of country data. Compare with Figure 5. The concentration of income (.849 versus .799) appears greater over aggregation by country, and the fraction of income to the poorer half of the population appears lesser (.014 versus .031). The diagonal line is the Lorenz curve at equality; the dotted black line is the curve at perfect inequality. The ratio of the area between the diagonal line and unbroken black line and the total area below the green line is the Gini coefficient.*
DATA FROM IMF 2011.

functional estimates of a perhaps unobservable population deserves emphasis. It is one thing to define a particular measure and another to know its precision. Each of the above are in a sense merely models—among many—of inequality; the sample data **x** yield estimates of these models with associated measurement and estimation error.

This distinction between observations (e.g., estimators) of inequality and their true values is important in that it sets statistical significance—the assertion of difference or similarity with probabilistic confidence—and suggests or mitigates causality in models between predictors (e.g., gender, sexuality, age, race) and responses (e.g., inequalities in income, wealth, life expectancy, etc.). Aaberge, Bjerve, and Doksum (2005), Biewen and Jenkins (2006), and Martínez-Camblor (2007) consider the sampling distributions of these estimators in the presence and absence of predictor covariates. The role of the log base in the Theil index is explored in Abayomi and Darity (2010).

A direct procedure for practitioners to approach observed values of these measures as statistics is to generate

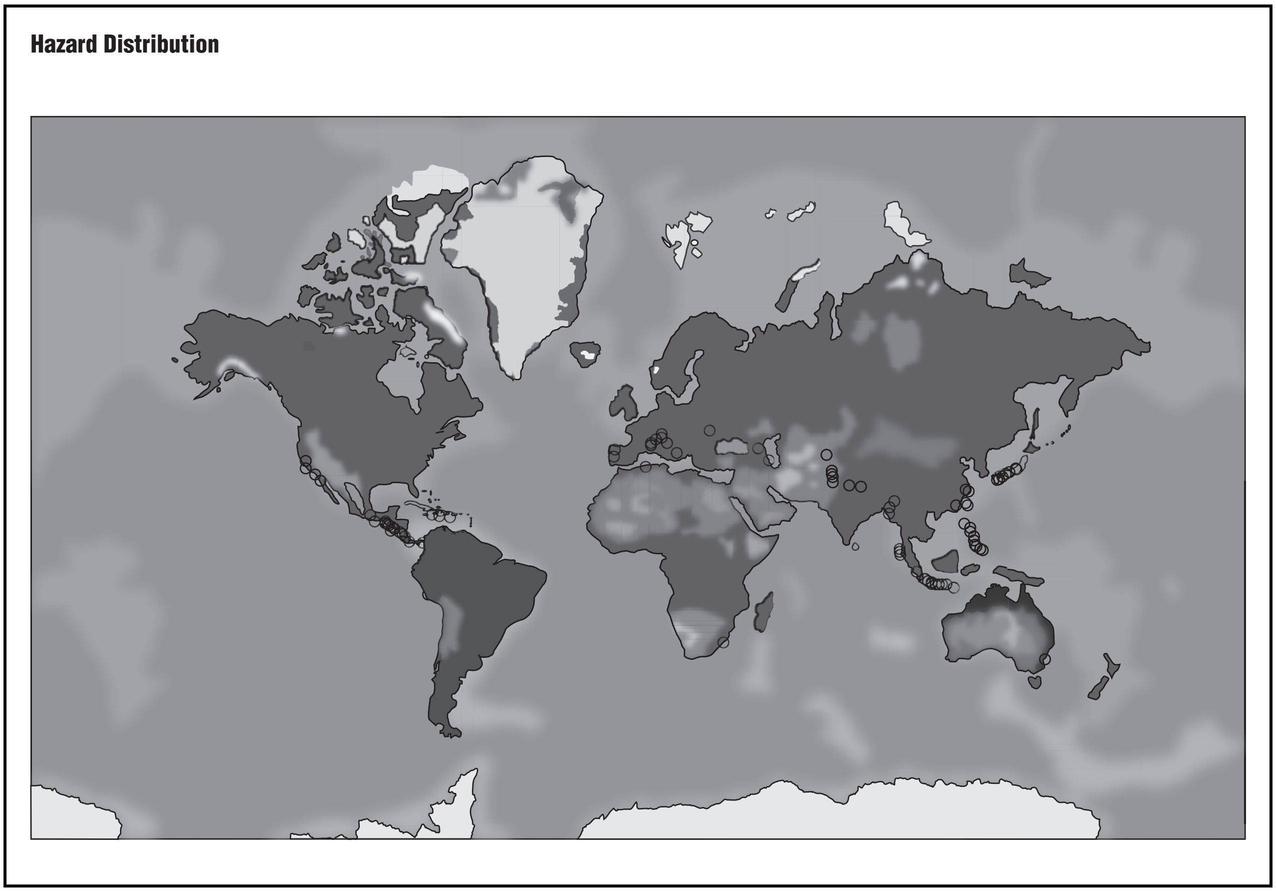

Figure 7. Estimated ninety-ninth percentile of hazard distribution on multivariate data (GDP, population, peak ground acceleration, floods, cyclones, drought, volcanoes, landslides) collected in 2003 or earlier. While there are a few locations identified in the developed world, the majority are in developing or underdeveloped regions, in particular Central and South America, the Caribbean, and Southeast Asia. The western share of Hispaniola (Haiti) is identified as a ninety-ninth-percentile vulnerable location. SEE ABAYOMI, LACER, AND LUPTON 2010.

point estimates and *standard errors*, essentially the expected squared deviation of the observed measurement from its true value, via the *bootstrap algorithm* (Efron 1979). A bootstrap estimator relies on *resampling*: basically subsampling, recalculating, and averaging the estimator over redraws from the observed data. For these measures of inequality, the bootstrap estimation procedure is slightly more involved; remember that the data **x** are observed as a distribution and, as such, violate the ordinary bootstrapping assumption of independence over the sample. Proximate confidence intervals, and equivalent hypothesis tests, for the univariate Theil and Gini indices can usually be computed directly using the asymptotically normal distribution of the bootstrap estimator. Pointwise intervals often can be generated for the distribution function and Lorenz curves (Zandvakili 2002; see Biewen 2002 for applications to inequality measures).

