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Inequality in the Distribution of Income: Trends and International Comparisons

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Inequality in the Distribution of Income: Trends and International Comparisons

Abstract
Economic theory alone does not establish any basis for preferring a more or less equal distribution of income. Nonetheless, a common aim of policy is promoting equality of opportunity. An extremely unequal distribution of income may be considered an indication of a lack of equal opportunity. Arguments for a more equal distribution of income than that which would result from market forces are based on a number of propositions. One is a common assumption made in economic analysis known as diminishing marginal utility of income. This is the notion that each additional dollar of income yields less utility, or satisfaction. If the assumption of diminishing marginal utility of income is accepted, then, in theory, it should be possible to increase the overall well-being (utility) of society by taking some from those with high incomes and giving it to those with low incomes. A second, noneconomic, justification for policies designed to make the income distribution more equal is concern that society prevent its members from falling below some minimum standard of living.

Existing measures of income fall well short of an ideal that would accurately indicate how well off individuals or households are. Not all kinds of income are counted. Taking the existing measures at face value, however, several observations can be made. First, the distribution of income in the United States has become increasingly unequal since the late 1960s. Second, the U.S. income distribution is the most unequal of all major industrialized countries. Some of the greater income equality found in other major industrialized countries may be due to the fact that government transfers are more directly targeted at lower income households.

The distribution of earnings is more unequal than is the distribution of household income. Of particular interest is that the gap in earnings between highly educated or skilled workers and less skilled workers has grown substantially. Explanations focusing on world trade and national demographics have been suggested, but the one most widely accepted is that technological advances in recent years have increased the demand for more highly skilled labor relative to its supply. Policies that boost the supply of skilled workers would thus seem likely to narrow that gap and act as an equalizing influence on the income distribution. But, the large gap in pay between skilled and unskilled workers that has developed would itself seem to be a substantial incentive for prospective and current workers to expand their education and training.

This report will be updated as developments warrant.

Keywords
Congressional Research Service, diminishing marginal utility of income, distribution of Income, inequality

Comments

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CRS Report for Congress

Inequality in the Distribution of Income: Trends and International Comparisons

Updated October 20, 2008

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Prepared for Members and Committees of Congress

Congressional Research Service

Inequality in the Distribution of Income: Trends and International Comparisons

Summary

Economic theory alone does not establish any basis for preferring a more or less equal distribution of income. Nonetheless, a common aim of policy is promoting equality of opportunity. An extremely unequal distribution of income may be considered an indication of a lack of equal opportunity. Arguments for a more equal distribution of income than that which would result from market forces are based on a number of propositions. One is a common assumption made in economic analysis known as *diminishing marginal utility of income*. This is the notion that each additional dollar of income yields less utility, or satisfaction. If the assumption of diminishing marginal utility of income is accepted, then, in theory, it should be possible to increase the overall well-being (utility) of society by taking some from those with high incomes and giving it to those with low incomes. A second, non-economic, justification for policies designed to make the income distribution more equal is concern that society prevent its members from falling below some minimum standard of living.

Existing measures of income fall well short of an ideal that would accurately indicate how well off individuals or households are. Not all kinds of income are counted. Taking the existing measures at face value, however, several observations can be made. First, the distribution of income in the United States has become increasingly unequal since the late 1960s. Second, the U.S. income distribution is the most unequal of all major industrialized countries. Some of the greater income equality found in other major industrialized countries may be due to the fact that government transfers are more directly targeted at lower income households.

The distribution of earnings is more unequal than is the distribution of household income. Of particular interest is that the gap in earnings between highly educated or skilled workers and less skilled workers has grown substantially. Explanations focusing on world trade and national demographics have been suggested, but the one most widely accepted is that technological advances in recent years have increased the demand for more highly skilled labor relative to its supply. Policies that boost the supply of skilled workers would thus seem likely to narrow that gap and act as an equalizing influence on the income distribution. But, the large gap in pay between skilled and unskilled workers that has developed would itself seem to be a substantial incentive for prospective and current workers to expand their education and training.

This report will be updated as developments warrant.

