

CHANGING INCOME INEQUALITIES WITHIN AND BETWEEN NATIONS: NEW EVIDENCE

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Fresh data sources on cross-national income are examined to document recent changes in the composition of world income inequality within and between nations. New evidence shows that during the 1980s and 1990s the composition of world income inequality experienced a fundamental change, characterized by the diminishing significance of between-nation income differences and the growing prominence of within-nation inequalities. Two competing trends account for this change: (1) steady growth in the average level of income inequality within nations, and (2) a decline in income inequality between nations. These recent trends signify a reversal in one of the major legacies of the Industrial Revolution—the internationalization of world income inequality across national borders. The findings raise important questions for future studies of cross-national inequality and development.

THE INTERNATIONALIZATION of income inequality is one of the major legacies of the Industrial Revolution. In the early 1800s, most inequality in the world distribution of income was attributable to within-nation income differences, while between-nation differences in average annual incomes were relatively small (Bourguignon and Morrisson 1999). However, national income differences ballooned over the nineteenth and early twentieth centuries, producing unprecedented levels of inequality across countries. By the middle of the twentieth century, income inequality between nations had clearly replaced within-nation inequality as the primary source of inequality in the world distribution of income (Berry,

Bourguignon, and Morrisson 1983a, 1983b, 1991; Korzeniewicz and Moran 1997; Schultz 1998). Thus, over a period of 150 years, the defining attribute of world income inequality switched from income differences within nations to income differences between them.

I argue here that recent decades have witnessed a reversal of that long-term trend. Specifically, I present new evidence showing that during the 1980s and 1990s the composition of world income inequality experienced a fundamental change, characterized by the diminishing significance of between-nation income differences and the growing prominence of within-nation inequalities. Although inequality between nations still accounts for the majority of inequality in the world distribution of income, within-nation income differences are gaining in importance (see Firebaugh 2001).

The results suggest a major reconfiguration of how income is distributed both within and between nation-states. The staggering between-nation income differences to come out of the Industrial Revolution may now be receding. Yet rising inequality within nations ensures that cross-national stratification processes are not disappear-

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ing, but rather are shifting in relation to national borders. Such a finding is significant for students of cross-national stratification and development, as well as those concerned with states and inequality in the context of globalization processes.

TWO COMPONENTS OF WORLD INCOME INEQUALITY

Between- and within-nation income inequality function as two additive components of world income inequality. Although previous sociological studies of cross-national income inequality have focused on each component individually, they have not examined the additive combination. With few exceptions, analyses of between- and within-nation inequality belong to two conceptually distinct literatures.

Most common in sociology are studies that focus on inequality within nations. These studies typically attempt to determine why inequality varies across countries by identifying cross-national covariates of within-nation income inequality. For example, empirical analyses have routinely examined the cross-national relationship between economic development and within-nation inequality by correlating estimates of average national incomes with common measures of income inequality (e.g., the Gini index) in cross-sections of national data (Ahluwalia 1976; Cutright 1967; Paukert 1973; Rubinson 1976; Weede and Tiefbach 1981). More recent analyses of within-nation inequality have used time-series data and extended coverage to larger panels of nations (Alderson and Nielsen 1999; Gustafsson and Johansson 1999; Nielsen and Alderson 1995). For many industrialized countries, comparative studies also examine trends in within-nation inequality over time (Gottschalk and Smeeding 2000; Smeeding, O'Higgins, and Rainwater 1990).

In contrast to studies of within-nation inequality, studies of between-nation inequality examine differences in nations' average annual incomes. These analyses do not account for income differences within nations, but proceed under the assumption of equal individual income within nations. One of the major questions debated in both the so-

ciology and economics literatures on between-nation inequality asks if average national incomes are converging or diverging over time (Barro and Sala-i-Martin 1992; Breedlove and Nolan 1988; Firebaugh 1999, 2000b; Jones 1997; Korzeniewicz and Moran 1997; Lucas 1988; Peacock, Hoover, and Killian 1988; Pritchett 1997; Romer 1986; Schultz 1998). In this literature, converging average incomes signal a decline in between-nation income inequality, whereas divergence indicates increasing inequality between nations.¹

Despite their routine separation in the literature, between- and within-nation income inequality both contribute to world income inequality: The magnitude of inequality in the world distribution of individual incomes is determined by both cross-national differences in average incomes *and* income differences within nations. Differences in average incomes across countries produce an uneven distribution of individual income at the global level. But within-nation income differences add to the magnitude of world income inequality above and beyond between-nation income differences. It's the sum of between-nation inequality and the average level of inequality within nations that determines the magnitude of income inequality for the world as a whole.

¹ Studies of between-nation inequality have one of two goals: to draw conclusions about between-nation differences in rates of economic growth, or to draw conclusions about inequality among individuals (Firebaugh 1999). Studies that draw conclusions about economic growth give countries equal weight, so that both large and small nations (with respect to population size) contribute equally to the magnitude and trend of between-nation inequality. By contrast, studies that draw conclusions about inequality among individuals weight countries by the relative size of their national populations. These studies examine cross-national inequality among individuals under the assumption that each individual receives his or her nation's average annual income. Because individual (or household) incomes make up the world distribution of income, it is the population-weighted studies of between-nation inequality that relate to the composition of world income inequality. In this paper, then, between-nation inequality refers to population-weighted differences in average national incomes.

TRENDS IN BETWEEN- AND WITHIN-NATION INCOME INEQUALITY

The relatively few empirical studies combining analyses of between- and within-nation inequality reveal a striking pattern of change in the composition of world income inequality over time. Table 1 summarizes the key studies and major findings from this literature.

