# U.S.Wage Income Since 1961:
# The Perceived Inequality Trend [1]

by

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## ABSTRACT

The social science literature interprets the increasing dispersion of the U.S. distribution of annual wage and salary income as a trend toward greater wage income inequality. The literature dates the trend back to around 1980. The dispersion of nonmetro wage income has increased when mean nonmetro wage income increased since 1961. An increase in nonmetro mean wage income is distributed to all nonmetro wage incomes, regardless of size, via a nearly equal proportional increase to all of them except the most small. These exceptions receive a somewhat larger proportional increase than larger wage incomes. This transformation increases the dispersion of nonmetro wage incomes. Individual nonmetro wage earners, in contrast to nonmetro wage incomes, do not all receive an equal proportional increase because individuals have varying success over time both in absolute terms and relative terms, i.e., in percentile. The evidence for the nearly equal proportional increase of all nonmetro wage incomes when mean nonmetro wage income increases is the time-series of the logarithm of wage percentiles. Over time the log percentiles of all but the smallest wage incomes vary in parallel. If dispersion is defined as inequality, then indeed a rising mean of nonmetro wage income driving an increase in the dispersion of nonmetro wage income is an inequality trend, since the mean increased 1961 - 2001. However terming it an inequality trend reflects a negative bias. 'Egalitarian bonanza' would be a more legitimate term since mean nonmetro wage incomes increased 1961 - 2001and the aggregate increase in wage income was spread to all nonmetro wage incomes via nearly equal proportional increases. Consequently, public funds expended to develop rural economies will raise all rural wage incomes by about the same proportion as long as development stimulates a rise in mean rural wage income.

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**Introduction**

Rural economic development policy is substantially motivated by a concern for the welfare of the rural population. There is reason for concern. Historically, residents of the rural areas of the U.S., have lower levels of educational attainment, lower wage and salary income, and higher rates of poverty than residents of urban areas. See, for example, Fuguitt, Beale, and Brown (1989) ), Duncan (1992), Rural Sociological Society, (1993), Lichter, Johnston, and McLaughlin (1994), Brown and Hirschl (1995), and Weber, Duncan, and Whitener (2002). The public policy of rural economic development has a strong welfare emphasis: expending public funds to stimulate private economic activity that increases the earnings of the rural labor force, particular those of low wage workers.

This Rural Development Research Report addresses the question of whether public funds earmarked for rural development should be partially diverted to special projects to raise the incomes of low wages workers alone or prevent benefits from just going to high wage workers. This report's clear answer is "No" since all rural wage incomes, small and large, are raised by about the same proportion when the mean of nonmetro wage income increases. Diverting funds into special projects for low wage workers fritters away funds from maximally stimulating activity that raises the mean of nonmetro wage incomes. Interfering with economic activity that benefits high wage rural workers might also detract from maximally raising the wage incomes of low wage nonmetro wage earners.

This report makes precise the old saying of economists that all workers, regardless of the size of their wage incomes, have a stake in expanding the economy and increasing the demand for labor: "A rising tide lifts all boats.". While widely believed by economists, the question of whether the assertion is true has been an active area of research (Danziger and Gottschalk, 1986). This report concludes that the logarithm of all nonmetro wage incomes, regardless of size, change by roughly equal constants in any given period of time. Like boats on a tide, wage incomes, in the logarithm, go up and down together. What that means for untransformed wage incomes is that they all increase or decrease proportionally, i.e., by approximately the same ratio, in a given period of time. They increase when the mean and median of nonmetro wage income increase. If all wage incomes increase proportionally then a measure of the dispersion of wage incomes, such as the interquartile range, the difference between the $75^{th}$ and $25^{th}$ percentiles, or the 90-10 difference, the difference between the $90^{th}$ and $10^{th}$ percentiles, necessarily increases. The $75^{th}$ percentile of wage income, for example, is an actual wage income. When all wage incomes are ordered from small to large, the $75^{th}$ percentile is the wage income that is bigger than 75% of the other wage incomes and smaller than 25% of the others. The proposition that all nonmetro wage incomes increase by about the same proportion when mean nonmetro wage income increases does not mean that the wage income of each and every rural worker increases by the same proportion

in the same time period. Individual wage earners get ahead of or fall behind the trend of proportional change in wage incomes, rising or falling in percentile rank.

This report finds that the essential issue in rural economic development is promoting economic activity that increases the demand for labor and raises wage incomes. All wage incomes will then move up by about the same proportion regardless of size when the demand for nonmetro labor raises the mean of nonmetro wage incomes. Concerns about whether low wage rural workers get a fair share of the benefits of rural economic development should not get in the way by diverting rural economic development funds from their main task, the task that benefits all nonmetro wage earners regardless of the size of the wage incomes: raising the mean of nonmetro wage incomes by stimulating private economic activity. The concept 'rural' is operationalized in the Federal statistical system by the concept, 'nonmetropolitan'[2] (abbreviated "nonmetro") that is, beyond a metropolitan area. So the data on which this report is based are about wage earners living in nonmetro areas. Currently about a fifth of the U.S. population lives in nonmetro areas.

This report's findings are relevant to the formulation of a rural development initiative such as, the "New Homestead Economic Opportunity Act" introduced to the Senate on January 21, 2003 (Senate Bill S-198), a bill to create a class of tax credits against individual and corporate Federal incomes taxes for private investment in certain nonmetro areas and in the blighted cores of old cities. The intention of this legislation is to increase the wage incomes of low wage workers in particular by increasing the demand for labor via the multiplier effect of the tax favored investments the legislation creates. If legislators took their cue in framing this legislation from the large literature in social science that contends that economic growth since around the year 1980 has increased wage inequality, they might "remedy" this perceived problem by set asides to help low wage workers, diverting funds from economic activity that increases the demand for labor, diminishing the beneficial impact of the legislation.

The labor economics literature on wage income in the U.S. in the last half century finds that economic growth in the U.S. since around 1980 has substantially increased the inequality of wage incomes. This increase in wage income inequality since 1980 is contrasted in the literature with wage increases prior to then that did not increase inequality or actually decreased it. This literature speaks of "inequality trend" , "polarization", "divergence" , "the disappearing middle", or the "hollowing out" of the distribution of wage and salary income since about 1980. These phrases and others deriving from this literature, e.g., "wage gap", "middle class squeeze" and the "Two Americas" have become popular in the news media and have entered debate on public

[2] 'Nonmetropolitan' refers to the set of nonmetropolitan counties in the U.S. The county is the primary unit of local government below the level of the state, but there is some variety in how this unit is defined throughout the country. Most enumerations of counties distinguish somewhat more than 3,000 of them. A nonmetropolitan county is a county not in a Metropolitan Statistical Area (MSA) as defined by the Office of Management and Budget. MSA's include core counties containing a city of 50,000 or more people or having an urbanized area of 50,000 or more and total area population of at least 100,000. Additional contiguous counties are included in the MSA if they are economically integrated with the core county or counties. The metropolitan status of every county in the U.S. is re-evaluated following the Decennial Census. While there has been a net decline in counties classified as nonmetro over the decades, the definition of nonmetro remained roughly constant from 1960 through 2002.

policy. While there certainly are richer and poorer Americans - and always will be as a matter of definition - this report shows that there is no evidence that the U.S. is being "polarized" into two separate groups of very rich and very poor wage earners[3]. Indeed, the data show, contrary to the labor economics literature, that the proportion of nonmetro wage earners with small wage incomes declined since 1961 even as the proportion of wage earners with large wage incomes increased.[4] Basing public policy on the labor economics literature is problematic because the proposition that the nonmetro U.S. labor force is being split into a poor and a rich group with few wage earners in the middle is not true and the interpretation of the increasing dispersion of wage incomes when mean wage incomes increase as an inequality trend is perversely pessimistic.

Yet the conclusion that the "rich get richer, the poor get poorer" and the labor force more polarized between them is pervasive in public policy discussion, including rural economic development policy. Former USDA Undersecretary Dr. Karl Stauber, now as president of the Northwest Foundation a leading advocate for rural economic development on the northern Great Plains, expresses concern about inequalities in an article entitled, "Why invest in Rural America - And How? A Critical Public Policy Question for the 21st Century" in the **Economic Review** of the Federal Reserve Board of Kansas City (Stauber, 2001:35,36). He writes:

> The middle class are leaving many parts of rural America - particularly the isolated and low-amenity, resource-dependent areas. ...
>
> On our current trajectory, we are headed for significant portions of rural America that are largely populated by the poor and the rich, and the small middle class that serves both groups. A fundamental goal of rural development must be the survival of the middle class. ...

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[3]The literature on the perceived inequality trend in the U.S. since about also 1980 deals with aspects of inequality not addressed here. This Rural Development Research Report deals with the dispersion of wage income, a topic at the center of the labor economics literature on the inequality trend in wage income but not the only topic of this literature, which also concerns itself with unemployment, poverty, the distribution of assets and forms of money income other than wage income, as well as measures of inequality other than those measuring the dispersion of wage income, such as the Gini concentration ratio.

[4]This Rural Development Research Report uses the U.S. Bureau of the Census' March Current Population Survey (CPS) as its source of data and variable definitions. See Appendix A. The U.S. Bureau of the Census distinguishes between labor income received in the form of wages and salary from an employer and revenue taken as income by the self-employed from their business. The sum of the two variables is called 'earned income' or 'earnings' both by the Census Bureau and the social science literature. By far the larger component of this sum is wage and salary income. Self-employment income is more unequally distributed than wage and salary income. Most members of the labor force report no self-employment income. The present paper only discusses annual wage and salary income. All dollar amounts are in constant 2001 dollars, unless otherwise noted.