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Inequality in the Distribution of Income: Trends and International Comparisons

Although an economic expansion began in November 2001, and productivity growth has been relatively rapid since then, there is concern that wages have not kept pace with overall economic growth, and that business owners have profited at the expense of workers.[1] There is no shortage of anecdotal evidence regarding workers who are losing ground in spite of a growing economy. At times when the benefits of economic growth do not seem to be shared by all, there tends, not unexpectedly, to be an increased focus on how much disparity in living standards there is across the population. Now that the economy seems to be somewhat less vigorous, those concerns are amplified.

There are a number of legislative issues for which the shape of the income distribution may be an important consideration. Among them are tax rates and the minimum wage. This report examines the distribution of income in the United States, including factors that may help explain it, how it has changed over time, and how it compares with those of other countries.

Evaluating Distributions

Economic theory does not establish a basis for preferring any particular degree of equality in the distribution of income. In theory, at least with respect to labor income, what matters is that the distribution result from efficient markets where final demand for goods and services and the relative productivity of the firms producing those goods and services determine the demand for labor in each sector of the economy, and the earnings of each of those jobs.

The shape of the income distribution is also a function of labor supply. The willingness of workers to take jobs depends on the pay as well as relative preferences for labor and leisure. The ability of workers to command a given wage is also a direct function of their educational attainment and skill level (their "human capital"). Changes in the age distribution can also affect the income distribution as workers tend to earn more as they get older.

But, even in an economically "ideal" world where the income distribution was solely attributable to the workings of efficient markets there may still be moral, ethical, or philosophical reasons for preferring an alternative outcome.

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[1] For more on this topic, see CRS Report RL33606, *Faster Productivity Growth: Who Benefits?*, by Brian W. Cashell.

Arguments for a more equal distribution of income than that which results from market forces are based on a number of propositions.[2] One is founded on a common assumption made in economic analysis known as *diminishing marginal utility of income*. This refers to the idea that each additional dollar of income yields less and less satisfaction (in economic jargon, utility) than the first. Put another way, this proposition presumes that one additional dollar of income means less to someone making $100,000 than it does to someone making $20,000.

If the assumption of diminishing marginal utility of income is accepted, then in theory it should be possible to increase the overall well-being (utility) of society by taking money from those with high incomes and giving it to those with low incomes. The difficulty with that proposition is that doing so may have economic costs that offset part, if not all, of any gain in overall utility.

A second justification for policies designed to make the income distribution more equal is concern that society prevent its members from falling below some minimum standard of living. This may be due to pure altruism, or the sense that luck has something to do with one's place in the income distribution, or the belief that when more people have a stake in society, the more tranquil it will be. Raising the minimum standard of living may thus serve as a kind of insurance.

Finally, a common aim of policy is promoting equality of opportunity. An extremely unequal distribution of income may be considered an indication of lack of equal opportunity.

Beyond these considerations, economics has little to say about the desirability of any particular income distribution, but economists have developed ways to measure changes in the distribution, and have searched for causes of variations in the distribution over time.

Measuring Income

As is the case with any number of economic statistics, income data have limitations. The Census Bureau, in an annual survey, collects data from a sample based on the concept of *money* income. Money income accounts for a wide range of income sources, but it is unavoidably incomplete. Money income includes income from earnings, interest and dividends, Social Security, and other forms of social insurance. It does not include the value of non-money benefits such as food stamps or housing subsidies. Neither does it include capital gains.[3]

With respect to the distribution of overall economic well-being, a limited measure such as money income may be misleading. For example, consider the case

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[2] See N. Gregory Mankiw, *Principles of Economics* (Fort Worth Texas: The Dryden Press, 1998).

[3] For a complete explanation of what is included in money income, see U.S. Department of Commerce, U.S. Census Bureau, *Current Population Reports: Consumer Income*, P60-231, August 2006, Appendix A.

where two families are in every way equal in terms of wealth and income, neither owns their home, but they both have substantial savings in interest earning assets. Suppose one family takes funds that are earning interest and uses them to buy their home. No one would argue that that family is now worse off, but the existing measures of money income would indicate that to be the case. In fact, the family that buys its home is earning an *implicit* income in the use of the house just as they would earn rental income if they rented it to the other family in the example. Not counting this implicit income in existing measures may have a significant effect on the shape of the income distribution. If homeownership rates change over time, or the share of assets invested in owner-occupied housing changes, and those changes affect one part of the distribution more than another, then existing data concerning changes in the shape of the distribution of income would be misleading.