Bourguignon and Morrisson's (1999) analysis provides a good starting point for examining historical trends. Their study traces the between- and within-nation components of world income inequality from the first part of the nineteenth century through the last half of the twentieth century. In the early 1800s, relatively small income differences across countries caused between-nation inequality to contribute very little to the magnitude of inequality in the world distribution of income. Bourguignon and Morrisson (1999) estimate that between-nation inequality accounted for only about one-tenth of world income inequality in 1820. But with the Industrial Revolution well under way, the composition of world income inequality was about to undergo a significant and lasting change.

Between the early 1800s and the mid-1900s, cross-national differences in average annual incomes exploded. Firebaugh (1999) explains the magnitude of this event: "At the beginning of the nineteenth century, average incomes in the richest nations were perhaps four times greater than those in the poorest nations. At the end of the twentieth century average incomes in the richest nations are 30 times larger" (p. 1597). The result of the Industrial Revolution, then, was a dramatic increase in the level of income inequality among nations. Bourguignon and Morrisson (1999) estimate that the Theil index measuring between-nation inequality increased from .061 in the early part of the nineteenth century to .482 by the middle of the twentieth century, an increase of nearly 700 percent. Such estimates are based on the best available historical data and cannot perfectly reflect the trend in between-nation inequality. Yet even allowing for measurement error in these estimates, the general historical trends are not much in dispute: Cross-na-

tional income differences soared during the Industrial Revolution, producing a huge increase in the magnitude of between-nation inequality. This divergence in national incomes is supported by other studies of cross-national development (Maddison 1995; Pritchett 1997).

In contrast to its effect on the trend in between-nation inequality, the Industrial Revolution had little impact on the average level of inequality within nations. If anything, average within-nation inequality declined over time (Bourguignon and Morrisson 1999). One explanation for this comparatively small change is the offsetting trends of within-nation inequality: Individual nations may have experienced sharp gains or losses in income inequality at different points throughout the period, but such nation-specific trends cancel out when examining the world trend. On average, inequality within nations changed little during the nineteenth century. This does not exclude the possibility of increasing or decreasing inequality in specific nations.

The combination of rapidly increasing income differences across countries and the relatively stable level of average inequality within countries caused between-nation inequality to emerge by the middle of the 1900s as the dominant component of world income inequality. Beginning in the 1950s and continuing through the decades to follow, the defining characteristic of world income inequality was no longer income differences within nations, but income differences among them. Estimates of the exact amount of total world income inequality attributable to between-nation inequality during the middle of the twentieth century vary across studies because it is impossible to correct for all potential sources of measurement error. Yet there is not much dispute that by the 1950s and 1960s, between-nation inequality had become the largest source of world income inequality. All of the studies outlined in Table 1 confirm the relative dominance of between-nation inequality in determining the magnitude of world income inequality at that time.

What trends have emerged in between- and within-nation inequality in more recent years? Although previous estimates agree that between-nation inequality has indeed

Table 1. Studies Estimating the Between- and Within-Nation Components of World Income Inequality

Author(s)/ Year	Years/Nations Covered	Inequality Measure	Estimate of Total Inequality Attributable to Between-Nation Inequality	Notes
Theil (1967)	1949, 1957, 1976 (projected); 54 nations	Theil	86% in 1949; 88% in 1957; 95% in 1976	China excluded; 1976 estimate based on projected income data
Theil (1979)	1970; 110 nations	Mean logarithmic deviation (MLD)	65% in 1970	Within-nation inequality based on regression estimates
Ram (1979)	1970, 1978; 128 nations for between- nation inequality; 56 nations for within- nation inequality	MLD	64% in 1970; 67% in 1978 (76% in 1970; 77% in 1978)	Average within- nation inequality assumed constant from 1970 to 1978
Berry, Bour- guignon, and Morrisson (1983a)	1970; 124 nations	Gini, Theil, MLD, Atkinson, variance of logged incomes	70 to 86% in 1970	Within-nation inequality based on regression estimates
Berry, Bour- guignon, and Morrisson (1983b, 1991)	1950 to 1977; 130 nations	Gini, Theil, MLD	67 to 86% from 1950 to 1977; trend stable over time	Within-nation inequality based on regression estimates; assumed growth rate for China
Korzeniewicz and Moran (1997)	1965, 1992; 46 nations	Gini, Theil	79% in 1965 and 86% in 1992 (Theil); 91% in 1965 and 93% in 1992 (Gini)	Uses GNP per capita for income data, where income data are not adjusted for purchasing power parity
Schultz (1998)	1960 to 1989; 120 nations	Variance of logged incomes	66% in 1960; 71% in 1970; 71% in 1980; 70% in 1989	Within-nation inequality based on regression estimates
Bourguignon and Morrisson (1999)	1820 to 1990; 33 country groups	Theil, MLD	11% in 1820; 37% in 1910; 58% in 1960; 59% in 1992	Historical data based on assumed average national incomes and income distributions
Milanovic (forthcoming)	1988, 1993; 91 nations	Gini, Theil	75% in 1988 and 74% in 1993 (Theil); 88% in 1988 and 1993 (Gini)	Income data based on household surveys

Note: All studies are based on income estimates using purchasing power parities, except Ram (1979, second set of estimates) and Korzeniewicz and Moran (1997). Because the Bourguignon and Morrisson (1999) estimates are based on 33 country groups (thus ignoring income differences across the nations in a group), their estimates of the between-nation percentage are at the low end.

been the larger of the two components of world income inequality, they provide conflicting results about trends over time. Many of the previous analyses show that the magnitudes of both the between- and within-nation components have been relatively stable after the post-World War II period (Berry et al. 1983b, 1991; Bourguignon and Morrisson 1999; Schultz 1998). By contrast, other studies conclude that between-nation inequality has continued to grow over time in comparison with within-nation inequality (Korzeniewicz and Moran 1997; Theil 1979). The conflicting estimates are difficult to reconcile, as the studies examine different time periods and use differing panels of nations, measures of inequality, estimates of average nation incomes, and assumptions about national income distributions. Further, none of the studies examines the most recent trends in between- and within-nation inequality, as most studies end with the 1970s and 1980s.