Still, these objective measures of inequality may be less compelling than other graphical or narrative descriptions. The P90/P10 ratio—the ratio of the ninetieth and tenth percentiles of **x**—is an attractive and easy-to-understand measure of distributional inequality. A simple plot of the ordered incomes is an even more compelling descriptor of distributional inequality; the greater the plot looks like a backward L, the more goods are captured by fewer people. Figure 4 plots L-curves of the CPI-U-RS money income for 2008.

In the sense that these objective measurements for inequality are models, they are not models of the cause and effect of inequity, nor do they reveal the way in which inequality is perceived or realized by real people. The Human Development Report Index, the Environmental Sustainability Index, and the Millennium Development Goals are particular attempts to quantify what

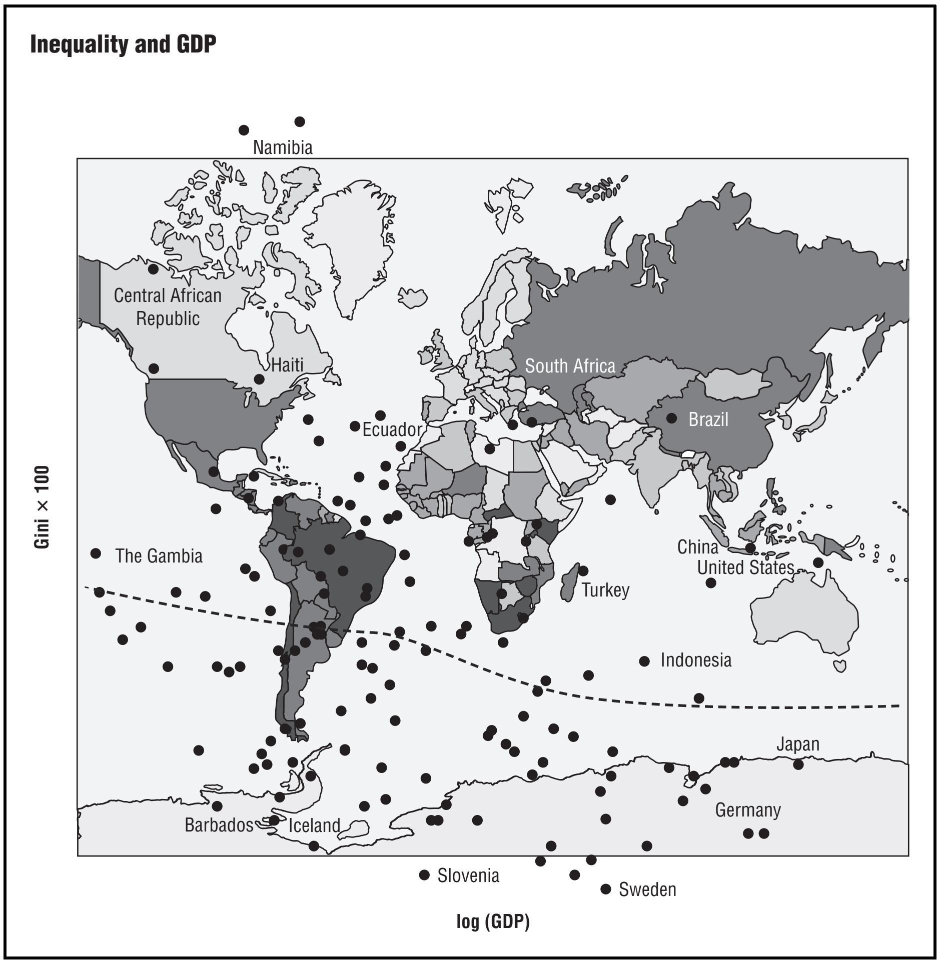

Figure 8. *Gini coefficients by country overlaid with scatterplot of log GDP versus Gini's (x100) with Lowess curve (Cleveland 1979). Higher coefficients—darker shading on the map—mean higher distributional inequality within country. GDP is on log scale; the normal range of GDP distorts the relationship between the Gini and GDP. Overall, the Gini coefficient—that is, distributional inequality—tends to decrease with GDP. On the map, contrast Sweden and Germany with China, Brazil, the United States, and South Africa. Points above the curve are countries with more than average inequality at level of GDP.* SEE UNDP 2010 AND IMF 2011 FOR DATA.

are essentially perceived and realized inequalities in quality of life (see Abayomi, Gelman, and Levy 2008; Abayomi and Pizarro 2010; and UNDP 2010). In addition, as functions of observed data, these objective measure are subject to error, including bias, reproducibility, and especially missing observations. In fact, the beneficiaries of inequality may have an incentive to obscure it (Parenti 2000).

Even statistical models are not purely objective measurements of inequality: they represent particular norms for what constitutes a fairer or more equal society. Typically, this incorporates distributional uniformity or nonuniformity. Models that include causes and effects—predictors and outcomes—are normative (Sen 1997) in the sense that they link a distributional measure to social welfare. Of course, objective measurements of inequality need not be solely focused on money, income, and wealth. Objective distributional inequity can be measured on all manner of data (see Talih and Borrell 2010).