Existing measures of income also ignore the value of leisure. Thus, in the case of two individuals whose measured incomes differ only because one of them works longer hours, the difference in their incomes may overstate the difference in their economic well-being because the one who is working longer hours is sacrificing leisure time.

Another weakness in existing measures of income is that they do not account for the implicit income yielded by homemakers or other work done at home. Consider two different married-couple households with the same income and both husband and wife are working. If in one of the households, the husband quits his job to stay at home and raise children, that household will experience a drop in money income. But the work done at home is not without value, and the measured difference in the incomes of the two households will overstate the difference in living standards between the two households.

The time period in which income is measured may also affect comparisons in the economic well-being of different households. Over the course of the business cycle, unemployment rises and falls and so do incomes. Some households may tend to be more affected than others by these cycles, and so the stage of the business cycle can have a significant effect on relative incomes.

Similarly, individuals' incomes generally vary substantially over the course of their lifetimes. New entrants to the labor force typically have lower incomes than those who have been working for some time. After retirement, income tends to drop off. Because of changes in income associated with this life cycle, the demographic mix of the population can have a major influence on measures of income disparity.

If it is concern about living standards that prompts interest in the distribution of income, then changes in wealth (e.g., the value of real estate, or other components of net worth) might also be taken into account. That too would be difficult because it would involve not just measuring actual changes, but distinguishing transitory from permanent changes in wealth over short periods of time.

Another difficulty in comparing incomes is deciding what is the relevant population. In the case of labor income, the distribution of income among individuals or among workers may be of most interest. But when it comes to overall living standards, it may be more appropriate to consider the distribution of income

among households. Most households can be presumed to pool resources and enjoy some economies of scale. In other words, because some costs of living are fixed, a family of four may not need twice as much income as a married couple for each family member to enjoy roughly the same living standard. That adds another complication in comparing incomes for households of different sizes.

Measuring Inequality

For the sake of simplicity and clarity, one way the Census Bureau publishes income distribution data is by "quintile." The population is ordered from lowest to highest income and then divided into five groups of equal size. The income within each group is summed and then compared to the total income of the population. If income were all equally divided and every household had the same income, then each quintile would account for 20% of total income. To the extent that each quintile falls short of, or exceeds, a 20% share, it is an indication of the degree of inequality in the distribution.

Table 1 presents data on the share of total household money income accounted for by each quintile, as well as for the top 5%, since 1967. The figures indicate that the bottom fifth accounts for much less than the one-fifth of total income it would get if the distribution were perfectly equal, while the top 20% accounts for more than twice what it would get in an equal distribution. The top 5% accounts for more than four times the 5% share it would get if the distribution were perfectly equal.

There are also several trends evident at the two ends of the distribution. Between 1967 and the late 1970s, the bottom fifth experienced a slight increase in its income share, while the share accruing to the top 5% of households in the distribution fell. Since 1980, however, the share accruing to the bottom fifth has fallen, and the shares accounted for by both the top 20% and the top 5% have risen. Between 1967 and 2007, the share of income accounted for by the three middle quintiles fell from 52.3% to 46.9%.[4]

[4] There is no official definition of the "middle class." For further discussion, see CRS Report RS22627, *Who Are the Middle Class?*, by Brian W. Cashell.

