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THE TREND IN BETWEEN-NATION INCOME INEQUALITY

Glenn Firebaugh
Department of Sociology, Pennsylvania State University, 211 Oswald Tower, University Park, Pennsylvania 16803; e-mail: firebaug@pop.psu.edu

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■ **Abstract** About seventy percent of the world's total income inequality is between-nation inequality as opposed to within-nation inequality. Between-nation inequality is the bigger component because average incomes in the richest nations are roughly 30 times greater than average incomes in the poorest nations. This highly uneven distribution of income across nations likely reflects the long-run divergence of national incomes over the course of the Industrial Revolution. Empirical investigations suggest, however, that between-nation income inequality has stabilized in recent decades. Because between-nation inequality has stabilized, the direction of the current trend in total world income inequality depends on the direction of the change in income inequality in the average nation.

THE BIG PICTURE: Incomes and Income Inequality Since 1800

To place the current trend in between-nation income inequality in historical context, the chapter begins with an overview of the twin income legacies of the Industrial Revolution: the increase in national incomes and the increase in income disparity between nations. The chapter then describes two conflicting narratives—a convergence story and a polarization story—that are both commonplace in the social science literature. Although cross-nation polarization apparently has been the order of the day over the past two centuries, recent empirical investigations observe a leveling-off of the trend in between-nation income inequality. The chapter reviews that evidence and then concludes with suggestions for strategic research to further understanding of how the world's income is distributed both across and within nations.

Rise in National Incomes

At the dawn of the Industrial Revolution, Thomas Malthus (1798) and other classical economists feared that humans might be doomed to near-subsistence levels

of living. The fear was based on a population-trap model positing that economic growth is unlikely to outpace population growth over the long run. In this model, economic gains are short-lived as the geometric growth of population inevitably catches up with linear economic gains. Unless there are preventive checks on population growth, then, income *per capita* will inevitably return to a low equilibrium level. A new round of economic expansion will upset that equilibrium in the short run, but in the long run income per capita will track back down to its pre-expansion level. In other words, economic growth will serve to increase the size of the human population, but it will not boost living standards over the long run.

The pace of population growth and economic growth over the last two centuries has proven the classical economists right about the expansion of the human population but wrong about the population trap. The productivity gains of the Industrial Revolution were accompanied by an era of unprecedented population growth. In 1820 the world's population was about 1.1 billion (Maddison 1995, Table 1-1a). Today the world's population is over six billion.

Has the quintupling of the world's population resulted in the stagnation of *per capita* incomes? No. Economic growth outpaced population growth over the period, so per capita incomes increased. The increase was substantial. According to recent estimates, per capita income for the world as a whole increased eight-fold over the past 170 years, from about $650 per capita in 1820 to about $5150 in 1992, in constant dollars (Maddison 1995, Table 1-1a). During a period of unprecedented population growth, then, the world's total income shot up even more rapidly.

With respect to the trend in the world's per capita income, the news has been encouraging over the past two centuries. Despite an unprecedented increase in the world's population over the period, the world's annual income stands at very roughly $5000 per person.

Although the rise in world incomes does not appear to be accompanied by rising human happiness or contentment (Easterlin 1998), at the least it can be said that at this juncture in history there is greater *potential* than there was in earlier eras for meeting the essential human needs for food, shelter, clothing, and medical attention. The central economic issue for our era is not whether there is enough to go around—there is more to go around now than ever before—but how evenly the world's income is distributed. The news in that regard is less heartening.

Rise in the Income Disparity Between Nations During the Industrial Revolution

The Industrial Revolution produced a sharp increase in the income disparity between the richest and poorest regions of the world. In 1820 per capita income in Western Europe (the world's richest region at the time) was roughly three times greater than per capita income in Africa. Today per capita income is almost 14 times greater in Western Europe than it is in Africa (Maddison 1995, Table 1-2). The gap is even larger for individual nations. Average incomes in the richest and the poorest nations now differ by a factor of about 30 (Summers, Heston, Aten

and Nuxoll 1994). Apparently, then, *national* incomes have diverged over the long run, from the early nineteenth century through much of the twentieth.

So there are two big stories about world income trends over the past two centuries. The first story is that the world's average income has risen substantially, and the second story is that income appears to have become more unevenly distributed across nations. Both stories contradict important theoretical models. The sharp rise in per capita income flies in the face of the population-trap model of classical economics. The rise in income inequality across nations flies in the face of the convergence prediction of some income growth models.