One major problem confronting attempts at precise and robust estimates of world income inequality is a lack of appropriate data. Estimating the distribution of world income requires reliable figures on national populations, average national incomes, and within-nation income distributions. In the past, these data have been hard to find for a large panel of nations. However, recent years have witnessed a significant rise in the number of quality sources of cross-national income data, and these new sources now enable a thorough analysis of the trends in between- and within-nation inequality from 1980 to 1995.

TWO ADDITIVELY DECOMPOSABLE MEASURES OF INCOME INEQUALITY

Estimating the between- and within-nation components of world income inequality requires inequality measures that are additively decomposable, meaning that the measure can be decomposed into the sum of between- and within-group components. Not all measures of income inequality meet this criterion. For example, the Gini index, a measure of income inequality frequently used in sociology, is not additively decomposable (Allison 1978; Bourguignon 1979;

Das and Parikh 1982; Jenkins 1991; Theil 1967). Two common measures of inequality that do meet the additively decomposable criterion are the Theil index and the mean logarithmic deviation (MLD).

The following equations decompose the Theil index and MLD into between- and within-nation components. In each equation, j is an index of the world's countries, p_j is the j th country's share of the world's total population (i.e., $p_j = \text{population } j / \text{world total}$, so $\sum_j p_j = 1$), y_j is the j th country's share of total world income ($\sum_j y_j = 1$), and \ln refers to the natural logarithm (as it does throughout the paper). For the Theil index:

$$\text{Theil} = \sum_j y_j \ln(y_j/p_j) + \sum_j y_j T_j, \quad (1)$$

where T_j is the value of the Theil index applied to the within-nation income distribution of country j . The first term on the right-hand side of the equation is the between-nation component. The second term, a weighted average of the income inequality in national income distributions, is the within-nation component.

Equation 1 shows how the decomposition of total world income inequality into additive between- and within-nation components is similar to a classic analysis of variance problem, where the total variance in some outcome variable is divided into the sum of weighted between- and within-group components. Here it is total inequality (not a variance) divided into between- and within-group components, with nations as groups.

Decomposed into its between- and within-nation components, the MLD takes on a form similar to the Theil index:

$$\text{MLD} = \sum_j p_j \ln(p_j/y_j) + \sum_j p_j L_j, \quad (2)$$

where L_j is the value of the mean logarithmic deviation for the within-nation income distribution of country j . As in the formula for the Theil index, the first term on the right-hand side of the equation is the between-nation component, and the second term, the within-nation component, is a weighted average of the inequalities in national income distributions. The difference between the Theil index and the MLD is in the weighting function of the national in-

come shares, y_j s, and population shares, p_j s. Whereas the Theil index uses income shares as weights for the between- and within-nation components, the MLD uses population shares.²

Values for the Theil index and MLD applied to national income distributions (i.e., the values for T_j and L_j in equations 1 and 2) can be computed using estimates of population quintile shares for individual countries:

$$T_j = \sum_q y_{qj} \ln(5y_{qj}), \text{ and} \quad (3)$$

$$L_j = 1/5 \sum_q \ln(1/5y_{qj}), \quad (4)$$

where q is an index of the five quintile shares ($q = 1, 2, 3, 4, 5$) within each country, j , and y_{qj} is the q th quintile's share of the j th country's total income. Substituting equations 3 and 4 into equations 1 and 2 estimates the two additive components of world income inequality directly from population quintile shares:

$$\text{Theil} = \sum_j y_j \ln(y_j / p_j) + \sum_j y_j \sum_q y_{qj} \ln(5y_{qj}), \text{ and} \quad (5)$$

$$\text{MLD} = \sum_j p_j \ln(p_j / y_j) + \sum_j p_j [1/5 \sum_q \ln(1/5y_{qj})]. \quad (6)$$

In both equations, the first term on the right-hand side is the between-nation component, and the second term is the within-

nation component, a weighted average (weights are either population shares or income shares) of income inequality within individual nations.³

NEW ESTIMATES OF BETWEEN- AND WITHIN-NATION INCOME INEQUALITY

I compute the between- and within-nation components of world income inequality from 1980 to 1995. I also compute the ratio of between-nation inequality to within-nation inequality to determine how the relative sizes of the two components have changed over time.

DATA

Estimates of average national incomes and national population size are from the World Bank (1998). The World Bank figures on average national incomes are estimates of GDP per capita calibrated to constant U.S. dollars using purchasing power parities (PPPs). I use GDP per capita as an indicator of average national income because it measures production occurring within national borders. In line with other recent empirical studies of inequality and development, I use PPPs (as opposed to foreign exchange rates) to calibrate incomes across countries to best capture local prices in national economies.⁴ Complete population and income data from 1980 to 1995 are available for a panel of 125

² Additively decomposable measures like the Theil index and MLD do not have a formal third term representing an interaction between the two other additive components. This does not mean that the between- and within-nation components of world income inequality are unrelated. The strength and nature of the relationship between these two components is determined by the associations among their common component parts: population size, average annual income, national income distribution. Parsing out the effects of these common components on the magnitude and trends of between- and within-nation inequality requires further decompositions that are beyond the scope and purpose of the current study. It is not necessary to pursue these additional decompositions in order to make accurate claims about the trends in between- and within-nation inequality.