Lastly, these ordinary objective measures of inequality do not distinguish the direction of the departure from uniformity. A distribution with a long right-hand tail—one where only a few members of the population hold most of the good—may yield the same estimate of inequality as another with a long left-hand tail. However, the normative assessment of inequality is quite different for these two distributions.

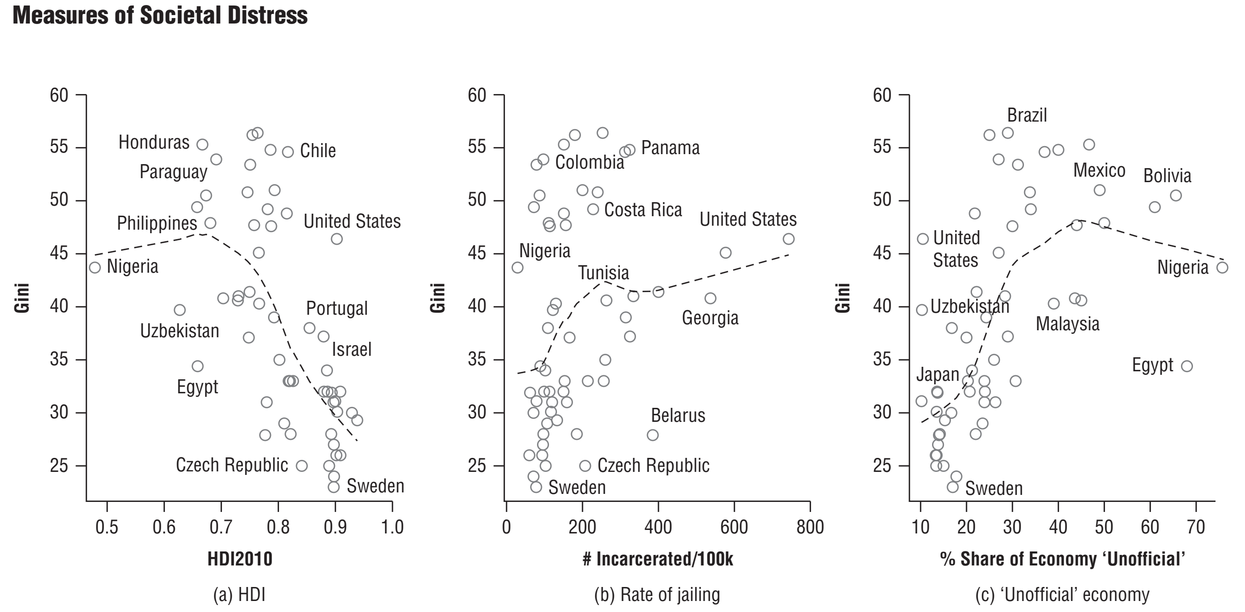

Figure 9. *Plots of the Human Development Index (HDI), number of incarcerated per 100,000, and percent share of economy due to "unofficial" activity versus Gini coefficient.* DATA FROM UNDP 2010, ICPS 2011, AND FRIEDMAN ET AL. 2000, IN ORDER.

INEQUALITY ACROSS COUNTRIES

Evaluation of cross-country inequality should include consideration of the relatively recent, and inconstant, nature of administrative boundaries in comparison to the persistently, and more or less stationary, unequal flow of resources and labor from the nations of the South and East to those of the North and West. There has been theoretical and empirical study of this historical and ongoing inequality between the North and South. The tableau has become more varied recently, as some nations of the South have experienced gains in wealth, and others in the North have begun what may be a prolonged descent. Some of this may be interpreted by the most elementary market theories; perhaps more can be explained by how "trade" is realized among the developed, developing, and underdeveloped worlds (see Rodney 1973 for seminal work on the European and African exchange, and Chichilnisky 1986 for a theoretical take on this behavior). Although there are strong historical antecedents for present-day international inequality, it is generally regarded as fact that the state of cross-country economics fosters ongoing inequity in income, wealth, and resources (see Hudson 2009 for a comprehensive history of the role of international economics in inequality, and James 1989 [1938] for an account of the San Domingo revolution and its predicate for modern Haiti).

The state of international inequality is undeniably striking. Using no other distinction than location above or below the equator, the nations of the North have an average gross domestic product (GDP) 270 percent greater than that in the South (IMF 2011). International inequality at individual levels is perhaps even more severe. In Figures 5 and 6, the Gini concentration coefficients are calculated over regions aggregated by geographical and administrative boundary—the Gini coefficient, when calculated over countries versus area, is 6 percent greater. Similarly, and tellingly, the P90/P10 ratio—the ratio of incomes at the ninetieth and tenth percentiles—calculated across countries is nearly twice as large as when calculated across gridded areas (the P90/P10 ratio over area is 115.1; when calculated over country, the ratio is 209.6) (IMF 2011).

This imbalance has been called an economic gradient toward the comparatively industrially productive and resource-poor nations of the North from the resource-rich but underdeveloped countries of the South. Alternatively, it could be characterized as the worldwide tendency for the international distribution of goods to move away from peoples of color. (Normative economic arguments against the propriety of this imbalance are made elsewhere; see, in particular, Rawls 1971 for the Rawlsian model for social welfare.) The inequalities measured here via coefficients for concentration are proxies for real and miserable human suffering (see Bauman 2002 and Stiglitz 2002 for accounts of institutional and personal actors). Prospectively, these gross levels of