'Egalitarian bonanza' is a better phrase to describe how nonmetro wage incomes change when their mean increases, that is, as national income increases and/or a greater share of it goes to labor. In statistical terms, the egalitarian bonanza is:

> Small, middle, and large nonmetro wage incomes change proportionally year to year by almost the same proportion that mean nonmetro wage income changes. Given that individual wage incomes are rank ordered by the marginal product of the worker earning them and that this rank order emerges out of pairwise comparisons of individual workers marginal product, distributing an increase in aggregate national income going to nonmetro wage earners by nearly equal proportional increases to all nonmentro wage incomes regardless of size is the only way that nonmetro wage incomes can be increased that preserves all the pairwise ratios of worker marginal product without distortion. An increase of national income going to nonmetro wage incomes - not absorbed by growth in the nonmetro labor force - is reflected in an increase in mean nonmetro wage income. Individual private market decisions distributes this income to wage incomes in nearly equal proportional increases. Individual nonmetro wage earners' wage incomes may move over time up or down in percentile so individuals do not necessarily all receive the same proportional increase or any increase when the mean of nonmetro wage incomes increases. Increasing all wage incomes by nearly the same proportion increases measures of dispersion such as differences between percentiles, e.g., the interquartile range or the 90-10 difference. If a smaller and a larger percentile are graphed against time, the larger one will appear to be diverging upward from the smaller in time periods when mean wage income increases, i.e., becoming larger faster. Nevertheless, in the logarithm both are increasing by almost the same amount, i.e., their graphs over time remain almost in parallel. Since all workers would welcome an equal proportional increase and equal proportional increases do not alter the ratios of their wage incomes, calling the increased dispersion engendered by this process an 'inequality trend' is biased and pessimistic. 'Egalitarian bonanza' is a much better phrase to label this phenomenon, which did not begin around 1980, but rather from the earliest year for which March CPS data are now available, 1961.

**The Literature on the Inequality Trend Since About 1980 in Wage Incomes**

In the last several decades social scientists have published many articles and books about a trend toward greater inequality in the U.S. distribution of earned income. The featured review article of the September 1992 **Journal of Economic Literature** summarizes the principal theses of this literature in its first paragraph:

> "From the perspective of 1991, U.S. earnings trends since 1950 are demarcated by two years: 1973 and 1979. Nineteen-hundred-seventy-three marked the end of rapid real earnings growth and the beginning of slower growth bordering on

> stagnation. Nineteen-hundred-seventy-nine marked the beginning of a sharp acceleration in the growth of earnings inequality,... "(Levy and Murnane, 1992: 1333).

i.e., 1) from the point of view of 1992, median earnings were growing more slowly than in the past, and 2) earnings inequality was growing more quickly. The present paper will show that the first thesis is approximately correct for the median of annual wage and salary income from the late 1960's through the early 1980's, but incorrect for the mid to late 1990's. The first thesis withered away in the literature by the late 1990's, leaving the second thesis of the trend toward greater inequality. It is not unusual for a contribution to this literature to allude to both the second thesis and the growth of the literature in its first sentence, e.g.:

> a) Buchinsky (1994): "The 1980's witnessed rapid and massive changes in the structure of wages in the United States. In particular one observes sharp changes in wage inequality, and dramatic increases in wage differentials by education and by experience."
> b) Morris, Handcock, and Bernhardt (1994): "The early 1980s brought a fundamental re-orientation for research on economic inequality. After years of little change, and even decline, inequality began to rise....";
> c) Karoly and Burtless (1995): "American wages and family incomes have become notably less equal over the past two decades.";
> d) Johnson (1997): "There is a rapidly growing literature in economics dealing with the causes of the increase in earnings inequality over the last few decades.";
> e) Kahn (1998): "Considerable attention has been paid in recent years to the issue of wage inequality.";
> f) McCall (2000): "Wage inequality among workers who are similar in education, age, and other characteristics has been growing as fast, and is considered as important, as wage inequality between workers who are dissimilar.";
> g) Haider (2001): "A vast literature has emerged over the past decade that documents and offers explanation for the recent changes in annual earnings inequality in the United States. The changes to be explained are well established: annual earnings inequality remained relatively stable during the 1950s, 1960s, and 1970s and then increased rapidly during the 1980s and early 1990s.".

The Levy and Murnane (1992) review article in **Journal of Economic Literature** cites 68 articles and books. Levy and Murnane (1992:1336) list findings in the literature on trends in earnings inequality under the heading "A Summary of Findings." Their points that will be addressed in the present paper are:

> "1. Earnings inequality was relatively stable in the 1970s but has increased rapidly in the 1980s. This is particularly true for men, but is also true for women. Inequality in the male earnings distribution has taken the form of polarization. The polarization, combined with stagnant growth in average earnings has meant that the proportions of men with earnings below $20,000 and above $40,000 (in 1988 dollars) have both increased.

2. For both mean and women inequality *between* groups defined by ....education, was stable, or declined, in the 1970s, and grew in the 1980s.

3. Inequality *within* groups defined by .... education .... has grown steadily since 1970.

....."

Levy and Murnane (1992) use the word 'polarization' to mean the creation of a bimodal distribution of wage and salary income, a pushing of the central mass of the distribution toward the tails. It is synonymous with the phrase, "hollowing out" [of the distribution]. While neither they nor the works they review examine the distribution of earned income directly, they distill their understanding of trends in measures of central tendency and inequality of earned incomes into a proposition about that distribution (Levy and Murnane (1992: 1349):

> "A careful reader of these and other articles ... would have emerged with several conclusions. First, the earnings distribution for year-round, full-time male workers was "hollowing out" in the sense implied by a shrinking middle class: The middle of the distribution was declining while the upper and lower tails were growing ...."

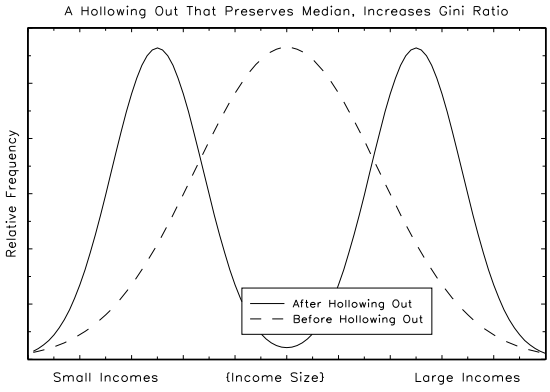



Figure 1: the concept of the "hollowing out" of the distribution

Figure 1 illustrates Levy and Murnane's (1992) image of a hollowed out income distribution. The perception of the hollowing out originated in the early to mid-1980's ( Kuttner, 1983; Lawrence, 1984; Thurow, 1984; and Bradbury, 1986). Morris, Bernhardt and Handcock (1994) claim to have invented a statistical technique that reveals the hollowing out.

A hollowing out of the distribution would be alarming. Increased inequality and the lowering of incomes of a large fraction of the population would be unfortunate in a democracy with egalitarian ideals and concerned for the welfare of its poorer citizens. Further, the divergence of political interests between rich and poor implies a future of sharp conflict between their interests. Aristotle asserted in The Politics (1958 [4th Century BC]) that democracy only survives in societies with a middle class large enough to buffer conflict between rich and poor. So many contemporary American political scientists agree with Aristotle's proposition that the American Political Science Association formed a task force of prominent political scientists to decry the effect of inequality on democracy (Task Force on Inequality and American Democracy, 2004). The U.S. government has based policy on this view. The Marshall Plan to rebuild Europe World War II was based on the premise that if Western European middle classes could be kept

from falling into poverty they would not be attracted to communism's appeal to the poor's resentment of the rich and Western Europe would remain democratic.[5]

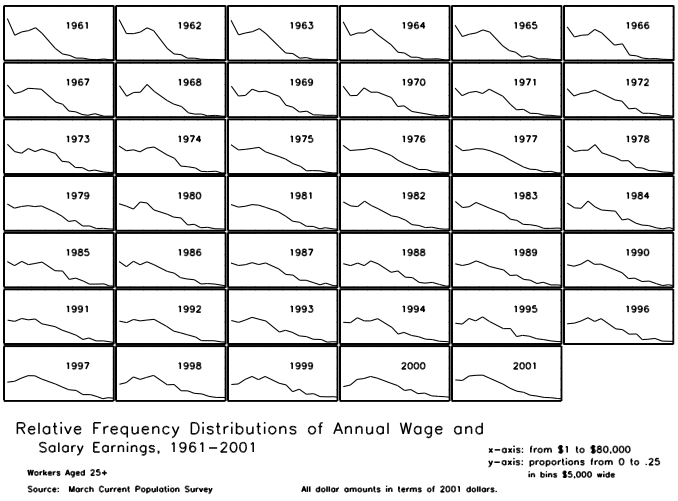



Figure 2: Relative Frequency Distribution of Annual Wage and Salary Income, 1961-2001
Source: Author's estimates from data of the March CPS.

There has been little dissent from the thesis that the inequality of wage incomes is rising. The thesis is referred to as a truism in major U.S. newspapers (e.g., the **Los Angeles Times**, the **New York Times,** the **Wall Street Journal**, or the **Washington Post**). Two articles from the **Wall Street Journal** are instructive on this point because the **Wall Street Journal**, a newspaper of finance with a readership of the well-to-do and those aspiring to be well-to-do, might be expected to be less interested in wage inequality than a general readership newspaper. Yet, in 1996, the editors of the **Wall Street Journal** (**WSJ**) allowed a **WSJ** reporter to give perhaps surprisingly slight grace to readers unfamiliar with or unaccepting of the thesis that wage inequality is rising. An article at the top of the middle column of the front page of the **WSJ** in December 1996 begins "Any alert newspaper reader knows that real U.S. wages have grown markedly more unequal in recent decades." (**Wall Street Journal**, December 26, 1996). The acceptance of the thesis by the **WSJ** is not isolated. An article by David Wessel, a **WSJ** front page columnist, (**Wall Street Journal**, top of column 1, page 1 Friday, April 2, 2004), is headlined "Barbell Effect The Future of Jobs: New Ones Arise, Wage Gap Widens". The article forecasts a bi-modal, i.e., hollowed out, wage distribution arising as the relative frequency of high paid and low paid jobs increase in the U.S. Wessel sees a divergence between the earnings of the well educated and the poorly educated and infers that such a divergence necessitates bi-modality in the distribution. By 2004 the thesis that inequality of earnings is growing had become a common perception of American public opinion according to the abstract of a paper presented to the American Sociological Meetings (Jacobs, 2004 ). Since the 1980's newspapers came to refer to the thesis of increasing inequality by phrases such as "the wage gap," "the middle class squeeze," or "the disappearing middle," expecting readers to know that the first phrase means the difference between the earnings of middle class Americans and those of wealthy Americans, the second phrase refers to the discomfort felt by workers whose earnings are shrinking, and the third phrase refers to the hollowing out of the U.S. earnings distribution.

[5]The author confesses to having contributed to the literature interpreting increasing dispersion in incomes as an inequality trend. See Redman, Rowley, and Angle (1992) which documenting a divergence trend among state median personal incomes.