Few dispute these stories. Average incomes have increased and regional and national incomes apparently have diverged over the course of the Industrial Revolution. The more vexing issue is whether the trends are continuing. In particular, has the cross-national divergence in incomes continued in the last half of the twentieth century as industrialization has spread to all regions of the world?

This article focuses on the question of recent cross-national divergence. I begin by describing two rival theses: the convergence thesis of income growth theory in economics and the polarization thesis of world system/dependency theory in sociology. Then I review the key studies that address that issue. Because those studies appear to present a mishmash of contradictory results, I try to make sense of the findings. Weighting by national population is the key. When nations are weighted equally—so small nations such as Luxembourg are given as much weight as large ones such as China—the distribution of income across nations has become more unequal in recent decades. But when nations are weighted by population size, the distribution of income across nations has remained relatively stable in recent decades. I argue that the latter fact is the one of more relevance to sociologists because change in the level of inequality for the world overall is a function of change in *population-weighted* between-nation inequality (plus change in population-weighted within-nation income inequality). I conclude by discussing the implications of these results for convergence, dependency, and population theories of national income growth.

CONVERGENCE THEORY VERSUS POLARIZATION THEORY*

Convergence Theory in Economics

The issue of whether national economies tend to converge or diverge over time has been a central concern in economics over the past decade. Economists are keenly interested in the convergence issue because of recent debates over the nature of economic growth. One popular view, often associated with neoclassical growth theory (Solow 1956), is that national economies tend to converge because of the

*Here and in a few other places in this chapter I draw on material from Firebaugh (1999).

principle of diminishing returns to capital and labor. As rich industrial nations experience diminishing returns, poorer nations (who are farther from the point of diminishing returns) will tend to catch up as they industrialize. DeLong (1988, p. 1138) summarizes the convergence argument this way in the *American Economic Review*: "Economists have always expected the 'convergence' of national productivity levels. The theoretical logic behind this belief is powerful. The per capita income edge of the West is based on its application of the storehouse of industrial and administrative technology of the Industrial Revolution .... The benefits of tapping this storehouse are great, so nations will strain every nerve to assimilate modern technology and their incomes will converge to those of industrial nations."

The convergence thesis has been challenged by the predictions of endogenous growth theory (Romer 1986, Lucas 1988). Endogenous growth theory argues that in today's world the principle of diminishing returns can be overcome by specialized inputs made possible by research. Thus, there is no inherent tendency toward long-run income convergence across nations. Because of their research advantages, it is possible for richer nations to maintain long-run rates of income growth that exceed those of poorer nations, implying cross-national divergence, not convergence.

By questioning some key elements of neoclassical growth theory, endogenous growth theory has reopened the debate about convergence and prompted a new generation of cross-nation growth studies in economics. However, many of the studies do not weight nations by their population size, so (as I argue below) the findings have limited relevance for sociologists interested in the trend in overall world inequality.

Despite the limited relevance of the findings of many of the endogenous growth studies, endogenous growth theory itself is relevant to sociology because it presents an important alternative explanation for income polarization across nations. If national incomes are diverging, the source of the divergence could be specialized research inputs in the richer nations. That explanation for divergence is quite different from the explanation offered by world system and dependency theories, as I now elaborate.

The Polarization Thesis in Sociology

Sociologists have no theory of between-nation income inequality that matches the level of formalization that one encounters in the economic literature on neoclassical growth theory and endogenous growth theory. Nevertheless, there is a rich empirical literature in sociology on the determinants of national economic growth, and much of this literature argues or assumes that rich nations are enriching themselves at the expense of poorer nations. Indeed, national divergence is a dominant theme in comparative sociology.

Dependency-Induced Divergence The divergence theme in sociology most often is based on a world system or dependency perspective on national development.

The ready acceptance of the divergence thesis by world system theorists is not surprising because world system theory emphasizes the division of the world economy into identifiable economic strata. That said, nothing inherent in a strictly world system perspective would rule out convergence stories because one can imagine conditions under which the strata would converge.

What dependency theory adds are arguments for why the strata tend to diverge. Dependency theory is a theory of world stratification—of why some nations are so rich and others are so poor. Dependency theory rests on the premise that the development of core nations and the underdevelopment of peripheral nations are complementary processes in that core nations enrich themselves *at the expense of poor nations*. In other words, the development of rich core nations and the "underdevelopment" of poor peripheral nations are two aspects of the same process. This state of affairs comes about because core nations differentially benefit from core-periphery economic exchange.