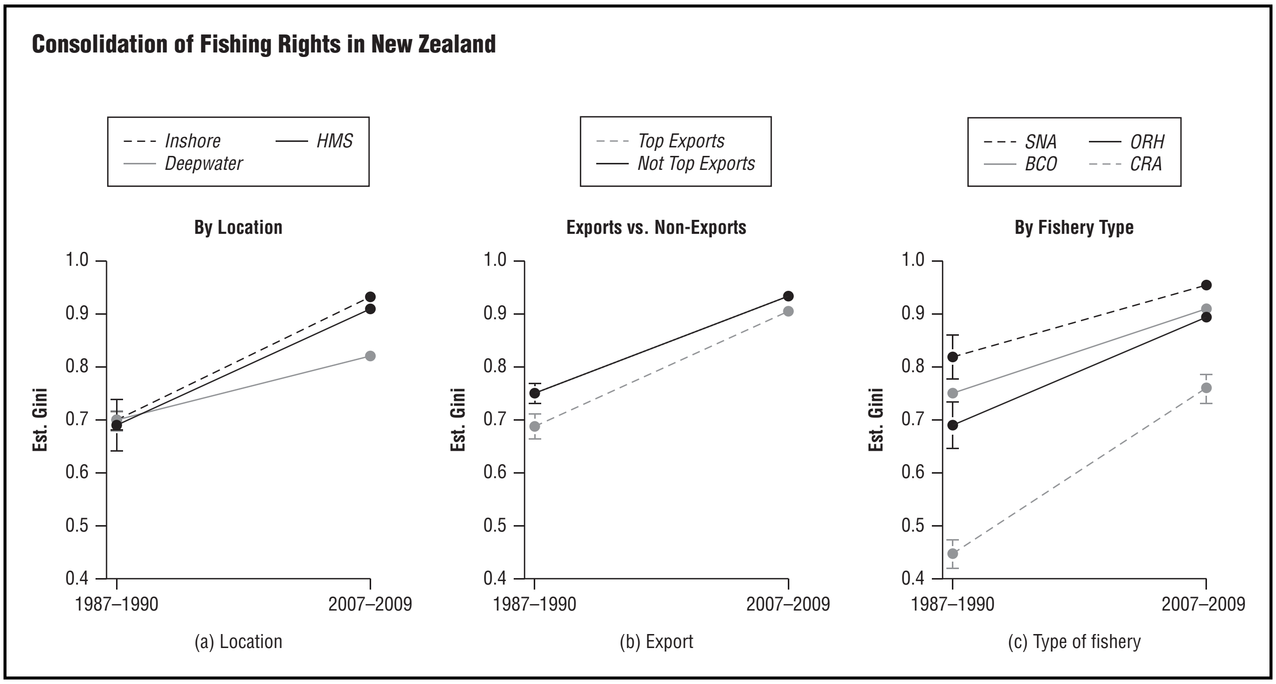

Figure 10. *Plots of change in Gini concentrations of New Zealand fishery quota shares from 1987 to 2009. Shares are stratified by: location of fishery; fish for export or internal consumption; and type of fish harvested. The New Zealand Individual Tradable Quota (ITQ) system is designed to manage an apportion of a limited resource for an economy heavily reliant of fish harvesting. Nevertheless, there is strong, statistically significant evidence of extreme and increasing consolidation (Yandle and Abayomi 2011).* YANDLE AND ABAYOMI 2011.

international inequality are more than disconcerting, they are dangerous (see Sachs 2008). Cross-national inequality in resources, income, and wealth generate vulnerability via reduced capacity to mitigate health and economic disasters. Figure 7 is a prospective illustration of locations that may be particularly vulnerable to future hazards.

The observed difference in inequality when GDP is collected over country boundaries versus over gridded locations—these are the maps in Figures 5 and 6—reflects the gulf in living standards among countries, in particular between the developed and developing world, and suggests that across-country inequality remains strong even in the presence of within-country inequalities. Inequality is realized transversely as well as lengthwise; across-country inequality means that equivalent quintiles are unequal in magnitude. The mean per capita GDP of nations in the North is 340 percent that of nations in the South; the median per capita is 180 percent greater. This means that the "middle" income in the South is just half that of a person in the North. The story here is that human lives are often miserably different depending upon country of residence (see, e.g., UNDP 2010 for country-by-country estimates of life and educational quality vis-à-vis GDP). Whether or not the covariates of inequality are causal or secondary, cross-country inequalities are associated with very different within-country experiences.

INEQUALITY WITHIN COUNTRIES

Figure 8 illustrates Gini coefficients at the country level with the relationship between observed Gini and observed GDP. A comparison of Figure 6 and Figure 8 indicates that many countries at relatively high income levels have high levels of within-country inequality. For example, Brazil, China, and the United States have relatively high GDPs and relatively high inequality. In contrast, Japan, Germany, and Sweden have relatively high GDPs and lower levels of within-country income inequality. This suggests that the relationship between inequality and countrywide wealth is not straightforward: GDP alone cannot explain the within-country differences in income distribution.

Within-country inequality is associated with societal distress, or more poetically, a "melancholy of the soul" (see Kristof 2011 for a good summary of the depressed social cohesion that inequality generates). These melancholies can be quantified: in general, more unequal societies have higher rates of incarceration and graft and relatively lower scores on human development. Figures 9a, 9b, and 9c are plots of the Human Development Index (HDI), indicating incarceration rate and percent share of economy devoted to "unofficial" country versus the countrywide Gini coefficient. Panel 9a shows that Chile, in particular, and the United States have relatively high levels of inequality at relatively high HDI scores. Panel 9b shows