³ The use of population quintile shares in these equations underestimates the real degree of inequality within nations because it assumes that individual incomes within each quintile are equal. The size of this aggregation bias can be reduced by using finer income data like population deciles, ventiles, or percentiles. I use population quintile shares because previous sensitivity analyses find that the bias introduced by these data does not significantly affect the results of analyses of trends in world income inequality (Goesling 2000).

⁴ For arguments supporting the use of PPPs in studies of inequality see Berry et al. (1983a, 1983b, 1991); Firebaugh (1999, 2000a, 2000b); Milanovic (forthcoming); Peacock et al. (1988); Ram (1979); Schultz (1998); and Theil (1979). For a contrasting opinion see Korzeniewicz and Moran (1997, 2000).

nations, which together represent about 93 percent of the world's population in 1980.⁵

Estimates of population quintile shares are from UNU/WIDER (1999) and World Bank (1999, 2000). Efforts were made to ensure that data drawn from these sources are comparable across countries and over time. For example, all 299 observations of quintile shares included in the subsequent analysis derive from income surveys meeting three criteria: (1) The unit of analysis is either a household or an individual drawn from (2) a representative survey of the entire national population, and (3) is based on comprehensive coverage of different income sources. The observations include both developing and developed economies and represent all of the world's geographic areas.

Because the World Bank (1998) estimates of average national incomes cover many more nations than does the compilation of data on national income distributions, I compute the between- and within-nation inequality components using different samples of

⁵ The 125 nations are United Arab Emirates, Argentina, Armenia, Antigua and Barbuda, Australia, Austria, Burundi, Belgium, Benin, Burkina Faso, Bangladesh, Bulgaria, Bahrain, The Bahamas, Belize, Bolivia, Brazil, Barbados, Botswana, Central African Republic, Canada, Switzerland, Chile, China, Cote d'Ivoire, Cameroon, Republic of Congo, Colombia, Comoros, Cape Verde, Costa Rica, Denmark, Dominican Republic, Algeria, Ecuador, Egypt, Spain, Finland, Fiji, France, Gabon, United Kingdom, Georgia, Ghana, The Gambia, Guinea-Bissau, Greece, Grenada, Guatemala, Guyana, Hong Kong, Honduras, Haiti, Hungary, Indonesia, India, Ireland, Iran, Iceland, Israel, Italy, Jamaica, Jordan, Japan, Kenya, St. Kitts and Nevis, Republic of Korea, Kuwait, Sri Lanka, Lesotho, Luxembourg, Latvia, Morocco, Madagascar, Mexico, Mali, Malta, Mauritania, Mauritius, Malawi, Malaysia, Namibia, Niger, Nigeria, Nicaragua, Netherlands, Norway, Nepal, New Zealand, Oman, Pakistan, Panama, Peru, Philippines, Papua New Guinea, Poland, Portugal, Paraguay, Qatar, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Singapore, Solomon Islands, Sierra Leone, El Salvador, Sweden, Swaziland, Syrian Arab Republic, Chad, Togo, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, United States, St. Vincent and the Grenadines, Venezuela, South Africa, Democratic Republic of Congo, Zambia, and Zimbabwe.

nations. For the between-nation component, I use the panel of 125 nations with complete average annual income and population data for the period 1980 to 1995. For the within-nation component, I maximize the comparatively limited quantity of data by including any reliable observation, not constraining the panel of nations to only those with estimates for every year. As a result, the number of nations included in the estimates of within-nation inequality varies over time. Appendix A lists the nations used to estimate the within-nation component.

RESULTS

Table 2 presents the results. The estimates for the Theil index indicate that between-nation inequality accounted for about 78 percent of total world income inequality in 1980. By 1995 the relative contribution of the between-nation inequality had dropped to 68 percent. Although cross-national differences in average annual incomes do indeed account for the majority of the world's income inequality, the relative importance of these differences has substantially declined. Estimates for the MLD tell a similar story: Between-nation inequality was by far the larger of the two components of world income inequality from 1980 to 1995, but its relative contribution diminished over time. Compared to the Theil index, the MLD reports a slightly larger drop in the relative contribution of the between-nation component.

Figure 1 further explores the change in the between- versus within-nation composition of world income inequality from the early 1980s to the mid-1990s by depicting the trend in the ratio of between-nation inequality to within-nation inequality. As measured by the Theil index, income inequality between nations was more than 3.5 times as great as income inequality within the average nation in 1980. By 1995 between-nation inequality was only about twice as large. The results for the MLD show a similar decline in the between-nation to within-nation ratio.

Two competing trends account for this change. First, a steady decline in the degree of inequality between nations: From 1980 to 1995, between-nation inequality decreased by at least 18 percent (Theil index). This

Table 2. Estimates of the Between- and Within-Nation Components of World Income Inequality, 1980 to 1995

Measure and Year	Between-Nation Inequality (N = 125)	Within-Nation Inequality	Number of Nations (Within-Nation Component)	Total Inequality (Between + Within)	Percentage of Total Inequality Attributable to the Between-Nation Component
<i>Theil Index</i>					
1980	.65	.18	35	.83	78
1983	.63	.19	28	.82	77
1986	.61	.20	43	.81	75
1989	.60	.21	53	.81	74
1992	.57	.20	60	.77	74
1995	.53	.25	47	.78	68
<i>Mean Logarithmic Deviation</i>					
1980	.74	.17	35	.91	81
1983	.69	.17	28	.86	80
1986	.64	.18	43	.82	78
1989	.61	.20	53	.81	75
1992	.57	.20	60	.77	74
1995	.52	.24	47	.76	68

Sources: Data are from World Bank (1998, 1999, 2000) and UNU/WIDER (1999). See text for details.

drop reflects a reversal in the long-term trend of increasing inequality typical of much of the nineteenth and twentieth centuries. Conversely, inequality within nations is rising. The Theil index records a 39 percent increase in the within-nation component of world income inequality from 1980 to 1995, the MLD records an increase of slightly over 41 percent. The consequence of these trends is clear: Between the early 1980s and mid-1990s the dominant between-nation component of world income inequality lost some of its strength to the within-nation component, which became an increasingly significant factor in determining the magnitude of inequality in the world distribution of income. This is directly opposite the process of increasingly dominant between-nation inequalities that characterized the changing composition of world income inequality from the early 1800s to the mid-1900s.