Table 1. Distribution of Household Income by Quintile

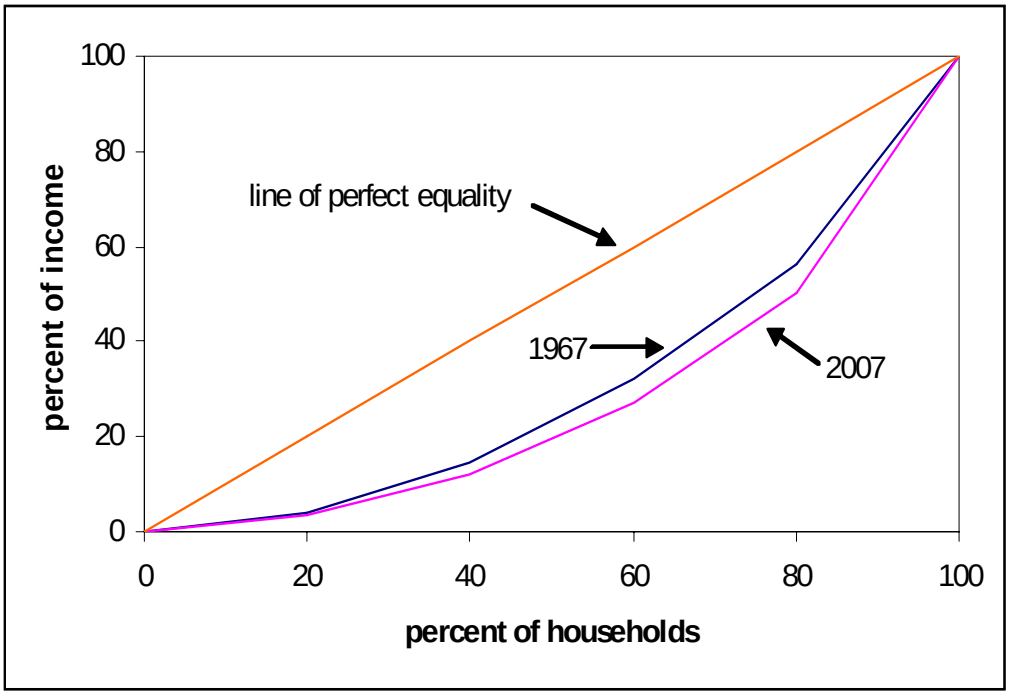
	Percentage Share of Total Household Income					
	Bottom	**Second**	**Third**	**Fourth**	**Fifth**	**Top 5%**
1967	4.0	10.8	17.3	24.2	43.6	17.2
1977	4.2	10.2	16.9	24.7	44.0	16.8
1980	4.2	10.2	16.8	24.7	44.1	16.5
1990	3.8	9.6	15.9	24.0	46.6	18.5
2000	3.6	8.9	14.8	23.0	49.8	22.1
2001	3.5	8.7	14.6	23.0	50.1	22.4
2002	3.5	8.8	14.8	23.3	49.7	21.7
2003	3.4	8.7	14.8	23.4	49.8	21.4
2004	3.4	8.7	14.7	23.2	50.1	21.8
2005	3.4	8.6	14.6	23.0	50.4	22.2
2006	3.4	8.6	14.5	22.9	50.5	22.3
2007	3.4	8.7	14.8	23.4	49.7	21.2

Source: U.S. Department of Commerce, U.S. Census Bureau.

A second indicator of the relative degree of inequality in the distribution of income is the Gini index, also known as the index of income concentration. The Gini index is a single number which can range between zero and one. It is an index, and therefore is not expressed in terms of any particular unit of measurement, but it does allow comparisons between and among distributions. They can be distributions from two different populations, or of the same population at different points in time. Thus, it can show if one distribution is more or less equal than another, and if there is any tendency for one distribution to become more or less equal over time.

To illustrate how the Gini index is calculated, **Figure 1** shows the distribution of household income for both 1967 and 2007. The horizontal axis represents the cumulative share of households, beginning at the low end of the distribution and working up to the household with the highest income. The vertical axis represents the cumulative share of income accounted for by those households.

Figure 1. Distribution of Household Income: 1967 and 2007



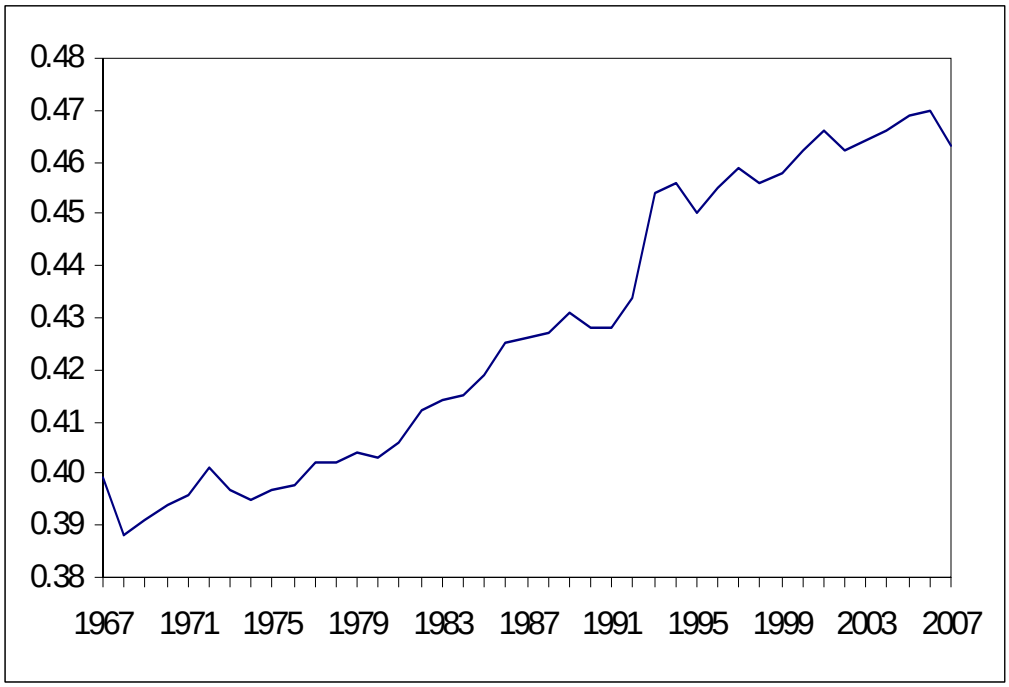
Source: U.S. Department of Commerce, U.S. Census Bureau.