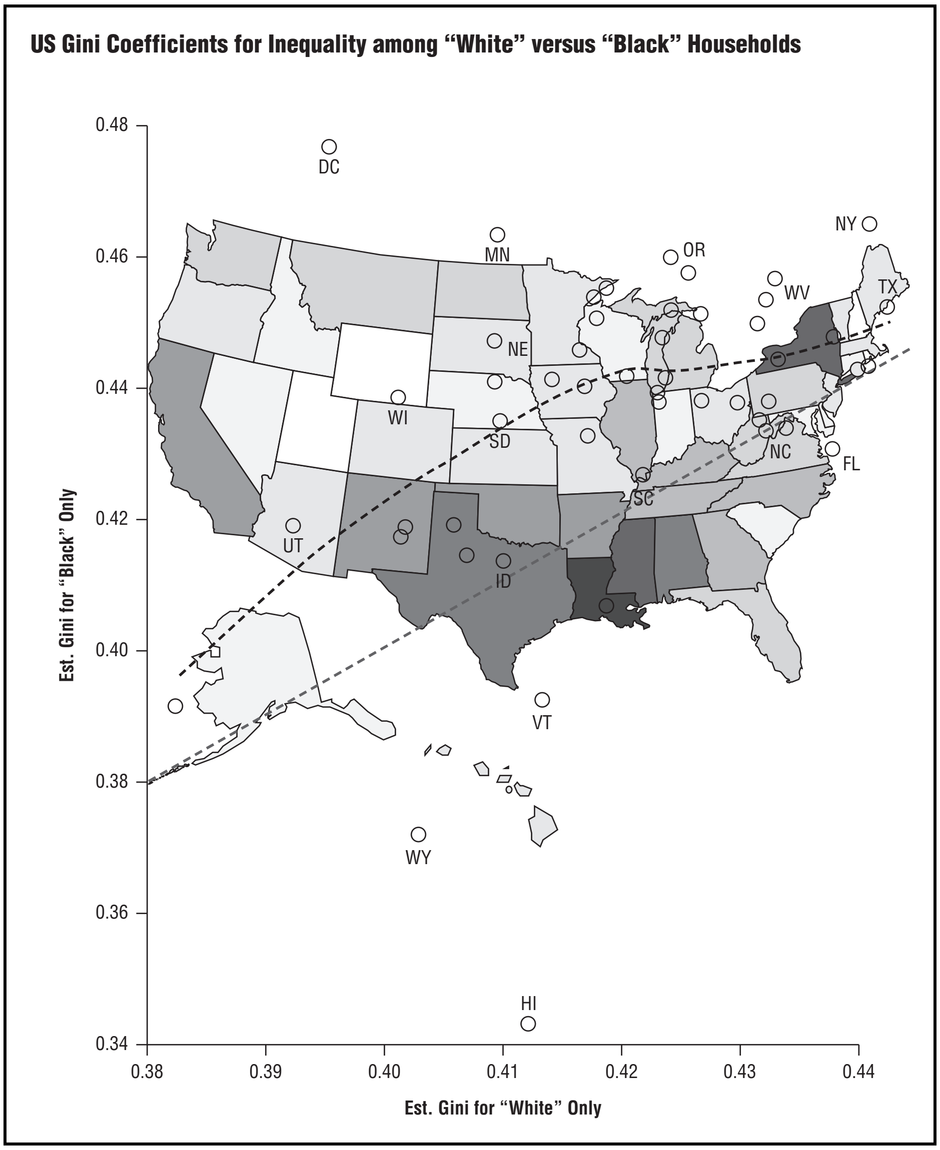

Figure 11. *Heat map of US state-by-state Gini coefficients with "white" only versus "black" only state-by-state estimates overlaid. State-level measurements of US inequality appear relatively moderate, yet with notable variation across states and under stratification by racial identification. The dashed black line is the lowess smoothed curve; the dotted grey line is 45° from origin. States above the dotted grey line have greater Gini coefficients for blacks versus whites. Generally, there appears to be a positive association between white- and black-inequality Gini coefficients. Black inequality is generally higher than white inequality. Of note: Hawaii has very few black residents and a relatively low Gini coefficient for within-black inequality; Washington, DC, is a special case, in that it has the highest within-black inequality coupled with the third-lowest white Gini coefficient.*
DATA FROM THE US CENSUS BUREAU AND US BUREAU OF LABOR STATISTICS 2011.

that the United States has an incarceration rate almost 130 percent as large as its closest competitor. Rwanda is second, with Russia a close third (ICPS 2011). These data are generated from official government statistics. Other sources, notably the Pew Center (2008), find estimates of the US incarceration rate more than 20 percent higher.

Inequality may not be a concomitant of economic development, but an argument for the contrapositive—that economic development is a predictor of greater equality—may be specious as well (see Kuznets 1955). Any general statement about the relationship between economic inequality and economic development must be conditioned