SENSITIVITY ANALYSIS

To check the robustness of these results, I examined three major concerns: (1) the

choice of income data used to estimate the trend in between-nation inequality, and the measurement error in these income estimates; (2) the changing panel of nations used to estimate the within-nation component; and (3) questions about the reliability of income estimates for China.

ESTIMATES OF BETWEEN-NATION INEQUALITY

The results of the initial analysis show a decline in between-nation inequality from 1980 to 1995. This finding is subject to two major criticisms, however. First, the observed trend in between-nation inequality may be sensitive to the income data used as estimates of average annual income. The figures for between-nation income inequality presented in Table 1 use GDP per capita (PPP) as estimates of nations' average annual incomes. Although there are justifiable methodological and theoretical reasons for choosing GDP per capita (PPP) as a measure of income, some comparative researchers have argued that GNP per capita (PPP) is a

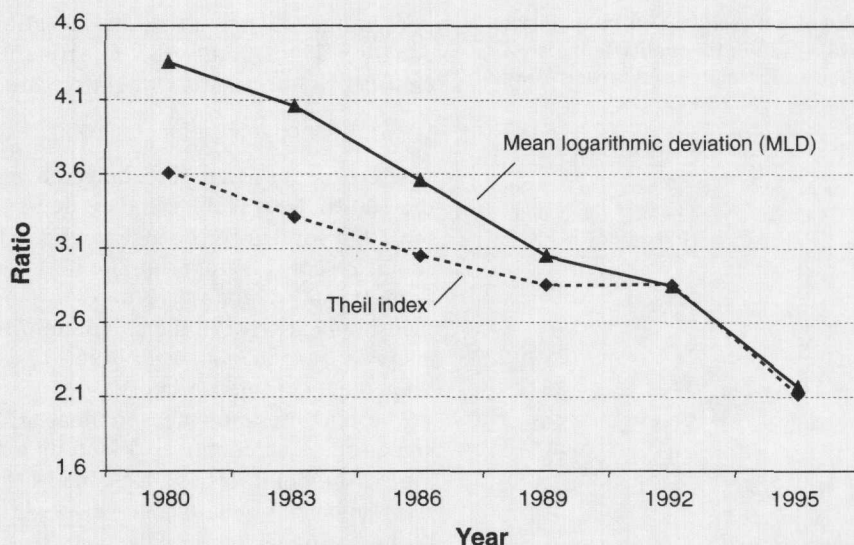


Figure 1. Ratio of Between-Nation to Within-Nation Income Inequality: 1980 to 1995

more appropriate indicator of national welfare conditions (Korzeniewicz and Moran 1997; Schultz 1998). An argument has also been made to use foreign exchange (FX) rates instead of PPPs to calibrate incomes across countries (Korzeniewicz and Moran 1997, 2000).

Does the decision to use GDP per capita (PPP) significantly affect the results of the analysis? Table 3 presents estimates of the ratio of between-nation inequality to within-nation inequality using three different indicators of average national incomes: (1) GDP per capita calibrated with PPPs, (2) GNP per capita calibrated with PPPs, and (3) GNP per capita calibrated with FX rates. Because the choice of income data for average annual incomes does not significantly affect the within-nation component of world income inequality, any differences in these three series of ratios are attributable to differences in the between-nation component. The results for GDP (PPP) and GNP (PPP) are very close, indicating that at least for studies of cross-national income inequality, the choice between these two closely related indicators is not critical. By contrast, results for the income series calibrated with FX rates differ somewhat from the others. In particular, the larger ratios for the FX data show that calibrating incomes across countries with FX rates yields sig-

nificantly higher estimates of inequality among countries. More important, although the FX data produce higher ratios across the board, they still yield a significant decline in the ratio over time. All three income series tell the same basic story: (1) between-nation inequality is the larger of the two components of world income inequality, but (2) its size relative to the within-nation component declined from 1980 to 1995.

A second major threat to the robustness of the finding that between-nation inequality declined from 1980 to 1995 is that the results do not account for measurement error in the estimates of average annual income. No one claims that World Bank estimates of GDP per capita are free of measurement error. The concern for this study is whether this error is great enough to seriously question the finding of declining inequality among nations.

To address this problem, I use a computer simulation developed by Firebaugh (2001) to add measurement error to the percentage change in between-nation inequality from 1980 to 1995. The simulation generates a confidence interval around the observed percentage change in between-nation inequality. As long as the confidence interval does not contain zero, I can assume that measurement error does not account for the observed decline in between-nation inequality.

Table 3. Ratio of Between-Nation Inequality to Within-Nation Inequality Using Different Estimates of Average Annual Incomes, 1980 to 1995

Measure and Year	Estimate of Average Annual Income		
	GDP per capita (PPP)	GNP per capita (PPP)	GNP per capita (FX)
<i>Theil Index</i>			
1980	3.61	3.88	6.53
1983	3.32	3.71	6.53
1986	3.05	3.44	6.22
1989	2.86	3.00	5.65
1992	2.85	2.90	5.65
1995	2.12	2.25	4.63
<i>Mean Logarithmic Deviation</i>			
1980	4.35	4.17	8.28
1983	4.06	3.63	7.53
1986	3.56	3.25	6.90
1989	3.05	2.95	6.43
1992	2.85	2.90	6.45
1995	2.17	2.12	4.88

Sources: Data are from World Bank (1998, 1999, 2000) and UNU/WIDER (1999). See text for details.