Thus, in dependency theory the law of differential benefits from exchange (Mandel 1975)—not the law of diminishing returns—is the mainspring for trends in intercountry inequality. The law of differential benefits from exchange implies a "growing gap between core and periphery" in the world economy as a whole (Chase-Dunn 1975, p. 720). "A picture of unequal development emerges in which the core becomes progressively more developed while peripheral development is hindered as a result of its relationship to the core" (Peacock et al 1988, p. 839). In effect, then, dependency theory argues that Marx's law of uneven development applies to the world economy as a whole rather than to classes within individual industrial nations (Chase-Dunn 1975).

Population-Induced Divergence Quite apart from differential benefits from exchange, there are other reasons why national incomes might diverge. One reason—noted earlier—is endogenous growth, as richer nations can use their advantages in research and development to offset the effects of diminishing returns to capital and labor. A second possibility is population-induced income divergence. National income is income *per capita*, so change in national income is determined by rate of population growth as well as by rate of economic expansion. Suppose two national economies expand at the same rate—say 6% in a given year. Do their national incomes converge or diverge? The answer depends on their respective population growth rates. The nation with the slower population growth rate will exhibit the more rapid growth in income per capita. So there is divergence if the richer nation has the slower rate of population growth and convergence if the poorer nation has the slower rate of population growth. This line of argument implies income divergence across nations because in recent decades population has tended to grow more rapidly in poorer nations than it has in richer nations.If income *per capita* has grown more slowly in poorer nations in recent decades, that slower growth may be due to the swelling of the young (nonworking) population in poor nations quite apart from any effects of international economic exchange. In analyses of trends in between-nation income inequality, then, it is important to

distinguish this *population-induced* income divergence from *dependency-induced* divergence.

The argument for population-induced income divergence is reminiscent of the view of classical economists such as Malthus (1798), John Stuart Mill (1848), Ricardo (1817), and Smith (1776) that economic growth is a "race between increases in the population and capital stock" (Dorfman 1991, p. 577). If this is true, then at this point in history poor nations—with their more rapid rates of population growth—are inherently disadvantaged. The argument here is that rapid population growth *slows* income growth. This argument is not the population trap argument because I am not suggesting that slower growth means a *negative* growth rate. (The population-trap model requires periods of negative growth rates, as per capita income returns to its pre-expansion level. That is, following periods of economic expansion, per capita income tracks back down to its equilibrium point as population growth outpaces economic expansion—so there is a period of declining average income.)

WITHIN-NATION VERSUS BETWEEN-NATION INEQUALITY

The total income inequality in the world is the sum of within-nation inequality and between-nation inequality. In sociology, the vast majority of cross-national studies of inequality examine within-nation inequality. In a typical study of this sort, regression analysis is used to estimate the effects of various national characteristics (e.g., income level, type of political system) on a nation's level of income inequality (examples include Cutright 1967, Weede & Tiefenbach 1981, Bollen & Jackman 1985, Hoover 1989, Nielsen & Alderson 1997). Such studies have been a staple of social science research at least since the 1960s, when economists and other social scientists began to assemble data to test Kuznets's (1955) inverted-U thesis that a nation's income inequality tends to increase with the onset of industrialization and then decline at more advanced levels of industrialization. In sociology, cross-national research on inequality was especially fashionable during the heyday of world system and dependency theory in the 1970s and 1980s.

While cross-national studies of within-nation inequality are commonplace in sociology, studies of between-nation income inequality are rare. There are three apparent reasons for the neglect of between-nation inequality in favor of within-nation inequality. First, within-nation inequality can be studied with cross-sectional data, whereas the study of between-nation inequality requires longitudinal data. Second, within-nation inequality is more policy-relevant in that national income distribution can be compressed by state policies. There are no international organizations with the muscle to compress the distribution of income across nations. Third, it can be argued that psychic costs of inequality are greater for within-nation inequality, since feelings of relative deprivation derive largely from local comparisons.