Gini Coefficients by State for Four Indicators

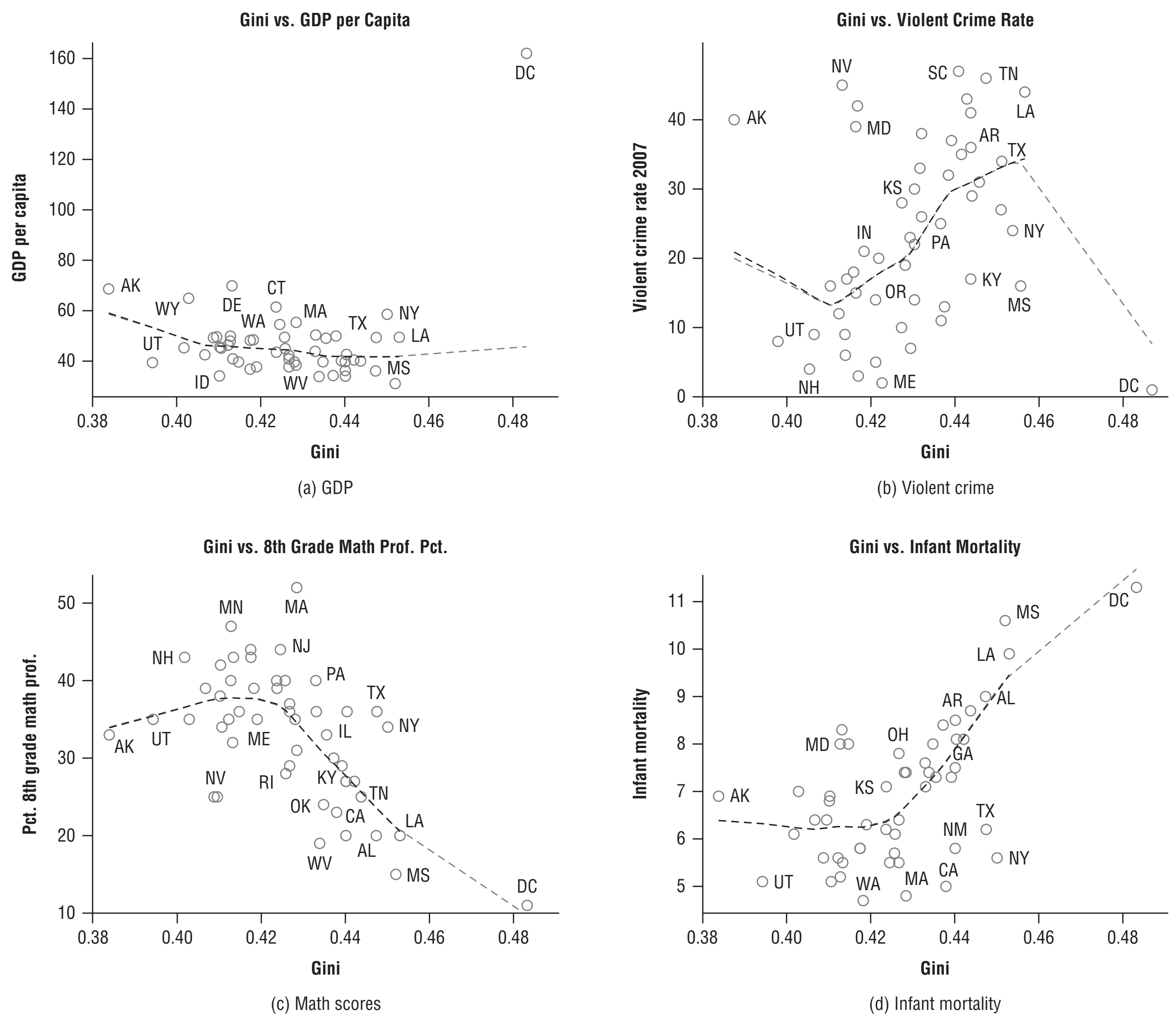

Figure 12. *Plots of Gini coefficients by state versus: GDP, 2007 violent crime rate, percentage of eighth graders scoring proficient in mathematics, and infant mortality.*

on the local scenery: some countries have enjoyed decreasing inequality with economic growth, while other countries have remained persistently or even increasingly unequal, as their economies have boomed. For instance, Figure 10 illustrates how the aggressive consolidation in fishing rights in New Zealand from 1987 to 2009 contributed to greater inequality, even though New Zealand enjoys a relatively well-educated, literate population, and positive growth rates.

Essentially, inequality within a country is inequality within a society. This often requires a narrative and ideological justification separate from the global schema. It is one thing to be aware of privation elsewhere; it is another to have a suffering neighbor. Prima facie, intrasocietal economic inequality is a proxy for unequal possession of capital: cultural, physical, and financial. Income and wealth concentration are corollaries for power consolidation. As people perceive inequality, they encounter their relative powerlessness, whether or not it is acknowledged officially. Societies with higher inequality have poorer social measures; inequality is antisocial (see Pickett and Wilkinson 2009 for an empirical and usefully anecdotal expansion of the relationship between equality and society).

AMERICAN INEQUALITY, RACIAL INEQUALITY: EXCEPTIONAL INEQUALITY?

When compared with the most unequal nations, many of which are in the underdeveloped world, inequality in the United States appears relatively moderate. Figures 1, 2, and 4 are plots of the empirical distribution function, Lorenz curves, and L-curves on estimated US data for 2008. These estimates suggest that contemporary levels of income inequality in the United States are moderate. Most studies of US inequality yield estimates between .3 and .5 (the maximum is 1). However, estimates on data that are binned, as well as right-censored, are probably much too low (Burkhauser, Feng, and Jenkins 2009). Over time, and especially since the early 1990s, US inequality has dramatically increased to levels reminiscent of the late 1920s (Jones and Weinberg 2000; Abayomi 2011). In 2006, for example, the average income at the ninety-ninth percentile and above was 976 times greater than the average for the remainder of the population.

There are multiple causes, or at least covariates of, widening American income and wealth inequality,