**Dispatching a Misconception in the Literature with a Glance at the Data**

Dispatching the misconception about the hollowing out of the distribution only takes a glance at the data. Figure 2 graphs the sample relative frequency distribution of annual wage and salary income in the U.S., 1961-2001 (in constant 2001 dollars) estimated from March Current Population Survey data [6] Figure 2 shows that there was no substantial "hollowing out" of the central mass of the distribution during or after the 1980's. The hollowing out widely discussed in the social science literature cannot be found in U.S. annual wage and salary income data.

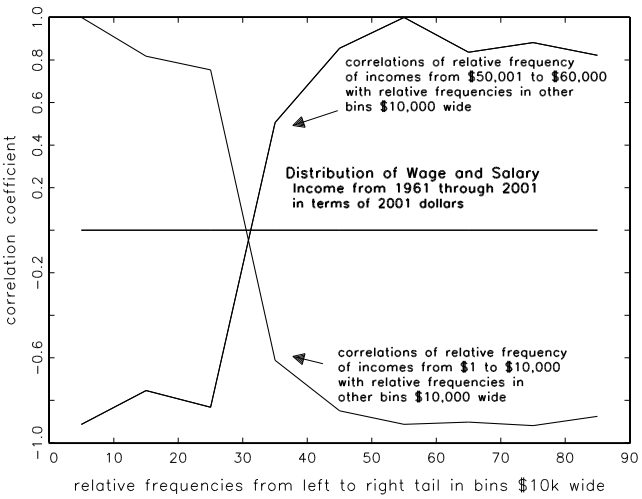



Figure 3: Correlations of relative frequencies in two bins, one in left tail, other in right tail, with relative frequencies throughout the distribution.
Source: Author's estimates from data of March, CPS.

But perhaps a subtle "hollowing out" occurred, a simultaneous increase in the left and right tails too small to be readily detected by visual examination of the relative frequency distribution? That hypothesis, too, is false. The left and right tails, the relative frequencies of small and large annual wage and salary incomes are negatively correlated, almost perfectly so. The magnitude of this correlation from 1961 to 2001 shows that when the relative frequency of the left tail decreases, the relative frequency of the right tail increases, and vice versa. See figure 3.

Figure 3 graphs the correlations over the years 1961 through 2001 between the relative frequencies in a range of small wage incomes (national level), $1 to $10,000 in constant 2001 dollars and the relative frequencies in a range of substantially larger wage incomes, those $50,001 to $60,000 in constant 2001 dollars and the relative frequencies in all the other ranges of wage income from $1 to $90,000. The two graphs are near mirror images of each other. Figure 3 shows that the relative frequencies of small and large wage incomes are inversely correlated with each other. That means that as the relative frequency of small wage incomes decreases, those of large wage incomes increase, and vice versa. Figure 3 shows that this inverse variation between the relative frequency of large and small wage incomes is quite strong. The correlation coefficient is nearly -1.0, the maximum in absolute value. This strong inverse relationship contradicts the premise of the "hollowing out" hypothesis which requires the relative frequencies of small and large incomes to covary positively. Figure 2 also shows the left tail shrinking and the right tail swelling, 1961-2001, i.e., an inverse relationship over time, not a simultaneous swelling in both tails, what the "hollowing out" hypothesis requires.

[6] See Appendix A for a discussion of the data, the March Current Population Survey, the data on which much of the literature on the trend toward greater inequality in earned income is based, and for discussions of both the choice of dependent variable, and choice of definition of labor force, the recipient population.

Figures 2 and 3 are based on estimates of U.S. national labor force data because the literature on the inequality trend in U.S. wage income is about trends at the national level.

This report's findings will cast doubt on the interpretation of a statistical method invented for the purpose of demonstrating the hollowing out of the distribution of annual wage and salary income, that of Morris, Bernhardt and Handcock (1994). Their method is to compare relative frequencies of earned income in the same bins over time. They use March Current Population Survey data. They use bin boundaries that are defined in terms of constant dollars and are invariant after being set in the base year, except for the upper boundary of the rightmost bin. In the base years , the bin boundaries are deciles of earned income (i.e., the first bin contains the relative frequencies of incomes from \$1 to the 10th percentile, the second bin from the 10th percentile to the 20th percentile, etc.). Consequently, the relative frequencies in each bin in 1967, the base year, are all 0.1. Morris et al. then find the ratio of the relative frequency in each bin in each later year to its relative frequency in 1967. If this ratio is greater than 1.0, then the relative frequency in the bin has grown over what it was in 1967, and vice versa for a ratio less than 1.0.The last year they examine is 1987. The ratios are:

$$\frac{y_{jt}}{y_{j(1967)}}$$

$y_{jt}$ ≡ the relative frequency,

bin j, year t

$j$ = 1, ... ..., 10

$t$ = 1967, ... ..., 1987

Figure 1 of Morris et al., (1994:208) shows a 1987/1967 ratio distinctly greater than 1.0 only in the rightmost bin. The left boundary of the rightmost bin is the 90th percentile of income in 1967 constant dollars. Any 1987 income larger in constant dollar terms is assigned to the rightmost bin. Is this ratio greater than 1.0 in the far right tail of the distribution an indication of an ominous hollowing out of the distribution? If wage incomes, small, middling, and large, increase in the same proportion as the mean and median of wage incomes increase, then over longer periods of time, the Morris et al., (1994) method will show a bigger and bigger ratio in the rightmost bin, without indicating a hollowing out of the distribution.

**Egalitarian Bonanza: How Nonmetro Wage Incomes, Small, Middling, and Large, Increase Proportionally When Their Mean Increases**

The word 'inequality' has a variety of interpretations in the social science literature. It has applied to the dispersion of incomes, for example, a greater difference in income between any two percentiles of income. The 90-10 difference, the difference between the 90th and the 10th percentiles, is often used to measure the dispersion of incomes because the 90-10 difference

operationalizes the concept of the gap between rich and poor insofar as a 90th percentile wage income is as big or bigger than that of 90% of the labor force and the 10th percentile is as small or smaller than that of 90% of the labor force. Many researchers prefer to measure inequality by reference to the Lorenz Curve, a measure of the concentration of wealth or income. Nygård and Sandström (1981) make the Lorenz Curve central to classifying measures of inequality. The Lorenz Curve is a generalization of how much of the total the biggest 1%, 2%, 3% .. etc. receive. The Gini concentration ratio is a very well known measure of concentration with a very simple relationship to the Lorenz Curve. Measures of concentration are sensitively dependent on how well measured the largest and smallest wage incomes are (Nygård and Sandström, 1981:240). This sensitivity poses a great difficulty for their estimation since household sample surveys encounter severe non-sampling error in the measurement of small very small and very large wage incomes. Further, large surveys sponsored by the Federal government, such as the March CPS, are not optimized to measure very large wage incomes, which because they are rare require over-sampling. According to Roemer (2000: 21), an evaluation of the March CPS' income questions as measuring devices, the March, CPS substantially underestimates large wage incomes. And, to make matters worse, the U.S. Bureau of the Census replaces very large wage incomes with a code number, the topcode, in the "public use samples" it releases of the microdata of the March, CPS, that is, the encoded responses for each respondent in the survey. In most years from 1961 on, the topcode was the minimum topcodeable income. More recently, it has been the mean of topcoded incomes in certain demographic partitions of the data. Using the topcoded observations when the topcode was the minimum topcodeable income to estimate any sample statistic requiring all sample observations, e.g., mean, variance, skew or Gini concentration ratio results in an underestimate. The bias is more severe for the variance (or standard deviation) than for the mean. The recent practice of the Census Bureau of using the mean of topcoded incomes in certain demographic categories as the topcode essentially eliminates this bias in the estimation of the mean, but not the variance, skew or Gini although it mitigates those biases. See Angle and Tolbert (1999) for a discussion of this mitigation in the case of the Gini ratio. These topcode problem in the estimation of sample statistics disappear in the estimation of any percentile below the minimum topocodeable income. Further, the mean is known to be unduly influenced by sampling error and the non-sampling error found by Roemer (2000) in a substantially skew distribution. The size distribution of income has a very substantial skew (Pareto, 1897). In such a situation the median, the 50th percentile, is considered a more "robust" statistic, i.e., one with much lower mean square error around its population parameter, than the mean (Snedecor and Cochran, 1989:136) and preferable as a measure of central tendency to the mean. Similarly, the difference between two percentiles in the left and right tails of the distribution, such as the 90-10 difference, the difference between the 90th and 10th percentiles, is more robust than the variance as a measure of dispersion. Levy and Murnane (1992) for example summarize what has been happening to wage incomes in terms of the median and divergences of (differences between) percentiles. The preference of the literature to use the concept of dispersion, measured by differences between percentiles, rather than concentration as measured by the Gini concentration ratio is likely influenced by the greater confidence in using estimated differences between percentiles. It is a matter of preferring to report what is found under a "brighter light" than what is at least somewhat murky.

Economic growth does not necessarily increase the mean of wage incomes, but since economic growth usually is faster than the supply response in the labor market, a rise in mean wage incomes usually follows economic growth. The mean of wage incomes is the amount of national income going to labor divided by the number of wage earners. The denominator of this ratio changes more slowly than its numerator. This report finds that, approximately, if there is a $y_i$ relative frequency of wage incomes of size $x_i$ to $x_j$ in year t and the mean of all wage incomes $\overline{x}_t$ increases by the ratio $\overline{x}_{t+1}/\overline{x}_t$, then there will be, approximately, a relative frequency of $y_i$ wage incomes of size $[x_i\ (\overline{x}_{t+1}/\overline{x}_t)]$ to $[x_j\ (\overline{x}_{t+1}/\overline{x}_t)]$ in year t+1, i.e., a wider range of wage incomes and an increase in dispersion of wage incomes.