Whatever the reasons, the relative neglect of between-nation income inequality is unfortunate since *the majority of the world's total income inequality is between-nation inequality, not within-nation inequality* (Korzeniewicz & Moran 1997). Total income inequality for the world is based on the variance of the world's income distribution: For a given mean income, the greater the variance, the greater the inequality. To measure inequality, one wants an index that is scale-invariant (Allison 1978), that is, an index that gives the same results regardless of the currency used (dollars or pesos or yen or whatever). One way to obtain scale invariance is to divide the standard deviation of the income distribution by the mean. This measure is called the coefficient of variation. A second way to obtain scale invariance is to log the income before taking the variance. This measure is called the variance of the logarithm or VarLog. The coefficient of variation and VarLog are both commonly used as indexes of inequality.

Importantly, because inequality can be measured as scale-invariant variance, inequality can be decomposed into a within-group and a between-group component. Suppose we knew the income of every person (or every household) in the world. Then we could calculate the variance of the income distribution for the whole world *and* we could decompose that total variance into its within-nation and between-nation components using the familiar ANOVA decomposition:

$$\sum_j \sum_i (X_{ij} - \mu)^2/N \equiv \sum_j n_j(\mu_j - \mu)^2/N + \sum_j \sum_i (X_{ij} - \mu_j)^2/N \quad (1)$$

where j indexes nation, i indexes individual, and μ denotes mean. Equation 1 applies to VarLog because VarLog is a variance. But VarLog is also a measure of inequality. It follows that it is possible to separate the within-nation and between-nation components of total world inequality by applying Equation 1 to VarLog. Several other inequality indexes decompose in a similar manner (see Allison 1978).

The important point here is that, with income data for everyone, one could determine how much of the world's total income inequality is due to within-nation inequality, and how much is due to the disparity in incomes across nations. In the absence of complete income data, several studies have tried to estimate the relative magnitudes of the within- and between-nation components (Theil 1979, Ram 1979, Berry et al 1983b, Korzeniewicz & Moran 1997). Although the studies differ in the data they use and the years they examine, they all agree with Berry et al (1983b, p. 217) that "it is clear that the level of world inequality is . . . primarily due to differences in average incomes across countries rather than to intra-country inequality."

Between-nation inequality is the larger component not because within-nation inequality is so small but because between-nation differences are so large. As noted earlier, the divergence of national incomes apparently has been part of the legacy of the Industrial Revolution, so average income in the richest nations and poorest nations now differs by a factor of about 30.

EVIDENCE ON RECENT TRENDS IN BETWEEN-NATION INEQUALITY

Until recent years sociologists have largely ignored the issue of trends in between-nation income inequality. The recent publication of two articles in the *American Journal of Sociology* (Korzeniewicz & Moran 1997, Firebaugh 1999) might signal change in that state of affairs. Both articles argue that the study of between-nation inequality is important to sociologists for two reasons. First, the huge disparity in average incomes across nations is the major component of total income inequality for the world. Second, between-nation inequality is a significant issue for sociologists because of the centrality of the polarization thesis in the world system and dependency literatures on development.

But the articles arrive at different conclusions concerning the recent trend in between-nation income inequality. Korzeniewicz & Moran (1997) conclude that between-nation income inequality continued to rise during the 1960s, 1970s, and 1980s, with an especially sharp rise during the 1980s. Firebaugh (1999) concludes that between-nation inequality was no greater in 1989 than it was in 1960.

Before comparing the two studies to determine why their conclusions differ, it is useful first to review a few earlier studies in economics and political science (most of the key studies are by economists or political scientists). Studies that weight nations by their population reach conclusions that differ from studies that do not weight. I begin with the studies that do not weight nations by their population.

Unweighted Studies

Quantitative cross-national analyses most often are unweighted in sociology. In a typical sociological study, data are collected for a sample of nations, and regression analysis is used to estimate the effects of some set of variables on the dependent variable of interest. In some instances a statistical consideration (e.g. heteroskedastic disturbances) might be invoked as a rationale for weighting nations differently, but for the most part cross-national studies in sociology assume that a nation is a nation, so India and Norway are given equal weight. The implicit logic is that India and Norway represent equally valid realizations of the underlying causal process. Hence in a study of, say, the effects of political stability on a nation's rate of economic growth, one assumes that the experiences of small nations are as telling as the experiences of larger nations (otherwise one would weight them differently). As I explain subsequently, that logic does not hold when one is interested in between-nation inequality as a component of total world inequality.