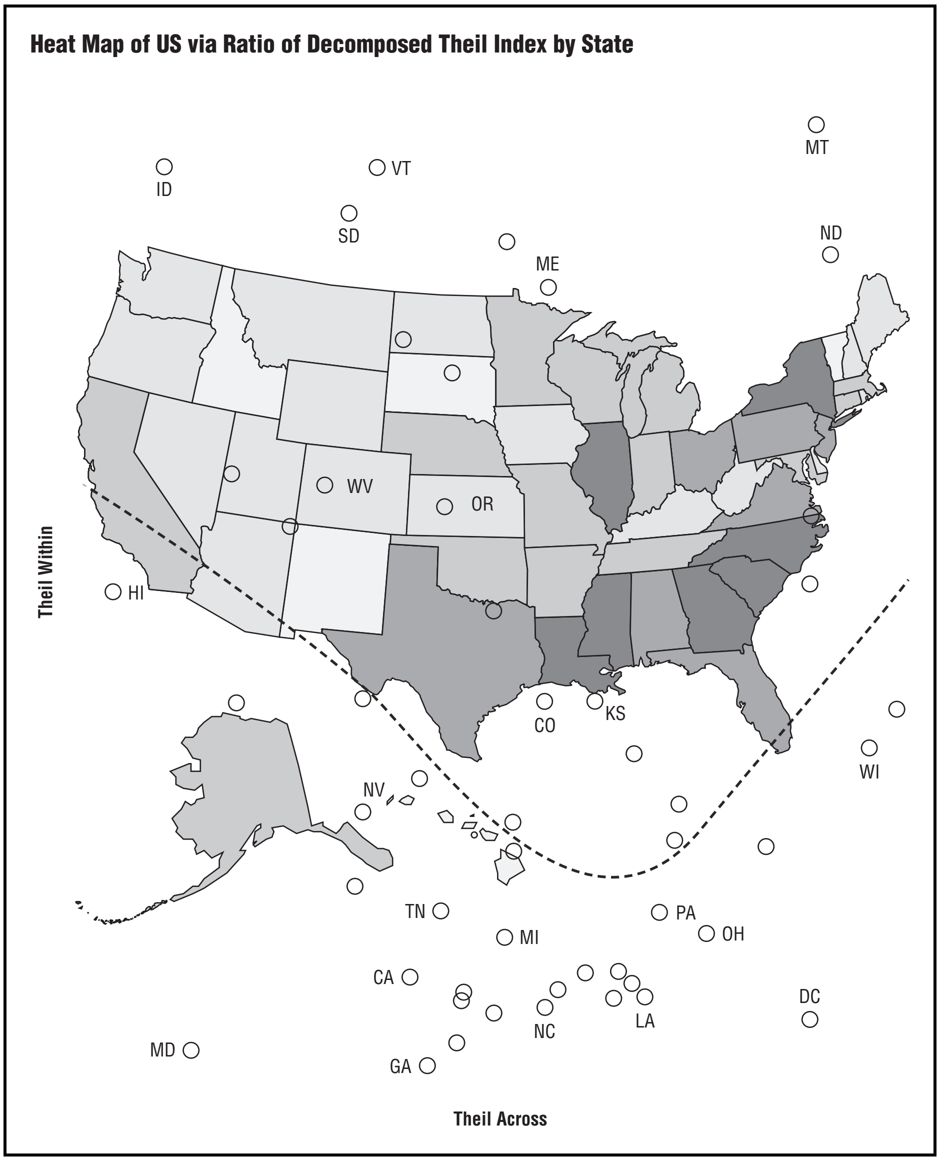

Figure 13. *Heat map of United States via ratio of decomposed Theil index (Equation [7]), state by state. Darker states have higher levels of across "black" and "white" inequality at commensurate levels of within-race income inequality. The scatterplot is overlaid with a Lowess curve (see Cleveland 1979).* DATA FROM THE US CENSUS BUREAU AND US BUREAU OF LABOR STATISTICS 2011.

including an increasingly regressive tax policy, declining American educational quality at even the best institutions, and the postindustrial financialization of the US economy (see, e.g., Lewin 2010; Quinn 2010). Much of the contemporary increase in economic misery, as measured by recent increases in measured income and wealth inequality, can be attributed to the Great Recession of 2007 to 2009. Research in the twenty-first century does suggest, though, that the United States is becoming persistently and uniquely unequal among the developed world. For example, US unemployment increased 4.5 percent over the 2007–2009 period, nearly twice as big an increase as the next largest among the developed nations, the United Kingdom (Chen et al. 2011).

The ''exceptional'' nature of American inequality is not without its accompaniments: in particular, the United States has the highest rate of incarceration of any country and one of the highest rates of violent criminal activity in the developed world (see ICPS 2011; Pew Center 2008). The United States also places in the bottom quintile of wealthy countries in many measures of rule of law. The *World Justice Project Rule of Law Index 2011* scores the United States particularly poorly in absence of corruption, fundamental rights, and access to civil and criminal justice, and the American justice system is notably inaccessible to the poor (Agrast, Botero, and Ponce 2011). The number of persons in US jails and prisons is particularly striking: an estimated one out every one hundred persons is behind bars. The observed probability of being in America and in jail is the world's highest (Pew Center 2008).

The character and magnitude of these maladies tends to vary across the American states, in some cases, with an apparent association to income inequality. Figure 12 plots estimated Gini coefficients by state versus violent crime rate, math proficiency scores for eighth graders, and infant mortality rates. Crime and infant mortality rates within a state appear to increase with the Gini coefficient, while math proficiency scores tend to decrease. Although GDP appears to have little relationship with the Gini inequality measurement, the District of Columbia is an interesting outlier. Washington, DC, scores lowest on math proficiency and highest on infant mortality, but has the largest GDP to Gini ratio (US Census Bureau 2011).

US economic inequality is even more striking when stratified by racial group. (The malleability and utility of racial classification is discussed elsewhere.) In this entry, for illustrative simplicity, ''black'' (only) and ''white'' (only) are as identified in survey data from the US Census Bureau's *2011 Statistical Abstract* and the Current Population Survey. Black versus white inequality, expressly, measured via differences in income and wealth, is enormous. It has been estimated that 85 percent of black and Latino households have a net worth less than the median of white households; the median net worth of black households is less than a tenth of white households. In terms of Lorenz, at the median, the black and Latino curve is 70 percent further from equality (Hamilton and Darity 2010). Further, income inequality among blacks appears even greater than income inequality among whites only. Figure 11 plots Gini coefficients for inequality for white versus black households by state: most states have *higher* income stratification among blacks than among whites.