This report shows that a proportional increase in the mean is approximately equal, i.e., as far as can be reasonably established through the statistical noise of sampling and non-sampling error in data collection, with proportional increases in all percentiles of wage income. associated with a comparable proportional increase in all wage incomes. Two kinds of evidence are offered. One kind is the demonstration that, when standardized and plotted against time, the graphs of the mean and any percentile almost overlap. Standardization involves finding the mean of a statistic, here for example, the mean of mean wage income from 1961 through 2001, subtracting it from each year's mean wage income, and then dividing each of these differences by the standard deviation of mean wage income from 1961 through 2001. This latter step is particularly important for percentiles since the standard deviation of large incomes is likely to be quite different from that of small incomes for a variety of reasons, including especially the tendency of people to only report their wage incomes in terms of several significant digits (Angle, 1994). This behavior leads to much greater "rounding" of reported incomes, e.g., reporting wage incomes to the nearest $10,000. Thus the nearest $10,000 can act as an "attractor", causing people to first round up and then down, or vice versa if their wage incomes are rising. This behavior plays havoc with the estimation of the ratio of wage income percentiles from the current year to the last but interferes less with the estimation of standardizations of each percentile if this report's hypothesis is correct because in that case all but one of these ratios are cancelled out:

$$x_{10(\tau=t)} = x_{10(\tau=0)} \left( \frac{\overline{x}_{\tau=1}}{\overline{x}_{\tau=0}} \right) \left( \frac{\overline{x}_{\tau=2}}{\overline{x}_{\tau=1}} \right) \ \ldots\ldots \left( \frac{\overline{x}_{\tau=t}}{\overline{x}_{\tau=(t-1)}} \right)$$

$$x_{10(\tau=t)} = x_{10(\tau=0)} \left( \frac{\overline{x}_{\tau=t}}{\overline{x}_{\tau=0}} \right)$$

where $x_{10(\tau=t)}$ is the $10^{th}$ percentile of wage income at time t and, according to this report's hypothesis might be any percentile. When $x_{10(\tau=t)}$ is standardized, $\tilde{x}_{10(\tau=t)}$:

$$\tilde{x}_{10(\tau=t)} = \frac{\left[x_{10(\tau=0)}\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right] - \left[\sum_{t=1}^{t=T} x_{10(\tau=0)}\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right]}{\sqrt{\sum_{t=1}^{t=T}\left(\left[x_{10(\tau=0)}\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right] - \left[\sum_{t=1}^{t=T} x_{10(\tau=0)}\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right]\right)^2}}$$

the factor common to both numerator and denominator, $x_{10(\tau=0)}$, cancels out leaving an algebraic structure in terms of ratios of the unconditional means:

$$\tilde{x}_{10(\tau=t)} = \frac{\left[\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right] - \left[\sum_{t=1}^{t=T}\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right]}{\sqrt{\sum_{t=1}^{t=T}\left(\left[\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right] - \left[\sum_{t=1}^{t=T}\left(\frac{\bar{x}_{\tau=t}}{\bar{x}_{\tau=0}}\right)\right]\right)^2}}$$

$$= \tilde{x}_{20(\tau=t)} = \ldots\ldots = \tilde{x}_{90(\tau=t)}$$

Any percentile of wage income, under the hypothesis, leaves the equivalent algebraic structure. So the hypothesis is that, once standardized, they all should overlap when plotted against time. The unconditional mean itself can be written the same way. That is why, given this report's hypothesis, the time-series graphs of standardized mean and standardized percentiles should overlap. The statistical test of this hypothesis is that the regression of each standardized percentile of wage income on the standardized mean of wage income should have intercept and slope not significantly different from zero.

The second kind of evidence is the demonstration that, in the logarithm, the time-series graphs of mean wage income and the percentiles of income do not diverge over time. They vary in parallel, approximately, which is what is expected if the "shock" that moves each one year to year. Given this report's hypothesis the logarithm of the time series of mean wage income and the percentiles of wage income should result in parallel graphs. The taking of the logarithm of wage income is a transformation that leaves the order of incomes by size unaltered. Thus the $j^{th}$ logarithm of a percentile of income is equal to the $j^{th}$ percentile of the logarithms of income. If $x_{it}$ and $x_{jt}$ are the $i^{th}$ and $j^{th}$ percentiles of nonmetro wage income in year t respectively and both have changed year to year by the same proportional factor in any year, call it $a_t$, then:

$$\ln(x_{it}) = \ln(x_{i(t-1)}) + \ln(a_t)$$

$$\ln(x_{jt}) = \ln(x_{j(t-1)}) + \ln(a_t)$$

which can be solved by backward substitution back to the first year of the time-series, t=0:

$$\ln(x_{it}) = \ln(x_{i(\tau=0)}) + \sum_{\tau=0}^{\tau=t} \ln(a_\tau)$$

$$\ln(x_{jt}) = \ln(x_{j(\tau=0)}) + \sum_{\tau=0}^{\tau=t} \ln(a_\tau)$$

which means that $\ln(x_{it})$ and $\ln(x_{jt})$ differ by a constant at any point in time. If this condition holds through time, the graph of their time-series will show them going up or down together in parallel over time. And vice versa, that is, if the graph of the logarithm of percentiles goes up and down together over time in parallel offset from each other by a constant, then they increase or decrease by the same proportional factor.

The Unconditional Mean of Nonmetro Wage Income Increased between 1961 and 2001

The premise of this report's hypothesis that it is an increase in mean nonmetro wage income that has driven the increase of the dispersion of nonmetro wage incomes in the period 1961 through 2001 is that mean nonmetro wage income increased between 1961 and 2001[7]. Figure 4 shows that it did. It also shows why from the vantage point of 1991, Levy and Murnane (1992) reported that the median of wage incomes had been stagnant in the 1970's and 1980's. The nonmetro mean rose steadily in the 1960's and the 1990's in real terms, i.e., constant 2001 dollars. In between it fluctuated up and down, ending the decades of the 1970's and 1980's close to where it began. In terms of constant 2001 dollars, the unconditional nonmetro mean of wage income increased from $16,092 in 1961 to $29,411 in 2001, a 2001 to 1961 ratio of 1.828.

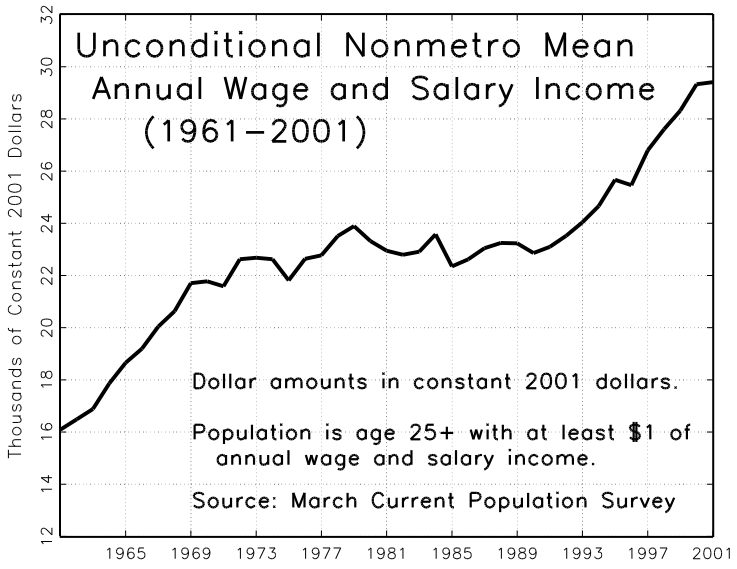



Figure 4
Source: Author's estimates from the March, CPS.

[7]In estimating the mean of nonmetro wage incomes, topcoded incomes were estimated as follows. If the observation was made in a year in which the Census Bureau used the minimum topcodeable income as the topcoded, the mean of topcoded incomes was estimated as 1.5 X the minimum topcodeable income. The narrow statement of Pareto's Law (Pareto, 1897) of large incomes is that the mean of incomes in excess of any particular large income is 1.5 X that particular income. Where the Census Bureau used the mean of topcoded incomes in a particular demographic category as the topcode, that topcode was accepted untransformed as a valid observation in estimating the mean.

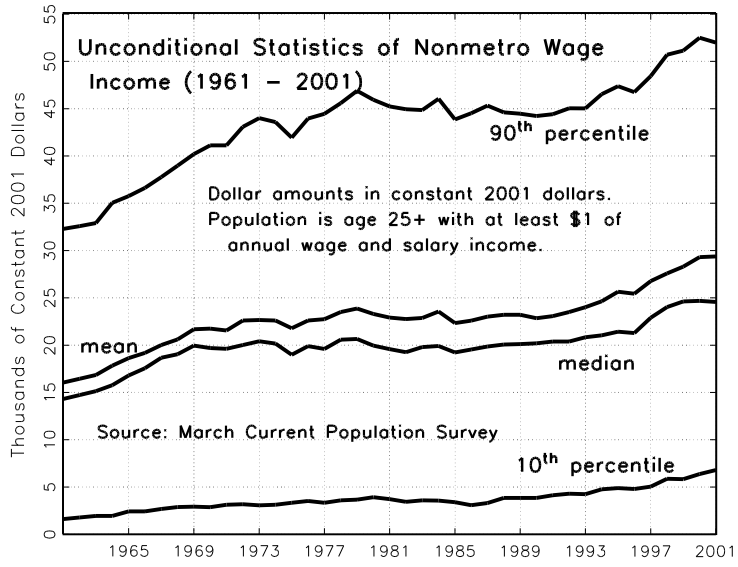



Figure 5

Figure 5 graphs the unconditional 10th percentile, 50th percentile (the median), and 90th percentiles of nonmetro wage income as well as the unconditional mean of nonmetro wage income from figure 4 against time. The reason the unconditional mean looks "flatter" in figure 5 is the range of income values is different. The range of $12,000 to $32,000 (in 2001 constant dollars) brackets the nonmetro mean from 1961 through 2001, but the 10th percentile is much lower and the 90th percentile much higher than the mean. So figure 5's range of incomes goes from $0 to $55,000 in constant 2001 dollars. Figure 5 shows that, in fact, the nonmetro median tracks the nonmetro median quite closely. Figure 5 also shows the same divergence trend between small and large percentiles for nonmetro wage income that Levy and Murnane (1992) and the later labor economics literature reports for the U.S. labor force as a whole. Over the period 1961 through 2001 the 90th percentile of nonmetro wage income increased substantially more than did the 10th percentile in real terms. The 90th percentile went from $32,308 in 2001 dollars in 1961 to $51,996 in 2001, while the 50th percentile, the median, only went from $14,342 to $24,587, a smaller increase in absolute terms, but a roughly equivalent proportional increase. Clearly, the 90-10 difference increased; indeed the dispersion of nonmetro wage income increased. Notice that the 50-10 difference (the difference between the median and the 10th percentile) is also greater in 2001 than in 1961.