The curved lines in **Figure 1** represent actual distributions of household income. (These are also known as 'Lorenz' curves.) The straight diagonal line depicts the distribution if it were perfectly equal, in other words if each household had the same income (e.g., with 100 households each household would account for 1% of total household income). The more equal the actual distribution is, the closer the line is to the hypothetical diagonal.

The Gini index is a ratio of the area between the diagonal and the line representing the actual distribution, and the total area under the diagonal. The closer the actual distribution is to the hypothetical equal distribution, the smaller the area will be between the two lines. If the actual distribution and the diagonal coincide, then the Gini is zero, indicating a perfectly equal distribution of income. In that case, each household would have identical incomes.

At the other extreme, consider a distribution where all income accrued to a single household. In that case, the actual curve would lie on the edge of the graph and the Gini index would be one. An increasing Gini index number indicates an increasingly unequal distribution. When comparing any two distributions, the one described by a higher Gini index number is the more unequal. Between 1967 and 2007, the actual distribution moved further away from the hypothetical equal distribution and the Gini index rose, indicating that the distribution of household income has become more unequal. **Figure 2** plots the Gini index for the distribution of household income in the United States since 1967.

Figure 2. Household Income Gini Index, 1967- 2007



Source: U.S. Department of Commerce, U.S. Census Bureau.

As the chart shows, since the late 1960s, the trend has been one of almost steadily increasing household income inequality. Although the index fell slightly in 2007, it still indicates a distribution that is much more unequal than it has been for most of the 40 years the data have been collected.

In addition to the Gini index, there are other summary measures that describe changes in the income distribution. Among those measures are ratios of incomes at different points in the distribution. For example, the ratio of the income of those at the 90th percentile in the distribution to that of those in the 10th percentile gives a estimate of the overall inequality in a distribution. Similarly, the ratio of the median income level (50th percentile) to the 10th percentile income level and the ratio of the 90th percentile income level to the median income can be computed. Changes in those ratios may indicate whether a change the degree of inequality is due to changes at the top or at the bottom of the distribution.

Economists at the Federal Reserve Bank of Richmond examined changes in those ratios to shed some light on changes in the distribution.[5] They found that, between 1961 and 2002, 75% of the increase in the 90-10 income ratio was accounted for by the increase in the 90-50 income ratio. In other words, changes in the upper half of the income distribution accounted for most of the overall increase in inequality. The authors also examined changes in the distribution of the top 10% of the distribution. They found that, between 1961 and 2003, the share of labor income accruing to the top 10% rose from 27% to 37%. More than 60% of that

[5] Kevin A. Bryan and Leonardo Martinez, "On the Evolution of Income Inequality in the United States," *Economic Quarterly*, Federal Reserve Bank of Richmond, spring 2008.

increase in share was attributable gains in the top 1% of the distribution. Moreover, the authors found that more than 60% of the gains in the income share of the top 1% was due to an increased share going to the top 0.1%.

International Comparisons of Income Distributions

In addition to tracking changes in inequality over time, international comparisons of the distributions of income may also put current measures in perspective. But, just as available measures of income in the United States differ from the ideal, measures of income in different countries also differ from each other. Fortunately, there is a source for comparable data that allows international comparisons of income inequality.