One of the earliest reliable unweighted studies of cross-national convergence is Jackman's (1982) study of the relative income growth rates of 98 nations from 1960 to 1978. Jackman found an inverted-U pattern for the relationship between initial income and income growth rate—a pattern that was subsequently replicated

in studies using different income measures and longer time periods (Summers & Heston 1991, Table IV; Sheehey 1996). Despite this faster growth in the middle of the distribution, there is *overall* divergence because growth rates tend to be higher for the richest nations than for the poorest nations. Subsequent research has replicated the divergence finding as well (Barro & Martin 1992, Table 3 and Figure 4; Sheehey 1996, Table 2; Jones 1997, Tables 2 and 3).

So when each national economy is given the same weight one finds (for recent decades) an inverted-U pattern in which nations in the upper middle of the distribution tend to exhibit the fastest rates of income growth and those at the lower end of the distribution tend to exhibit the slowest rates of growth. The upshot is that *national economies* are diverging for the world as a whole even though there are convergence "clubs" (for example, there is evidence of income convergence among Western European nations: Abramovitz 1986, Baumol 1986, Jones 1997).

Weighted Studies

The findings about between-nation inequality based on unweighted studies might not apply to weighted between-nation inequality since nations vary so much in population size. Large nations such as China and India greatly affect the weighted measure but have little effect on the unweighted measure, and the reverse is true for small rich nations such as Luxembourg and Norway. So it is important to determine how the two types of studies differ in the sorts of questions they are asking.

The evidence that national economies are diverging (unweighted studies, above) is generally of more interest to economists than it is to sociologists. Sociologists and economists are interested in international convergence/divergence for different reasons. The interest in economics is theoretical, to test theories of macroeconomic growth. Most often for economists, then, each nation represents one unit (one economy) and, in typical analyses, economic trends in Luxembourg count just as much as economic trends in China, even though China has nearly 3000 times more people. By contrast, sociologists generally study between-nation income inequality because of what it can reveal about income inequality for the world as a whole (Korzeniewicz & Moran 1997, Firebaugh 1999). In short, sociologists are interested in whether there is intercountry convergence in the case where *individuals, not nations,* are given equal weight. Thus sociologists are more interested in the results of *population-weighted* studies.

To verify that the contribution of between-nation income inequality to total world income inequality is calculated by weighting nations by their population size, consider Equation 1 (above), the ANOVA formula for within- and between-group variance. Observe that the between-group component, $\sum_j n_j(\mu_j - \mu)^2/N$, is *weighted by group size* (n_j), so group effects in ANOVA are effects based on the *equal weighting of individuals*. The same principle governs the partitioning of world inequality into its between-nation and within-nation components, since inequality is a type of variance.

Despite the fact that it is *weighted* national convergence that bears most directly on total world inequality, most convergence studies are unweighted. ("Convergence studies" refers to research on the issue of whether national incomes are moving together or moving apart, so the term "convergence" as used here is shorthand for both convergence and divergence.) In contrast to the large and growing literature on unweighted convergence, the empirical literature on weighted convergence is rather sparse.

An early study by Berry et al (1983a) remains one of the best of the weighted studies. Based on a large sample of nations containing most of the world's population, Berry et al (1983a) conclude, first, that economic growth in China was the most potent force equalizing world incomes from 1950 to 1977 and, second, that there was no clearcut trend in intercountry income inequality from 1950 to 1977.

Peacock et al (1988, Figs. 1 and 2) replicate the Berry et al finding of relative stability in between-nation income inequality. The Peacock et al study is based on income data for 53 nations from 1950 to 1980. Although they find no evidence of an overall trend, Peacock et al do find evidence for convergence within world system strata and divergence between the strata. These patterns are offsetting, so overall there is stability in between-nation inequality.

In contrast to Berry et al (1983a) and Peacock et al (1988), Ram (1989, Table 1) finds that national incomes diverged from 1960 to 1980. The difference between Ram's findings and the findings of the prior two studies cannot be attributed to differences in the way inequality is measured, since all three studies use the Theil index. The apparent reason is that—unlike the other two studies—Ram's study excludes China. Both Berry et al (1983a) and Firebaugh (1999) stress the importance of China to the recent trend in between-nation income inequality. Between-nation income inequality declines as nations' incomes move toward the world mean and increases as nations' incomes move away from the world mean. Because China's per capita income is well below the world mean, China's faster-than-world-average income growth has reduced between-nation income inequality. Because China contains a large share of the world's population, the effect of China's income growth on (weighted) between-nation income inequality has been notable (Berry et al 1983a, Firebaugh 1999).