The computer simulation uses a random number generator to add measurement error to the estimates of GDP per capita for the years 1980 and 1995, creating a new sample of income estimates for the 125 nations. The percentage change in between-nation inequality from 1980 to 1995 is computed for both the Theil index and MLD using this new sample of data. The simulation repeats the process of adding measurement error to create a new sample of income estimates and then computing change in between-nation inequality with the new data 100 times—that is, there are 100 trials in the simulation yielding 100 different estimates of the percentage change in between-nation inequality for each inequality measure.

The 100 estimates of change in between-nation inequality vary because they are based on different samples of income estimates. The variance among these 100 estimates of change can be used to construct confidence intervals around the average

percentage change in between-nation inequality. The formula for constructing the confidence intervals is straightforward:

$$\text{Confidence interval} = \mu \pm z\sigma, \quad (7)$$

where μ is the mean percentage change for the 100 trials, σ is the standard deviation of the 100 estimates of change, and z is the z -score. Z -scores are appropriate because random normal deviates are used to generate measurement error in the simulation. In this analysis I use the value $z = 1.96$ to generate 95 percent confidence intervals.

The magnitude of measurement error assumed for each country is based on a rating scale from Summers and Heston (1991, app. A.2) (updated in Summers et al. 1994).⁶ This rating scale assigns for each country a letter grade to indicate the quality of its income estimates. The grades range from A to D, where “D in our minds means the real GDP estimate could well be 30% higher or lower, and an A, 5–10% in either direction” (Summers et al. 1994, app., “Grading of PWT Country Estimates,” first paragraph). In the simulation, I interpret these ratings to mean that the real incomes for countries assigned grade A are within ± 9 percent of the World Bank estimates of GDP per capita, and that real incomes for countries assigned grade D are within ± 30 percent of the World Bank estimates. The complete rating schedule is used to assign one of eight levels of measurement error to each of the 125 nations in

⁶ The Summers and Heston (1991) rating scale applies specifically to estimates of GDP per capita (PPP) in the Penn World Table, not to estimates from the World Bank (1998). This is an important caveat because the Penn World Table and World Bank estimates of average annual incomes are not identical. I justify applying the Summers and Heston ratings to World Bank data in two ways. First, the Penn World Table and World Bank data are closely related because they are based on the same underlying national statistics and price surveys from the United Nations International Comparison Project. Second, in the absence of any alternative rating scale, the Summers and Heston ratings are the most informed estimates available, certainly an improvement over measurement errors assigned arbitrarily. For the few small countries that are in the World Bank (1998) data but not the Penn World Table, I conservatively assign the highest level of measurement error.

the analysis.⁷ The simulation also assigns the probability that real income is within the designated margin of error as $p = .95$, leaving a 5-percent chance that the size of measurement error is something greater than the bounds given by the rating scale.

Table 4 presents the confidence intervals generated by the computer simulation. The size of the confidence interval around the mean percent change in between-nation inequality depends on assumptions about how measurement error in the income estimates is correlated within countries over time. Firebaugh (2001) explains that there are a number of reasons to expect that the level and direction of measurement error within countries at different points in time is systematic, not random. That is, over time, estimates of GDP per capita (PPP) for individual countries will be consistently higher or lower than real income, not 30 percent higher one year and 15 percent lower the next. In the computer simulation, I capture this systematic bias by manipulating the level of error correlation between the 1980 and 1995 income estimates for each country. Table 4 presents three sets of estimates, where the assumed error correlation within countries ranges from a moderate value (.6) to a higher, but still conservative estimate (.8).

None of the confidence intervals generated by the computer simulation contains zero, indicating that the observed decline in between-nation inequality is not due to measurement error in the estimates of GDP per capita. The results are robust across both inequality measures, and also across different assumptions about the level of error correlation within countries over time. Even the most conservative assumption yields confidence intervals with upper bounds well below zero. Based on these results, I conclude that measurement error in the estimates of GDP per capita is not a serious threat to the

⁷ The complete schedule and distribution of nations is: A = ± 9 percent error (17 nations); B+ = ± 12 percent error (7 nations); B = ± 15 percent error (6 nations); C+ = ± 18 percent error (1 nation); C = ± 21 percent error (32 nations); C- = ± 24 percent error (3 nations); D+ = ± 27 percent error (10 nations); D- = ± 30 percent error (49 nations). Ratings for individual countries are available on request from the author.

Table 4. Computer Simulation Adding Measurement Error to the Percent Change in Between-Nation Inequality, 1980 to 1995

Error Correlation	Confidence Interval	
	Theil Index	Mean Logarithmic Deviation
$r = .60$	$-19.5\% \pm 9.7\%$	$-29.5\% \pm 11.5\%$
$r = .70$	$-19.2\% \pm 6.3\%$	$-29.3\% \pm 7.4\%$
$r = .80$	$-19.2\% \pm 4.6\%$	$-29.2\% \pm 4.8\%$
Observed change ^a	-18.5%	-29.7%

Source: Estimates of GDP per capita (PPP) from World Bank (1998). N = 125 nations.

^a Observed change refers to estimates with no simulated measurement error (Table 2).

robustness of the findings. Complete technical details of the computer simulation are available on request from the author.