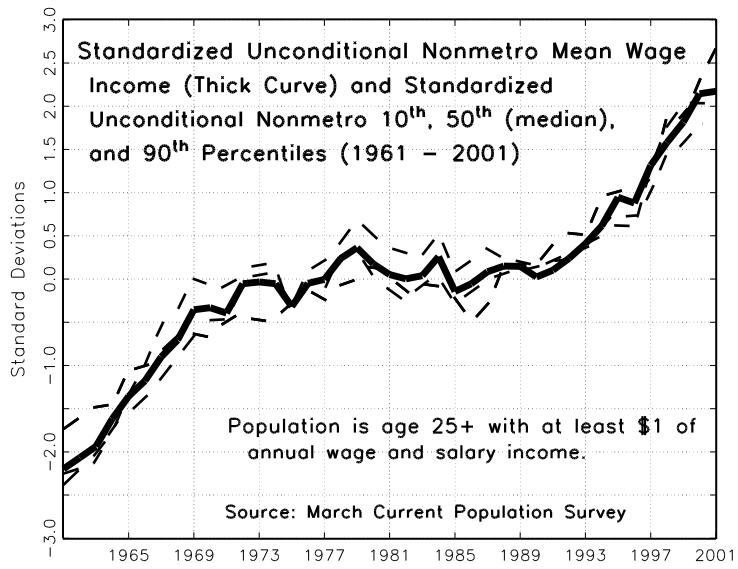



Figure 6

Most of the increase in the 90-10 difference is due to the 90th percentile's rapid increase. One might easy form the impression that the rich, at least the wage rich, are getting richer, leaving the wage poor behind, if not poorer. Notice though the pause in the time pattern of the upward movement of the 90th percentile during the 1970's and 1980's the two decades when the mean and median are stalled too. Notice also that the impression that the 90th percentile is racing upwards

away from smaller percentiles is based on the absolute dollar difference between them, not their proportional increases. The ratio in constant 2001 dollars of 1961's to 2001's 10th percentile is 4.132. The same ratio for the median is 1.714 and for the 90th percentile 1.609. You can see that the percentiles smaller than the median increased, proportionally, more rapidly than those at the median or larger. The pattern is that among the small incomes, the smaller increased proportionally more. Among wage incomes at the median or larger, the proportional increase from 1961 to 2001 is remarkably equal, roughly comparable to the ratio of increase of the unconditional mean, just somewhat less, as they must be in order to accommodate higher ratios among smaller incomes. The value in constant dollars in 2001 is about 1.6 the income in 1961. So much for the wage rich racing away from the wage poor, at least in proportional terms.

Table 1.

| percentile | ratio of percentile in 2001 in 2001 dollars to percentile in 1961 in 2001 constant dollars |
|---|---|
| 10th | 4.132 |
| 20th | 2.991 |
| 30th | 2.257 |
| 40th | 1.974 |
| 50th | 1.714 |
| 60th | 1.669 |
| 70th | 1.594 |
| 80th | 1.585 |
| 90th | 1.609 |

Figure 6 shows that when standardized the unconditional percentiles of nonmetro wage income, the 10th, the 50th (the median), and the 90th overlap the standardized unconditional mean of nonmetro wage income when plotted against time, just as this report's hypothesis predicts, what one expects if all nonmetro wage incomes increased proportionally over time as mean nonmetro wage incomes increase. So while the 90th percentile of nonmetro wage income did increase between 1961 and 2001 much faster in terms of constant 2001 dollars than the 10th percentile, both experienced almost the same proportional growth, what figure 6 shows.

But, one might object, this report's hypothesis asserts that all nonmetro wage incomes increased by the same proportion as the mean in a period of time. Figure 6 just shows three percentiles. Possibly something else happened between these ranks of income. Figure 7 addresses that issue. It graphs the standardized 10th, 20th, 30th, 40th, 50th (median), 60th, 70th, 80th, and 90th percentiles of nonmetro wage income along with the standardized nonmetro mean (thick curve) from 1961 and 2001. It looks as if all these standardized percentiles exhibit only modest random fluctuations in terms of standard deviations around the graph of the standardized mean. That means that, if this report's hypothesis is correct, the regression of each standardized percentile of nonmetro wage income on the standardized mean of nonmetro wage income should be 1.0. Table 2 gives the estimates from each of these nine ordinary least squares (OLS) regressions.

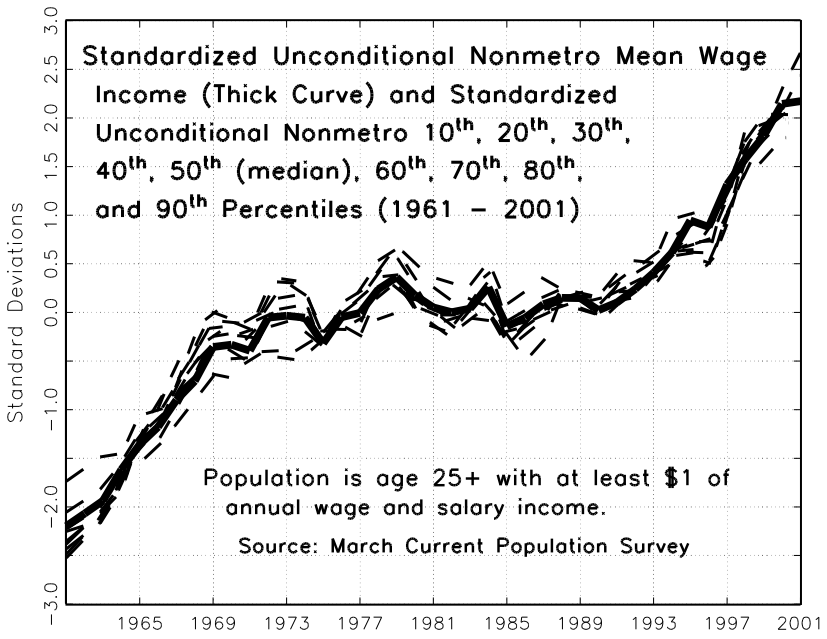


Figure 7

Table 2. OLS Regressions of 10th, 20th, 30th, 40th, 50th (median), 60th, 70th, 80th, and 90th Percentiles of Nonmetro Wage Income on Mean of Nonmetro Wage Income 1961 - 2001 (n = 41)

| dependent variable: a standardized percentile of nonmetro wage income | $r^2$ | F-test for explained variance: F(1,39) | probability of error in rejecting null hypothesis | coefficient (slope) of standardized mean of nonmetro wage income (standard error of estimate) |
|---|---|---|---|---|
| 10th | .926 | 484.816 | < .0001 | .962053 (.043693) |
| 20th | .974 | 1487.382 | < .0001 | .987142 (.025596) |
| 30th | .987 | 2876.300 | < .0001 | .993289 (.018521) |

| | | | | |
|---|---|---|---|---|
| 40th | .980 | 1889.584 | < .0001 | .989837 (.022271) |
| 50th (median) | .966 | 1104.058 | < .0001 | .982792 (.029578) |
| 60th | .958 | 883.867 | <.0001 | .978642 (.032918) |
| 70th | .965 | 1087.924 | <.0001 | .982544 (.029789) |
| 80th | .961 | 967.496 | <.0001 | .980434 (.031521) |
| 90th | .955 | 822.819 | <.0001 | .977112 (.034064) |

As predicted, the coefficients from the regression of the standardized percentiles of nonmetro wage income on the standardized mean of nonmetro wage income are nearly 1.0, indicating near statistical equivalence. Yet, in understandardized form all nine percentiles clearly indicate for nonmetro wage income the pattern of diverging percentiles that the labor economics literature takes as evidence of a trend toward inequality most readily explained by the "polarization" of the U.S. labor force into two groups, one wage poor, the other wage rich. See figure 8. Notice in figure 8 that the larger an income becomes, the faster it becomes larger. Indeed the dispersion of nonmetro wage incomes increased between 1961 and 2001, although this process appears to have stalled in the 1970's and 1980's, when mean nonmetro wage income did sustain a major increase or decrease. But figure 9 shows the apparent evidence for "polarization" in figure 8 is nothing of the sort.

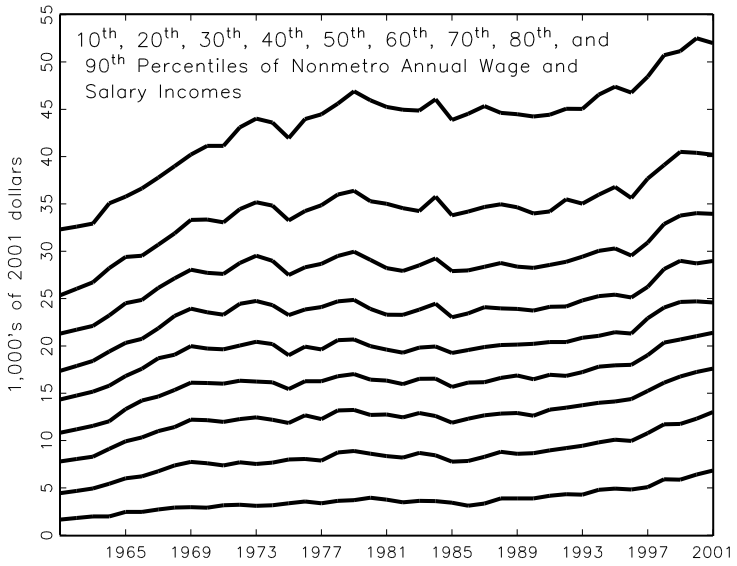


Figure 8

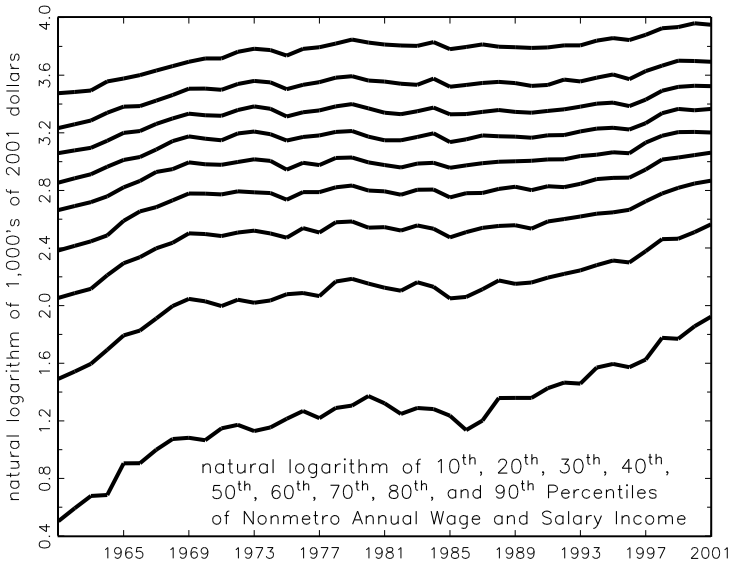



Figure 9

Figure 9 shows the logarithm of the percentiles of nonmetro wage income from 1961 through 2001. If the (unlogged) percentiles increase or decrease proportionally over time by the same amount, the time-series graphs of the log-percentiles will be parallel, and conversely, if the time-series graphs of the log-percentiles are parallel, then the percentiles increase or decrease proportionally by the same factor. As you can see in figure 9, the 40th through the 90th log-percentiles are quite nearly parallel, as predicted by this report's hypothesis. The exception to the generalization, are the smaller log-percentiles, the 10th, 20th, and 30th. These are not parallel, but they are hardly evidence of inequality. The smaller they are, they more they converge with the larger percentiles, that is, the smaller a nonometro wage income is the greater is its proportional increase when the mean of nonmetro wage income increases, proportional increases which are greater than the proportional incomes of larger incomes. This is not evidence of an inequality trend. Figure 9 is evidence of an egalitarian bonanza, when the mean of nonmetro wage income increases.