Based on income data for 120 nations containing almost all the world's population, Schultz (1998) finds that between-nation income inequality changed very little from 1960 to 1989. This finding holds whether inequality is measured using the Gini coefficient or the Theil index or VarLog (Schultz 1998, Table 1). All three measures *increase* over time, however, when conversion of local currencies to US dollars is based on official exchange rates instead of the actual purchasing power parities (PPPs) of the currencies (Schultz 1998, Table 1).

Firebaugh's (1999) results support Schultz's. Based on 120 nations representing 92% of the world's population, between-nation income inequality was about

the same in 1989 as it was three decades earlier. Comparing 1960 inequality with 1989 inequality, the squared coefficient of variation declined by 1.5%, Gini increased by less than 1%, VarLog increased by 5.5%, and the Theil increased by 1.7% (Firebaugh 1999, Table 4). The trend appears to be relatively flat or even slightly downward since 1970, because all four measures of inequality indicate that between-nation income inequality was slightly lower in 1989 than it was in 1970 (Firebaugh 1999, Table 4).

Recall that Peacock et al (1988) found an offsetting pattern of convergence and divergence. If some regions of the income distribution are converging and other regions are diverging, then one's conclusions about overall inequality might be sensitive to the weight given to different regions of the income distribution. To test that possibility, Firebaugh (1999) used a measure of inequality—Atkinson's (1970) index—that allows researchers to assign different weights to different parts of the income distribution. The change in between-nation inequality was small regardless of the reweighting used (Firebaugh 1999, Table 6).

In sum: When China is included, weighted studies of between-nation income inequality generally find that national incomes (*per capita incomes*) have neither diverged nor converged in recent decades. That conclusion holds regardless of the inequality index used.

There is one notable exception, however. As Schultz (1998) shows, weighted national incomes diverge when income is based on foreign exchange (FX) rates rather than on PPP. The results of Korzeniewicz & Moran (1997) are instructive in this regard. By using an income series that is based on foreign exchange rates, Korzeniewicz & Moran conclude that, from 1965 to 1990, between-nation inequality increased by 12% as measured by the Gini and by 38% as measured by Theil's index (Korzeniewicz & Moran 1997, Table 3). These results resemble those of Schultz, who reports a 12% increase for the Gini and a 47% increase for the Theil from 1965 to 1989 *when national incomes are estimated using official foreign exchange rates* (Schultz 1998, Table 1). However, when incomes are estimated using purchasing power parity, both the Gini and the Theil *decline* slightly over that period (Schultz 1998, Table 1).

Hence Korzeniewicz & Moran's deviant finding is based on their use of exchange rate data. Economists who work closely with national income data warn that "it really makes a difference if exchange rates are used rather than PPPs" (Summers & Heston 1991, p. 355). Although early studies in economics used official exchange rates to convert local currencies to dollars, PPP-based estimation is now the industry standard. It is widely recognized that official exchange rates are badly flawed calibrators of currencies. Many goods and services are not traded on the international market, so exchange rates are based on a restricted bundle of goods and services (Grosh & Nafziger 1986, p. 351). The failure to capture economic activity is especially acute for nonmonetized exchange in nonindustrial nations, so income estimates based on exchange rates tend to miss significant economic activity in poorer nations. In addition, foreign exchange markets are not

totally free but are routinely distorted by government policy and speculative capital movement.[1]

Because of such problems, convergence studies in economics now routinely use PPP-based income series (in addition to the studies summarized above, examples include Barro 1991; Mankiw et al 1992, Levine & Renelt 1992, Quah 1996). For the PPP-based income series, the trend in between-nation income inequality in recent decades has been (i) upward if one weights each nation equally and (ii) flat if one weights nations by their populations.

NEW DIRECTIONS FOR RESEARCH

The Schultz-Firebaugh Finding

Working independently, Schultz (1998) and Firebaugh (1999) found that population-weighted between-nation income inequality has been relatively stable over recent decades. This finding is important, first, because of what it indicates about total world income inequality. Because between-nation income inequality is the major component of total world income inequality, stable between-nation income inequality implies that total world income inequality is not likely to be changing very rapidly.

The Schultz-Firebaugh finding is important, second, because it suggests the following hypothesis: *Population-weighted between-nation income inequality has stabilized in recent decades*. Observe that the hypothesis assumes that between-nation income inequality had not been stable earlier. The premise is that the Industrial Revolution ushered in an epoch of diverging national incomes. This is not to say that national incomes diverged monotonically over the nineteenth and early twentieth centuries—there may well have been periods of divergence followed by periods of compression. But it is to say that between-nation income inequality was greater in the middle of the twentieth century that it had been at the outset of the Industrial Revolution.