THE TREND IN WITHIN-NATION INEQUALITY

Parallel checks for robustness are not possible for the within-nation component. The choice of income data (GDP versus GNP, and PPP versus FX) is not problematic for this component as the calibration of currencies is not an issue within nations. A comparable computer simulation is not possible because the panel of nations used to estimate the within-nation component varies over time, and because there is no justifiable scale available to rate the magnitude of error in the estimates of within-nation inequality. For the within-nation component, the greatest concern is the changing panel of nations. Does the inclusion of different nations at different points in time explain the finding of increasing inequality within nations?

Because the within-nation component is simply a weighted average of inequality within nations, with weights equal to each nation's share of world population or income, the world's most populous or wealthiest nations play the dominant role in determining the size of the component. So most important for robust estimates of the within-nation component is including populous na-

tions like China and India, and nations with large economies like the United States. All of the estimates of within-nation inequality in this analysis include these largest nations, making it unlikely that the inclusion of additional nations with comparatively small weights will affect the results.⁸ Further note that although the estimate of within-nation inequality for 1995, for example, reflects a panel of only 47 countries (see Table 2), these countries represent over 70 percent of the world's total 1995 population. The estimates for other years are similarly representative, meaning that the results are based on a large majority of the world's population.

Finally, the finding of increasing inequality within nations should come as no surprise to students of comparative inequality because recent trends of rising inequality are now well documented in many regions of the world, including the United States (Morris and Western 1999; Nielsen and Alderson 1997), many western European and other industrialized nations (Gottschalk and Smeeding 1997, 2000; Smeeding et al. 1990), developing countries like China (UNU/WIDER 1999; Yang 1999), and former Communist states (Milanovic 1999). Income inequality has not grown in all of the world's nations. But has it grown *on average*? The results of this analysis say yes, and other empirical studies support this conclusion.

INCOME ESTIMATES FOR CHINA

A final threat to the robustness of these findings is the reliability of income estimates for China. Income estimates for China are weighted more heavily than estimates for any other nation in both the within- and between-nation inequality components because of that country's population size. In fact, the weights for China are so large that income trends within that one country alone could be driving the trends in between- and within-nation inequality for the world as a whole. If so, questions about the quality of income estimates for China become a major concern.

⁸ This observation is supported by a separate sensitivity analysis in which I estimated within-nation inequality with different samples of countries (Goesling 2000).

To determine the impact of income estimates for China on the trends in between- and within-nation inequality, I repeated the decomposition analysis without that one country. Excluding China has almost no effect on the within-nation component and flattens out the trend in between-nation inequality. The ratio of between-nation inequality to within-nation inequality still declines over time. Compared with the trend depicted in Figure 1, the trend in the ratio of between-nation inequality to within-nation inequality without China shows a similar but smaller decline. Overall, these checks indicate that robustness does not depend on the reliability of income estimates for China, as the results are similar with and without China in the sample.

DISCUSSION AND CONCLUSION

This research note draws on fresh sources of cross-national income data to document recent changes in the composition of world income inequality between and within nations. Between 1980 and 1995, income inequality within nations became an increasingly salient component of inequality in the world distribution of income, while between-nation inequality declined in significance.

The recent changes in the between- and within-nation composition of world income inequality signify a reversal in one of the major legacies of the Industrial Revolution—the internationalization of world income inequality across national borders. Since the middle of the twentieth century, cross-national differences in average annual incomes have accounted for the majority of inequality in the world distribution of income. This prominence of between-nation inequalities in the distribution of world income is the remnant of a long-term divergence in average national incomes that began in the early 1800s and continued through the mid-1900s. Now it appears that growth in between-nation inequality has finally been arrested, causing the cross-national income differences produced during the Industrial Revolution to lose some of their force. The 1980s and 1990s experienced a decline in the amount of world income inequality attributable to between-nation income differences, a trend reversing a long-term pattern.

At the same time, between-nation inequality still accounts for more than two-thirds of inequality in the world distribution of income: The world's most staggering inequalities are observed across nations, not within them. Further, increasing inequalities within nations have offset much of the recent drop in between-nation income differences, meaning that total world income inequality was only slightly lower in 1995 than in 1980. More than a story of growth or decline in global income inequalities, recent changes in the between- and within-nation components of world income inequality reveal a reconfiguration of inequality around national borders.

These findings raise a number of difficult empirical and theoretical problems for future studies of cross-national inequality and development. Empirically, decomposing world income inequality into additive between- and within-nation components represents only a first step in a much larger project on global income inequalities. For example, I do not determine how changes in the population size, average annual income, and income distribution of individual nations have contributed to recent change in the composition of world income inequality. I also do not attempt to identify the many national-level factors (e.g., foreign direct investment, educational expansion, political democracy) that might explain trends in between- and within-nation inequality.

But any future empirical work on the changing between- and within-nation components of world income inequality also demands a revised theoretical model of global inequalities. I do not claim to test the merits of the many current theories of cross-national income inequality, such as sociology's world systems and dependency theories, or convergence and endogenous growth theories in economics. Yet it is difficult to see how these theories might account for the trends documented here because they do not identify the mechanisms underlying change in both inequality between nations and inequality within nations. Rather, the goal of most recent theoretical models has been to explain change in one component or the other. Although this goal has been appropriate for answering the many theoretical questions developed in the literature, it is not ad-

equated for a theory of global inequalities that must account for the changing composition of world income inequality around national borders. This is indeed a significant hole in the current inequality literature.

Instead, the trends in between- and within-nation income inequality are best viewed within sociology's emergent literature on globalization. This literature is especially appropriate because, by definition, national borders are part and parcel of the globalization process: Most studies define globalization in terms of the changing significance and position of national or regional borders in relation to economic, political, or social transactions (Bairoch 2000; Chase-Dunn, Kawano, and Brewer 2000; Held 2000; Therborn 2000).