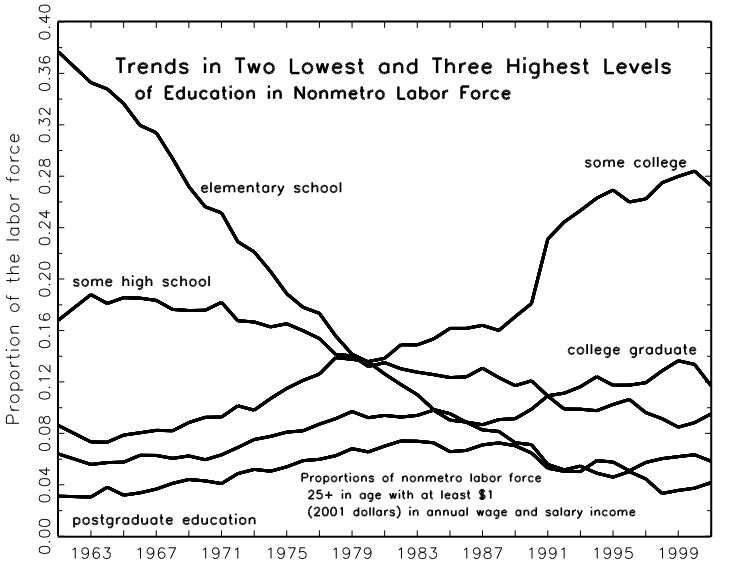


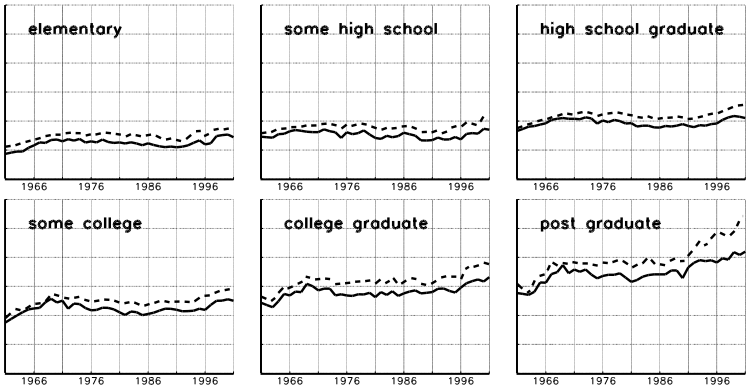

Figure 10. Graph of proportions of Nonmetro Labor Force at Various Levels of Education
Source: Author's estimates from March, CPS

The Effect of Education on the Dispersion Trend in Nonmetro Wage Income

But what about the effect of rising levels of education in the nonmetro labor force on the dispersion trend in nonmetro wage income. Were there divergences between wage income percentiles of wage earners at different levels of education? Among wage earners at approximately the same level of education? Could changes in the distribution of education in the nonmetro labor force account for the dispersion trend in unconditional nonmetro wage income so clear, for example, in figure 8?

During the period 1961 through 2001, the level of education of the nonmetro labor force rose steadily. See figure 10, which shows the proportion of the nonmetro labor force with only an elementary school education plummeted from about 37% to about 4% between 1961 and 2001, while the proportion with at least some post-secondary education rose rapidly. More educated nonmetro workers earned more on average than less educated workers in the period 1961 through 2001. See figure 11, which plots the mean and median of the wage income of the nonmetro labor force at each of six levels of education distinguished from 'elementary school' through 'postgraduate education', that is, more than four years of post-secondary education completed.

Given this fact, in any year that the mean education level of the nonmetro labor force increased, part of the aggregate national income paid to nonmetro workers in wages went to pay for the upgrade in education levels in the labor force and is not available to distribute broadly to wage incomes of all sizes. It may be, as Johnson (1997) has inferred, that the modernization and globalization of the U.S. economy has increased the demand for more educated workers while reducing the demand for less educated workers, thus opening a "wage gap" between



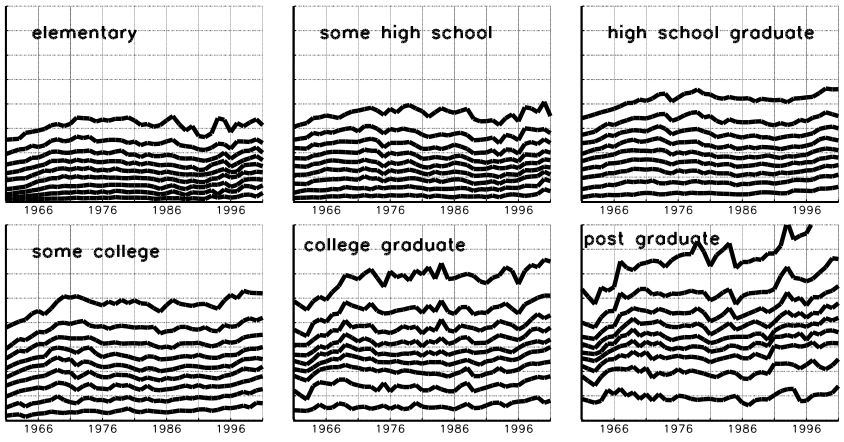

Sample Estimates of Median (solid curve) and Mean (dashed curve) of Nonmetro Annual Wage and Salary Salary Income by Level of Education

x-axis: 1961 – 2001
y-axis: $1 to $60,000 in constant 2001 dollars with tic marks at $10,000 intervals

Population age 25+ with at least $1 of annual wage and salary income.
Source: March Current Population Survey

Figure 11

them. In fact, figure 12 does make it look as if the higher percentiles of the most educated nonmetro wage workers are not only diverging upward and away from the smaller percentiles of the most educated but also from the wage incomes of the less well educated.




Sample Estimates of 10th, 20th, 30th, 40th, 50th (median), 60th, 70th, 80th, and 90th Percentiles of Nonmetro Annual Wage and Salary Income

x-axis: 1961 – 2001
y-axis: $1 to $80,000 in constant 2001 dollars with tick marks at each $10,000

Population age 25+ with at least $1 of annual wage and salary income.
Source: March Current Population Survey

Figure 12

A glance at figure 12 also suggests that the divergence of higher from lower percentiles is concentrated among the more educated. That impression might be due to

the fact that the wage incomes of the more educated have been larger all through the period 1961 to 2001 and since the higher percentiles of the more educated are larger than those of the less educated, proportional increases in them will dominate the range of the y-axis on which they are plotted. There may be the same sort of proportional increases among the higher percentiles of the less educated but the absolute differences between them are so much smaller than the absolute differences between the higher percentiles of the more educated, the fact of nearly equal proportional increases cannot be readily detected by looking at figure 12. See figure 13, which is the first graph of figure 15, that of the least educated group, people with only an elementary school education, enlarged and graphed on a range of incomes from $0 to $35,000 in 2001 dollars instead of the range of $0 to 80,000 in figure 12. As you can see in figure 13, the larger percentiles peel away upward from the lower percentiles over time in approximately the same way they do, when the larger percentiles are larger incomes as those of the more educated are.

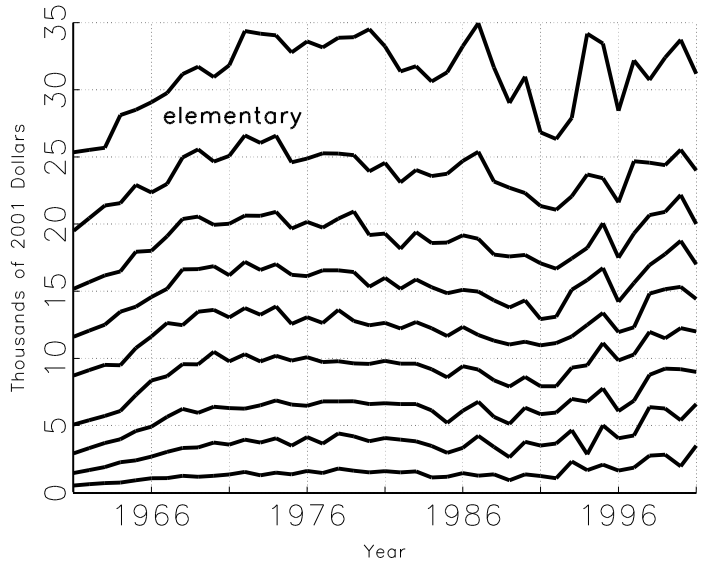



Figure 13

In fact, the ratios of a given wage income percentile of the more educated to the same wage income percentile of the more educated did not systematically increase between 1961 and 2001 as would be expected if the wage incomes of the more educated were veering away and upward from those of the less educated. If the wage incomes of the more and less educated alike were increasing by nearly the same proportion when the unconditional mean of wage income increased, then one would not expect the ratio of their medians to increase.