These inequities can be measured in very real outcomes: black men and women are overproportionally arrested, convicted, and sentenced; black men are particularly overrepresented in low-wage jobs and underrepresented in high-wage jobs; black professionals are discriminated against before and after hiring at all levels of employment; and most directly, African Americans are more likely to die younger, sooner, and from disease (see CDC and NCHS 2010; Austin, Hamilton, and Darity 2011; West and Sabol 2009; Abayomi and Hawkins 2010; Sue 2010).

In general, black Americans appear to be more economically unequal, within racial grouping, than whites. The income distribution for blacks only, seen in Figures 2 and 3, is closer toward singularity than the distribution for whites only. Greater within-group inequality exists at the same time that relative inequality between black and whites remains high. The distribution of black incomes is more stratified, though, at lower levels of income than for whites. The right-tailed-ness of both distributions is apparent in Figure 4. The plot of the ECDF (Figure 2) illustrates depressed incomes from white to black: the fraction of the black population is higher at lower incomes than for whites.

Figure 13 illustrates the association of within-group versus across-group inequality for black and white Americans. It may be imprudent to infer an overall functional relationship between within-racial-group and across-racial-group inequality. Nevertheless, the geographic distribution of inequalities is interesting. Using the across-group to within-group decomposition of the Theil index (equation 7 above), Figure 13 suggests that the southern states—in conjunction with New York, Illinois, and California—have the greatest ratios of across- to within-racial-group inequality. This can be interpreted as relatively large differences between the incomes of whites versus blacks at commensurate levels of income concentration within these groups separately.

Finally, though the focus here on black versus white inequalities is not the only narrative on American inequality, it is perhaps the dominant one. Income and wealth differences between groups identified as wholly white or wholly black tend to be the largest. In addition, intraracial differences among people who are or who identify as black are persistent and measurable on things as meaningful as prison time received as an increasing function of pigmentation. Indeed, the dominance of income cleavage between black and white Americans is consonant with research that suggests a strong preference for white self-identification when possible (see Darity, Dietrich, and Hamilton 2005). Jill Viglione, Lance Hannon, and Robert DeFina (2011) find significant association between length of prison time and lack of highly pigmented skin, even when looking at black women alone.

RESOLVING INEQUALITY: A MORE OR LESS UNEQUAL FUTURE?

Describing inequality as a measurement yields insight that should be regarded. Measurements of inequality are essentially calculations on a simplex, or a constrained surface, defined by the number of people in a population. In the most straightforward way—that is, with Gini's concentration coefficient—we can regard a measured inequality as a function that takes individuals (and their incomes or wealths, say) as an argument and generates a number: zero for a completely equal distribution, and one for a completely singular one. Under a hypothesis that people are "identically distributed"—in the sense of having an equivalent probability of income or wealth assigned to them in a population—the measurements of nonzero inequality are evidence of an unequal alternative. In the context of the empirical distribution function, the ECDF is essentially a listing of people with their associated quintile. The way in which this list is ordered, beyond any randomness, is consonant with the level of inequality. If all people in the population are identically distributed, then the assignment of a dollar quintile would be arbitrary; when ranking people in order of how many dollars they receive or have, any listing should be as good as another. In another way, the probability distribution of incomes should be completely and unconditionally exchangeable over selections of racial grouping, nationality, gender, and so forth.

Measurements of inequality—across the globe, across countries, across racial groupings—contravene a belief in "observable exchangeability." Differences in income and wealth are strong across all sorts of stratifications: Northern versus Southern hemispheres, Western versus Eastern countries, southern versus northern American states, black Americans versus white Americans. These inequalities can be measured immediately as income and wealth deprivation, or indirectly as, for example, vulnerability to environmental hazards, propensity for incarceration and crime, substandard education, or increased mortality.

Prognostics for the future of inequality are not especially auspicious. Even as some nations (or rather, groups of people within some nations) have made progress in closing gaps in inputs and outcomes, others have begun a troubling descent away from greater equality. Sandeep C. Kulkarni and colleagues (2011), for example, document strong differences in life expectancy across race and, relative to other nations, a drop in life expectancy for US men and women over the 2000–2007 period. The changes in the Human Development Index (HDI) are also documented in Abayomi and Pizarro (2010) and UNDP (2010). In a perverse way, the future may be more equally unequal, as overall levels of inequality fall across, but increase within, some groupings (see Abayomi and Darity 2010).

Dependency within a population (or between populations) is the indispensable kernel of numerical (i.e., measured) and social psychological (i.e., perceived and felt) inequality. Measurement of inequality can be viewed as a way of codifying this interdependence. Inequalities and variations in inequalities illustrate how unequal outcomes can be predicted from individual demographic differences. Also, the measuring of inequality is the intellectual imposition of dependency: inequality measurements are measures on distributions characterized by their dependency (see Abayomi, Luo, and Thomas 2010).

A lack of inequality across groups is a conditionally uniform distribution of resources, incomes, wealth, or sufferings, hazards, or maladies. Positioning inequality across categorical classifications as a question of strong conditional dependence on qualifiers pushes toward a more ethical perspective. There is a duality between justice, then, and equality. Geographical or phenotypical independence in resources—for example, justice—is equivalent, in the sense of measurement, to zero inequality.

SEE ALSO *Discrimination, Measurement of; Model Minorities; Racial Hierarchy; Racism: Overview; Stereotype; Stigma.*

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INEQUALITY: BRAZIL

The study of inequality in Brazil raises important issues for the discussion of prejudice, discrimination, and racism. Until the 1970s, Brazil's representation as a "racial democracy" went by and large unchallenged. The country was portrayed as a remarkable example of a nation in which prejudice and discrimination had no place. This was possible due to certain peculiar traits, such as a high level of racial mixing, the absence of legal obstacles precluding the social ascension of blacks, and the complexity of the country's racial classification system, all of