Social scientists need to test further the Schultz-Firebaugh hypothesis that between-nation income inequality has stabilized in recent decades. Although Schultz and Firebaugh demonstrate that population-weighted between-nation income inequality changed little over the 1960s, 1970s, and 1980s, their data end in 1989, with the breakup of the USSR. So one does not know if the flat trend they observed has continued into the 1990s.

[1]To appreciate the severity of the problem with using foreign exchange rates to study the convergence issue, consider income estimates for China. The remarkable economic growth of China since 1978 (Nee 1991, Fig. 1; Mastel 1997) is reflected in the PPP income series, where China's income ratio jumps roughly 40% from 1975 to 1989. The foreign-exchange-rate-based World Bank income series used by Korzeniewicz & Moran fails to capture that growth but instead indicates that China's growth rate lagged so far behind the rest of the world that the FX income ratio for China declined by a whopping one-third from 1970 to 1989 (from .139 to .090).

Researchers need to go back in time as well, to determine more precisely the magnitude and timing of the apparent rise in population-weighted between-nation income inequality over the course of the Industrial Revolution. One recent study concludes that "Economic growth was extraordinarily fast from 1820–1992. World population increased five-fold, per capita product eight-fold, world GDP forty-fold . . . . The rise in per capita income differed widely between countries and regions, so intercountry and interregional spreads became very much wider" (Maddison 1995, p. 19). The trends in the income means for regions and nations in the Maddison data in fact point to intercountry and interregional income divergence. But these intercountry income trends have not been converted into population-weighted *inequality measures* along the lines of the Schultz and Firebaugh studies. What is lacking, then, is a direct comparison of the 1960–1989 trend in population-weighted between-nation income inequality with earlier trends in population-weighted between-nation income inequality. So studies that conclude that the trend in between-nation inequality has leveled off in recent decades are unable to specify very precisely how much the between-nation trend has leveled off.

The Trend in *Total* World Income Inequality

In addition to the need for more historical research on the trend in between-nation inequality, there is need for research on current trends in *total* world inequality. Reviewing briefly: Income inequality for the whole world is the sum of within-nation and between-nation income inequality. Empirical investigations conclude that the between-nation component is larger than the within-nation component. Schultz (1998) and Firebaugh (1999) find that the between-nation component has changed relatively little over recent decades.

Two implications follow. First, the *direction* of the current trend in total world income inequality depends on the direction of the change in within-nation income inequality. Because between-nation inequality is basically steady, then world income inequality is rising if the within-nation component is increasing and it is falling if within-nation income inequality is declining. Second, the *magnitude* of the change in world income inequality depends on (i) the magnitude of the change in within-nation income inequality *and* (ii) the *relative sizes* of the within-nation and between-nation contributions to the total. If Korzeniewicz & Moran (1997, Table 2 Gini coefficients) are correct in their conclusion that within-nation income inequality comprises less than 10% of the total world income inequality, then even a substantial increase or decline in within-nation inequality would have at most a modest effect on the trend in world income inequality.

To determine the direction and magnitude of recent change in total world income inequality, then, one needs to answer two questions. First, is within-nation income inequality increasing in the average nation (where nations are weighted by population)? Second, what proportion of total income inequality is between-nation as opposed to within-nation income inequality? I begin with the second question.

What Proportion of Total World Income Inequality Is Between-Nation Income Inequality? Although empirical investigations agree that between-nation inequality is the larger of the two components, estimates vary regarding their relative sizes. Theil himself (1979) estimated that between-nation income inequality accounted for roughly two thirds (65%) of the total inequality in 1970 (Theil index). Ram's (1979) re-estimation of Theil's study with more complete data yields the same result. Berry et al (1983b, Table 9) estimate that between-nation inequality accounted for 70% of the total in 1970 (Theil index).

By contrast, Korzeniewicz & Moran (1997, Table 2) estimated that between-nation income inequality accounted for 86% of the total income inequality in 1992 (Theil index). If within-nation inequality comprised about 30% of the total in 1970, then the Korzeniewicz-Moran estimates for 1992 imply that the within-nation contribution to total inequality was cut in half during the 1970s and 1980s. This result is highly unlikely. Because between-nation inequality did not increase over the period, the within-nation contribution could be halved only if income inequality in the average nation were also cut in half. Re-estimates based on inequality data for 59 nations (Theil index) comprising 82% of the world's population indicate that between-nation income inequality accounted for about 73% of the total in 1989 (B. Goesling, unpublished analysis).