Of course, were that the case, the same proportional increase to the larger wage incomes of the more educated as the smaller wage incomes of the less educated would open up a bigger absolute difference between their wage incomes. Figure 14 shows the times series of the ratio of the median wage income of the most educated nonmetro wage earners to that of the least educated

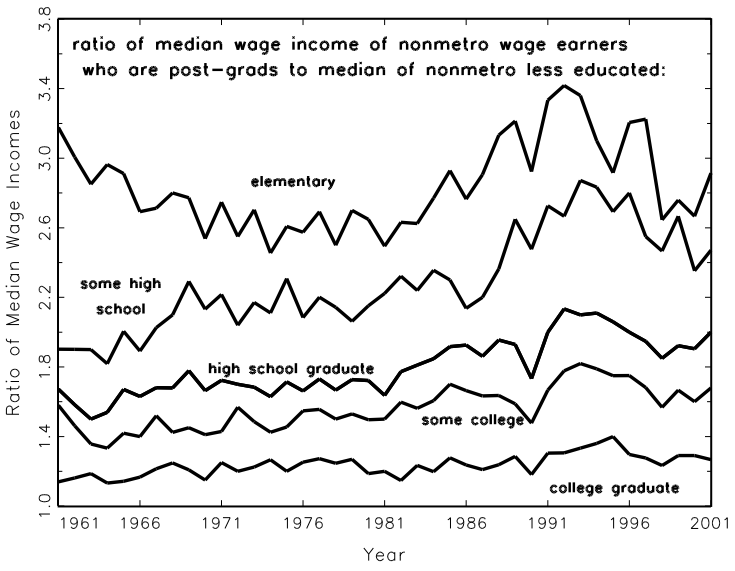
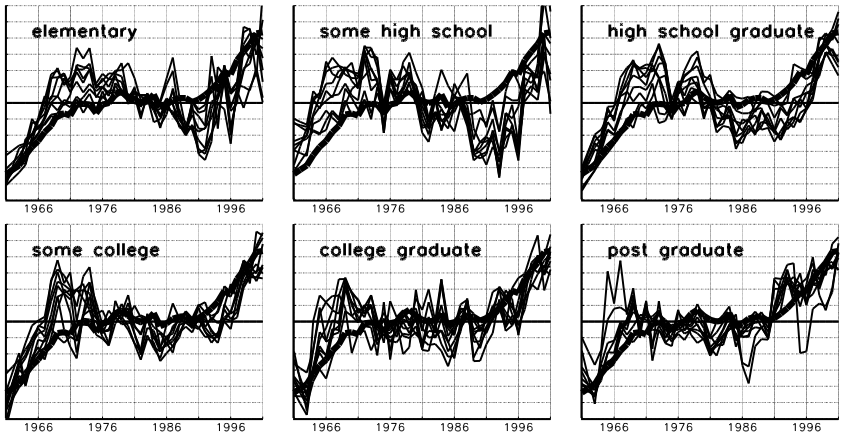



Figure 14

from 1961 through 2001 (top curve in figure 14). There is little evident upward trend in this ratio, i.e., no basis on which to assert that the wage incomes of the more educated are racing upward away from the those of the less educated. In fact, figure 14 indicates that the wage ratios at the median wage of segments of the labor force at different levels of education vary nearly randomly around a constant. This constancy is perhaps the reason why all wage incomes increase by a nearly equal proportion when mean wage income increases. Such a mechanism is the only way that wage incomes could be increased and preserve the ratio of wage incomes between these different segments of the labor force constant. The presumable reason for keeping them constant is that education has a constant and close relationship to labor productivity.



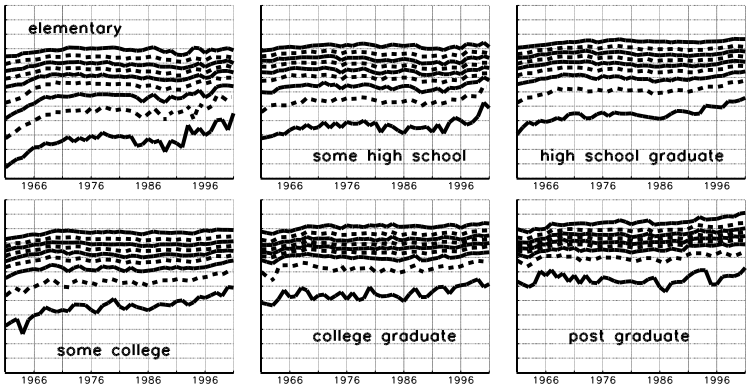

Standardized Unconditional Nonmetro Mean Wage Income (Thick Curve) and Standardized Nonmetro Deciles of Annual Wage and Salary Income by Level of Education (10th through 90th decile)

x-axis: 1961 – 2001
y-axis: standard deviations from −3.0 to +3.0 with a tic mark at each .5 standard deviation

Population age 25+ with at least $1 of annual wage and salary income.
Source: March Current Population Survey

Figure 15

Figure 15 shows that the standardized deciles from the 10th to the 90th of the wage incomes of each education level segment of the nonmetro labor force nearly overlap the standardized unconditional mean. Figure 16 shows that when the natural logarithm of the nonmetro wage deciles is taken, those at each education level segment of the nonmetro labor force are substantially parallel over time. Figures 15 and figure 16 substantially validate this report's hypothesis that nonmetro wage income dilate proportionally by about the same factor, greater than 1.0, when the unconditional mean of nonmetro wage income increases.




Sample Estimates of Natural Logarithm of 10th, 20th, 30th, 40th, 50th (median), 60th, 70th, 80th, and 90th Percentiles of Nonmetro Annual Wage and Salary Income

x-axis: 1961 – 2001
y-axis: natural logarithm of income in thousands of constant 2001 dollars; range −1 to 5 with tic marks at intervals of .5

Population age 25+ with at least $1 of annual wage and salary income.
Source: March Current Population Survey

Figure 16

## Conclusions

There is a "vast" (Haider, 2001:799) scholarly literature on the perceived trend toward greater inequality in U.S. wage income in recent decades. This literature mostly defines inequality in wage income as a trend toward greater

dispersion of wage income and also in terms of the growth in the relative frequency of large nonmetro wage incomes.

The thesis of the social science literature that there is an on-going inequality trend in wage income in the U.S. has been amply transmitted to a wide public via the print media. The content of this literature has been so well reported in the print media that editors of the **Wall Street Journal**, not a publication with a reputation for critiquing economic inequalities, allowed a reporter to remind readers of the inequality trend literature in wage incomes in the first sentence of a story at the top of the front page in a way that allows scant grace to readers who need reminding of or who disagree with that thesis: "Any alert newspaper reader knows that real U.S. wages have grown markedly more unequal in recent decades." (**Wall Street Journal**, December 26, 1996).

The present Rural Development Research Report shows that an increase in nonmetro mean wage income is reflected in approximately equal proportional increases in all nonmetro wage incomes, regardless of size. A nearly equal proportional increase of all wage incomes increases the dispersion of wage income. The exception to this generalization is the smallest nonmetro wage incomes because they enjoy a greater proportional increase than larger nonmetro wage incomes, when the mean of nonmetro wage income increases. This generalization does not assert that all nonmetro wage earners have their wage incomes increased by the same proportion when mean nonmetro wage income increases. From period to period there are winners and losers among wage earners, in absolute terms, i.e., more or less money, and/or in relative terms, i.e., a higher or lower percentile.

Some of the propositions of the literature on the inequality trend can be easily dismissed. A glance at the data, figure 2, shows that the nonmetro distribution of annual wage and salary income did not become U-shaped, hollowed out, between 1961 and 2001. Figure 3 which graphs the correlations between the relative frequencies of large and small nonmetro wage incomes shows that the relative frequencies of large and small wage incomes vary inversely. The relative frequency of large nonmetro wage incomes grows while the relative frequency of small nonmetro wage incomes decreases, and vice versa. If so, the possibility of the simultaneous thickening of left and right tails of the distribution, the hollowed out distribution (See figure 1), did not occur in the period of 1961 through 2001 in the U.S. Inspection of figure 2 shows that the relative frequency of small wage incomes decreased over most of the period of 1961 - 2001 in the U.S. while the relative frequency of larger wage incomes increased. The simplest explanation for both phenomena is that all wage incomes increase in size when mean wage income increases, the mechanism this report hypothesizes as the explanation of the dispersion trend in nonmetro wage income.

A search of the literature on U.S. wage income in recent decades failed to find a discussion of this mechanism of change in wage income so this report's finding the mechanism is novel. There are two major pieces of evidence that this mechanism exists. One is that the standardized deciles of nonmetro annual wage income from the $10^{th}$ to the $90^{th}$ percentile, when

standardized, all overlap the standardization of the nonmetro mean of annual wage income. Wage income percentiles are wage incomes in a particular rank order of the sample of observations from small to large. Thus the $10^{th}$ percentile is a small income whereas the $90^{th}$ is a large one. See figures 6 and 7. Table 2 presents the statistical test for how similar these standardized variables are. Figure 15 shows that controlling for education by segmenting the labor force into six different levels of educational attainment does not fundamentally alter this result. If the hypothesized mechanism exists, then it implies that these standardized variables should be statistically equivalent.

The other major piece of evidence showing all wage incomes, regardless of size, increase by nearly the same proportion when mean wage income increases is the demonstration that the logarithms of wage income deciles from the $10^{th}$ percentile to the $90^{th}$ percentile vary in parallel over time, which is what is expected given this report's hypothesis. The unlogged $90^{th}$ percentile of nonmetro wage incomes races upward and away from a smaller percentile, say the median, the $50^{th}$. See figures 5, 8, 12, and 13. It is this racing away of large percentiles that has been accounted for by the "hollowed out" distribution hypothesis. It certainly looks as if the wage rich are getting richer faster than workers earning less. However, when logarithms are taken, all the nonmetro wage income percentiles, with an exception, are obviously approximately parallel. See figures 9 and 16. The exception is the logarithm of the small incomes. These converge upward toward the time-paths of the larger log-percentiles, indicating that small incomes are increasing proportionally faster than larger incomes, i.e., they are closing the gap. Figures 9 and 16 show that the smaller the income, the faster it increases proportionally. This finding contradicts the "vast" literature that asserts there is a trend toward greater inequality in wage incomes.

Some people may think it is the well educated who are leaving the less well educated behind in terms of wages, but analysis of the data shows that the ratios of the nonmetro median wage incomes of the less well educated to the most educated group were basically constant over the period 1961 through 2001. The more educated earn more on average than the less educated, presumably because education raises their productivity, and consequently when all wage incomes receive essentially the same proportional increase, their increase is larger in absolute terms than those of the less educated. As figures 12 through 16 show, the mechanism of wage income increase by nearly the same proportion works on the wages of those with about the same amount of education as it works on the wage incomes of those with different amounts of education.