Recent empirical studies have made progress in identifying different dimensions of globalization, in particular the dimensions associated with economic globalization. For example, Chase-Dunn et al. (2000) examine the trend in trade globalization from 1795 to 1995. By contrast, comparatively little is known about the implications of economic globalization for many of sociology's long-standing substantive concerns. Alderson's (1999) study of deindustrialization within 18 OECD nations is a rare attempt in sociology to quantify the effects of globalization on a substantive social outcome.

Popular discourse on economic globalization commonly claims increasing inequality as one of the most significant potential consequences. Yet the possible connection between globalization and world income inequalities has received little serious attention among sociologists. The results of this analysis suggest that economic globalization may indeed play an important role in explaining the decline of between-nation inequality and concomitant rise in within-nation inequality during the 1980s and early 1990s, mainly because the timing of these trends coincides with a period when economic globalization processes appear to have quickened. But the global integration of the world economy is not unique to the late twentieth century, so it is not clear why the long-term trend in between- versus within-nation inequality has only recently reversed. Perhaps the changing between- versus within-nation composition of world

income inequality is one social consequence that sets the modern era of globalization apart from previous periods of global economic integration.

Aside from any potential effects of economic globalization, the finding of increasing inequality within the world's average nation and declining inequality between nations also offers conditional support for global institutional accounts of cross-national convergence among states in the modern world system. The literature on political globalization argues that such cross-national convergence is a relatively recent occurrence, spurred on, in part, by the worldwide spread of neoliberal political ideologies (e.g., the "Washington consensus") that advance financial deregulation and privatization as the universal keys for national growth and development. Others have tied convergence among states to a more long-term modernization project (Inkeles 1998).

Sociology's world polity perspective has stressed the role of an isomorphic global culture in explaining the increasing similarity observed among nation-states (Meyer et al. 1997). None of these institutional literatures has yet to seriously incorporate a discussion of world income inequalities. Examining trends in the between- versus within-nation composition of world income inequality in the context of globalization might be one way of bridging this current divide.

Brian Goesling is a Ph.D. candidate in the Sociology Department at The Pennsylvania State University. His dissertation on trends in cross-national income, education, and health inequalities combines his interests in social stratification and institutional theory. He is co-author (with G. K. LeTendre, D. P. Baker, M. Akiba, and A. W. Wiseman) of "Teachers' Work: Institutional Isomorphism and Cultural Variation in the U.S., Germany, and Japan" (Educational Researcher, 2001, vol. 30, pp. 3-15).

APPENDIX A

Nations Included in Estimates of the Within-Nation Component of World Income Inequality, 1980 to 1995

Country	Year						Country	Year					
	1980	1983	1986	1989	1992	1995		1980	1983	1986	1989	1992	1995
Armenia				■		■	Egypt						■
Australia	■			■		●	Spain	■		■	●		■
Austria			●				Estonia					■	■
Belgium			■	■	■		Ethiopia						■
Burkina Faso						■	Finland	■	■	■		■	
Bangladesh	■	■	■	■	■		France		■		▲		
Bulgaria	■	■	■	■	■	■	United Kingdom	■	■	■	■	●	
Bahamas			■	■	■		Ghana				■	■	
Belarus						■	Guinea					■	■
Bolivia				■			The Gambia					■	
Brazil	■	■	■	■		●	Guinea-Bissau					■	
Botswana			■				Greece	■			■		
Canada	■	■	■	■	■	●	Guatemala			■	■		
Chile				■		■	Guyana					■	
China	■	■	■	■	■	▲	Hong Kong	■		■		■	
Cote d'Ivoire			■	■			Honduras					■	●
Columbia				■	■	●	Hungary		■	■	■	■	■
Costa Rica	■	■	■	■		●	Indonesia	■	■	■	■	■	●
Czech Republic				■	■	■	India	■	■	■	■	■	■
Dominican Republic		■		■			Ireland	■		■			
Denmark	■		■	■	■	■	Israel					●	
Algeria				■		■	Italy	■	■	■	■	■	■
Ecuador						■	Jamaica				■	■	
							Jordan	■		■		■	

(Continued on next page)

(Appendix A continued)

Country	Year						Country	Year					
	1980	1983	1986	1989	1992	1995		1980	1983	1986	1989	1992	1995
Japan	■	■					Papua New Guinea						■
Kazakhstan					■		Poland	■	■	■	■	■	■
Kenya					■	■	Portugal	■			■	■	
Korea	■	■	■	■			Romania				■	■	■
Laos					■		Russia	■		■	■	■	■
Sri Lanka	■		■	■			Rwanda		■				
Lithuania					■		Senegal					■	
Lesotho			■				Singapore	■	■		■	■	
Luxembourg			■				Sierra Leone				■		
Latvia					■	▲	El Salvador						●
Morocco		■			■		Slovak Republic				■	■	■
Madagascar					■		Sweden	■	■	■	■	■	■
Mexico		■		■	■	●	Thailand	■		■	■	■	
Mali						■	Trinidad and Tobago	■					
Mongolia					■		Tunisia				■		
Mauritania				■		■	Tanzania					■	
Mauritius	■		■		■		Turkey			■			■
Malaysia		■		■		■	Uganda				■	■	
Niger					■	■	Ukraine					■	●
Nigeria			■		■		United States	■	■	■	■	■	▲
Nicaragua					■		Venezuela	■		■	■		●
Netherlands	■	■	■		■		Vietnam					■	
Norway		■	■	■	■		Yemen					■	
Nepal		■				■	South Africa				■	■	
New Zealand	■	■	■	■			Zambia				■	■	
Pakistan			■	■	■	■	Zimbabwe				■		
Panama	■			■									
Peru	■		■			●							
Philippines			■	■	■	▲							

Sources: ■ = UNU/WIDER (1999); ● = World Bank (2000); ▲ = World Bank (1999).

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