In short, there is substantial evidence that most of the world's total income inequality is between-nation inequality, not within-nation inequality. Most studies find that between-nation income inequality accounts for very roughly two-thirds to three-fourths of the total. So even if income inequalities were completely eliminated within nations, the distribution of the world's income would remain highly uneven.

Estimating the Within-Nation Component One important implication of the stable between-nation trend is that the trend in world income inequality depends on the trend in within-nation income inequality. Hence in this chapter on between-nation inequality some brief comments about within-nation inequality are appropriate.

The major hurdle for empirical studies of within-nation income inequality is the lack of reliable and comparable inequality data for nations. The study of between-nation and within-nation income inequality presents researchers with different types of data problems. In the case of between-nation inequality, knowledge is required only of nations' mean incomes, but those mean incomes must be converted to a common currency. So appropriate calibration is a major concern in the case of between-nation inequality. Nations' currencies must be calibrated before national incomes can be compared.

The calibration of currencies typically is of slight consequence for within-nation inequality, since nations generally have a common currency within their borders. But the information required to estimate the variance of an income distribution is greater than the information required to estimate the mean of an income distribution, so in that sense the data for estimating within-nation income inequality are harder to obtain and are more suspect than the data used for between-nation estimation. Because of the greater information required, the within-nation inequality

data are spottier. Whereas reasonably reliable estimates of national per capita income are available for most of the world, there are large gaps in the coverage for within-nation income inequality.

Within-nation inequality data are improving, however, and it is not premature for researchers to think about how best to estimate total world inequality with data soon to be available. One helpful way to conceptualize the issue of estimating world inequality is to think of the data as being packaged in chunks called nations. If one had income data for everyone—that is, if the data were not aggregated into nation chunks—then total world income inequality could be estimated using any of the standard inequality indexes. But the agglomeration of the data into nations rules out indexes that are not easily decomposable into within-group and between-group components. For example, the between-nation Gini and the average within-nation Gini do not sum to the total Gini.

The Theil, the squared coefficient of variation, the variance of logged income (VarLog), and the mean logarithm deviation (that is, the log of the arithmetic mean minus the log of the geometric mean: Bourguignon 1979; see Jasso 1982 for related discussion) are inequality indexes that can be used for combining within- and between-nation inequality to estimate total inequality. Bourguignon (1979) argues that the Theil and the mean logarithm deviation have the most desirable decomposition properties. The variance of logged income can be decomposed into within and between components along the lines of Allison (1978) and Equation 1 above, even if it is not decomposable in the sense of Bourguignon (1979). The squared coefficient of variation is decomposable, but it is often avoided in cross-nation research because of its extreme sensitivity to values at the upper end of the distribution. The other three indexes all use the logarithm of income in one form or another, so they reflect the welfare principle that income increases at the lower end of the income distribution produce greater welfare benefit than do income increases at the upper end of the income distribution.

Allison (1978) gives decomposition formulas for the Theil, the squared coefficient of variation, and VarLog. As Allison demonstrates, the Theil weights the within-nation component part by nations' *income shares* whereas VarLog weights the within-nation component by nations' *population shares*. Firebaugh (1998, 1999) shows that inequality indexes can be expressed in a common form, as functions of the average distance of income ratios from 1.0 (the point of equality). Inequality indexes differ because they employ different distance functions. Recognition of the common form of inequality indexes enables researchers to more readily compare results of the different inequality indexes.

CONCLUSION

When Adam Smith published *The Wealth of Nations* in 1776, he could scarcely have foreseen the profound changes that would occur in nations' incomes over the remaining 225 years in the millennium. National incomes today are dramatically

larger, on average, and apparently more unequal as well. Because income inequality across regions is greater today than it was in Smith's day, it appears that national incomes have diverged over the course of the Industrial Revolution.

Empirical investigations suggest, however, that the trend in between-nation inequality has stabilized in recent decades. These findings challenge the conventional sociological wisdom that the world is polarizing. The immediate task for researchers is threefold: To determine if the flat trend has continued into the 1990s; to determine more precisely the timing of the stabilization; and to combine the between-nation trend with careful studies of trend data for within-nation income inequality in order to determine the direction and pace of change in the world's total income inequality.

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