It is up to the observer to interpret the mechanism by which wage incomes change when their mean increases as an inequality trend or an egalitarian bonanza. The case for seeing it as an increase in inequality is that the larger wage incomes increase more in absolute terms than smaller wage incomes. If dispersion is one's definition of inequality, indeed there is greater dispersion after an increase in mean wage income and so greater inequality. The gap between the richest and poorest is wider. The distribution is more "spread out", the income difference between any two percentiles of wage is greater and the distance itself is related to income level. Given an increasing mean, the bigger the pair of any percentiles, a given percentile difference apart, e.g., $60^{th}$ and $70^{th}$

percentiles, the greater the difference between them and the greater the divergence upward over time of the larger from the smaller.

The case for interpreting the mechanism by which wage incomes change when the mean increases by the phrase 'egalitarian bonanza' starts with recognizing what this mechanism is not. It is not a bifurcation of the labor force into two roughly equal groups of wage earners, one with small wage and the other with large wages with few wage earners in between with middling wages. This mechanism did not start working around 1980. It has worked on nonmetro wage incomes since 1961, the starting point of the time-series of data examined. The findings of Goldin and Margo (1992) that wage income dispersion decreased in the Great Depression suggest this mechanism has been at work for a much longer time when the American economy, population, and democracy thrived. The point that the increasing dispersion introduced by a rising mean should not be bothersome is made by reversing the process back to its origin: the whole labor force back at almost the same very low wage, a state of affairs most reasonable people would not envy.

The phrase 'inequality trend' used in the social science literature to reference an increase in the dispersion of wage income suggests that something bad is happening, that someone is being harmed. Harmed? Nonmetro wage incomes of all size receive a nearly equal proportional increase when their mean and median increase. The proportional increase is roughly that by which the mean increases, but not exactly since small wage and salary incomes increase by a larger proportion so they are continually "catching" up slightly with the larger percentiles. It is a bonanza shared out proportionally in a strictly egalitarian way. It is not widely known that this mechanism exists because it differs from the experience of individuals who, in any given time period, are more or less successful either in absolute (more or less money) and/or relative terms (a higher or lower percentile), but it is clearly demonstrated in figure 11. It is the remarkable equality of the proportional increases of nonmetro wage incomes of all sizes when the mean of nonmetro wages increases that makes the term "inequality trend" inappropriate as a name for the mechanism of change of wage incomes. Of course, the equality of proportional adjustments of wage incomes of all sizes with change in their mean does not derive from anyone's intention to be egalitarian. Instead this mechanism is the only way that an increase in national income going to wage earners can be distributed so that it preserves all existing ratios of wage incomes, presumably each based on productivity assessments.

It is vital that this mechanism of change in nonmetro wage incomes be known to people who influence rural economic development policy. The question of how rural development funds can most effectively help low wage rural workers might be answered with restrictions on economic activity, restrictions to channel benefits to low wage rural workers away from wage earners with larger wages, under the inference that, otherwise, they would benefit disproportionately, That inference would be a correct interpretation of what the "vast" literature on the inequality trend in U.S. wage income implies. It is the wrong answer though for rural economic development policy, because, as this paper shows, all wage incomes increase by nearly the same proportion when their mean increases. The way to help low wage nonmetro labor force

is the same way to help high wage nonmetro labor force: increase the nonmetro mean wage income via economic development. All wage incomes will increase by nearly the same proportion when mean wage income increases. The major exception is that for very low wage incomes which will increase by a somewhat larger proportion than high wage incomes.

Restrictions intended to ensure that low wage workers benefit disproportionately from economic development are redundant and counter-productive if they interfere with maximizing the impact of funds earmarked for rural economic development on raising mean nonmetro wage income.

Is it fair to call the dispersion trend in nonmetro wage incomes as illustrated by the upward divergence over time of larger wage income percentiles (figures 5, 8, 12, and 13) an inequality trend? If greater dispersion is defined as greater inequality, then, by definition, inequality is increasing. But it is not fair or appropriate to label increased dispersion caused by the increase of all wage incomes, regardless of size, by nearly the same proportion when mean wage income increases as increased 'inequality'. 'Inequality' implies that something has become worse. That is not the case. The entire labor force welcomes the increase. Also, the mechanism which causes the increased inequality is remarkably equal. The increases are nearly equal proportionally. Calling this event an increase in 'inequality' is willful pessimism. That is evident by running the process in reverse. Goldin and Margo (1992) found lower wage dispersion during the Great Depression, a time of lower mean and median wage incomes, and a synonym for misery. The logical consequence of increasing equality defined as less wage income dispersion is near equality at subsistence. 'Egalitarian bonanza' is a better term for the trend in nonmetro wage income dispersion than 'inequality trend'.

**APPENDIX A: Data and Methods**

The distribution of annual wage and salary income is estimated with data from the March Current Population Surveys (1962-2002). The March Current Population Survey (CPS) is known as the Annual Demographic Survey. It has a supplementary questionnaire which includes questions on types of income received in the previous calendar year, posed on behalf of the U.S. Bureau of Labor Statistics. One of the types of income asked about on the March Supplement is total wage and salary income received in the previous calendar year. The CPS is conducted monthly by the U.S. Bureau of the Census (Weinberg, Nelson, Roemer, and Welniak, 1999). The CPS has a substantial number of households in its nationwide sample. Labor force is defined as the population 25 + in age, earning at least $1 in annual wage and salary income. The age restriction to 25+ is to allow the more educated to be compared to the less educated. The data of the March CPS of 1962 through 2002 was purchased from Unicon, inc. (Unicon, inc, 2002; Current Population Surveys, March 1962-2002), which provides the services of data cleaning and extraction software, along with substantial research on variable definitions and comparability over time. Unicon, inc was not able to find a copy of the March 1963 CPS which contains data on education. Consequently, the distribution of wage and salary income received in 1962 (from the March 1963 CPS) conditioned on education is interpolated from the 1961 and 1963 (from the 1962 and 1964 March CPS').

All dollar amounts in the March CPS' are converted to constant 2001 dollars using the PCE (personal consumption expenditure) price index numbers from Table B-7 Chain-type price indexes for gross domestic product, **Economic Report to the President**, February 2003 (Council of Economic Advisers, 2003).

The numbers of persons in the March Current Population Survey in each year and the number of them meeting the criterion for selection are:

| March CPS of | Total number of person records in the March Current Population Survey | people, age 25+, who earned at least $1 in previous calendar year |
|---|---|---|
| 1962 | 71,745 | 22,923 |
| 1963 | 54,282 | 15,147 |
| 1964 | 54,543 | 23,903 |
| 1965 | 54,516 | 23,839 |
| 1966 | 110,055 | 46,656 |
| 1967 | 104,902 | 45,266 |
| 1968 | 150,913 | 47,157 |
| 1969 | 151,848 | 48,088 |
| 1970 | 145,023 | 46,004 |
| 1971 | 147,189 | 46,088 |
| 1972 | 140,432 | 44,143 |
| 1973 | 136,221 | 43,200 |
| 1974 | 133,282 | 43,043 |
| 1975 | 130,124 | 42,424 |
| 1976 | 135,351 | 43,888 |
| 1977 | 160,799 | 52,663 |
| 1978 | 155,706 | 52,255 |
| 1979 | 154,593 | 52,793 |
| 1980 | 181,488 | 63,429 |
| 1981 | 181,358 | 64,108 |
| 1982 | 162,703 | 57,877 |
| 1983 | 162,635 | 57,995 |
| 1984 | 161,167 | 58,049 |
| 1985 | 161,362 | 59,819 |
| 1986 | 157,661 | 59,596 |
| 1987 | 155,468 | 59,603 |
| 1988 | 155,906 | 60,501 |

| | | |
|---|---|---|
| 1989 | 144,687 | 57,158 |
| 1990 | 158,079 | 62,883 |
| 1991 | 158,477 | 62,942 |
| 1992 | 155,796 | 62,085 |
| 1993 | 155,197 | 61,331 |
| 1994 | 150,943 | 59,575 |
| 1995 | 149,642 | 59,999 |
| 1996 | 130,476 | 53,358 |
| 1997 | 131,854 | 54,553 |
| 1998 | 131,617 | 54,056 |
| 1999 | 132,324 | 54,659 |
| 2000 | 133,710 | 55,925 |
| 2001 | 128,821 | 53,967 |
| 2002 | 217,219 | 89,200 |

The measurement of education changed in the CPS after the 1990 Census from a count of years of school completed to a more degree oriented measure which better measures the diversity of post-secondary education. The present study reconciles the two categorizations of educational attainment by collapsing both sets of categories to an ordinal polytomy of six categories. The crudeness of this categorization obliterates the distinction between the two different categorizations of educational attainment. The categories of highest level of education attained used here are:

| |
|---|
| elementary school or less |
| some high school |
| completed four years of high school |
| some college |
| completed four years of post-secondary education |
| completed more than four years of post-secondary education |

In figure 2, this paper estimates the distribution of annual wage and salary income the traditional way, in terms of relative frequencies of observations falling into bins of fixed width, a histogram. There are many ways to estimate a distribution. All of them involve a trade-off between parsimony of model and error of fit. Parsimony is expressed in the amount of smoothing of the estimate. In terms of fixed bins, the greater the bin width, the fewer bins are used, and the greater the degree of aggregation and the smoother the estimate of the distribution. A wage and

salary income distribution of a large population defined in geographic terms has been a familiar statistical object for over a century. It is known to be right skewed (Pareto's Law (Pareto, 1897), broadly construed) and usually unimodal after smoothing. Histograms have long been used with income data and, unlike methods of estimating the distribution of unfamiliar random variables, do not require lengthy descriptions of method. In published tabulations, the Census Bureau, traditionally, presents income distributions as histograms, but histograms with variable bin widths. In Census Bureau practice bins near the mode have a fixed width, e.g., $10,000, which increases with income size in the increasingly sparse right. This policy is intended to keep the standard errors of estimate of the right tail bins comparable to those of the bins near the mode. However, such presentation disguises how skewed income distributions are because it is difficult to mentally adjust the relative frequency for the increasing bin length in the right tail. The present paper estimates a distribution with relative frequency bins that are fixed length, $10,000 wide (in terms of constant 2001 dollars), to facilitate comparison between the more dense left tail and central mass and the less dense right tail of the distribution.

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