The Luxembourg Income Study (LIS) project has assembled survey data from a large number of different countries' statistical programs on social and economic indicators.[6] Among those statistics available are data on household income. Although there are differences in individual definitions of income across countries, these data can be adjusted so that they reflect a more consistent measure of income.

In making these adjustments to get to a common measure of income, however, the definition of income had to be limited. In limiting what is counted as income, the actual measures that allow cross-country comparisons are in some cases more removed from the ideal measure than they might otherwise be.

The LIS uses a measure of after-tax household money income as its standard.[7] This necessarily excludes the imputed values for owner-occupied housing and unpaid homework. It does include some "near cash" subsidies such as food stamps, housing subsidies, and certain scholarships. Income is also measured net of income and payroll taxes but not of sales, value added, and other indirect taxes. That may make the distributions seem more equal in those countries that rely heavily on income taxes, which tend to be progressive.

The standard of living afforded to a household by a given amount of income is also affected by the size of the household. An adjustment is made to these household income data to reflect the fact that the income must be divided among the members of the household. The LIS study assumes that there are some economies of scale and that each additional member of a household requires a slightly smaller amount of income to maintain the overall standard of living of the household.

The LIS reports data allowing direct comparisons of income distributions of a large number of different industrialized countries. **Table 2** presents summary data on the income distribution from some of them. The countries are listed in order from

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[6] Information about the Luxembourg Income Study can be found at their website. See [http://www.lisproject.org].

[7] Peter Gottschalk and Timothy M. Smeeding, *Empirical Evidence on Income Inequality in Industrialized Countries*, Luxembourg Income Study Working Paper No. 154, revised February 1999.

the one with the lowest Gini index number (most equal distribution) to the one with the highest (most unequal distribution).

The first column of data shows the estimated Gini coefficient for each country. The next column (P_{90}/P_{10}) shows the ratio of the incomes of those at the 90th percentile of the distribution to the incomes of those at the 10th percentile. For example, for the United States in 2004, those near the top of the distribution had more than five times the income as those near the bottom. The last column (P_{90}/P_{50}) indicates the ratios of income at the 90th percentile of each distribution to the median incomes (the 50th percentile) of that distribution. For the United States, those at the 90th percentile in the distribution had more than twice the U.S. median income. Note that the data are from different years so that, to some extent, differences between countries may be attributable to the effects of the business cycle.

Table 2. Summary Measures of Income Distributions for Selected Countries

Country	Year	Gini Index	P_{90}/P_{10}	P_{90}/P_{50}
Denmark	2004	0.228	2.78	1.56
Netherlands	1999	0.231	2.78	1.63
Sweden	2005	0.237	2.82	1.63
Norway	2000	0.251	2.80	1.59
Germany	2000	0.275	3.37	1.80
France	2000	0.278	3.45	1.88
Belgium	2000	0.279	3.30	1.74
Australia	2003	0.312	4.24	1.98
Canada	2000	0.315	4.19	1.93
Italy	2000	0.333	4.47	1.99
United Kingdom	2004	0.345	4.46	2.14
United States	2004	0.372	5.68	2.13
Russia	2000	0.434	8.37	2.76
Mexico	2004	0.458	8.48	2.98

Source: Luxembourg Income Study.

A study by Atkinson, Rainwater, and Smeeding, using LIS data from the late 1970s, found that most of these countries had experienced an increase in the degree of inequality in their income distributions, with the largest increases in the United States and the United Kingdom. That at least suggests the possibility of some

common factor influencing the distributions of these economies.[8] However, Smeeding also points out that over the last 25 years, the United States started with the most unequal distribution among the rich nations of the world and over that period experienced the largest increase in inequality of those rich nations.[9]

Although the United States appears to have a relatively unequal distribution, the median income in the United States is higher than in other countries. Smeeding and Rainwater analyzed income at different points in the distributions and made adjustments for differences in the purchasing power of the different currencies.[10] They found that people in the upper half of the distribution in the United States enjoyed living standards far above their counterparts in other industrialized countries. However, those near the bottom, at the 10th percentile in the U.S. distribution, were not as well off as those at the same point in the distribution in the other countries examined.

Explaining International Differences

What explains these international differences in income distributions? The reasons fall into three categories. First, many other countries devote a much larger share of their national output to income transfers, which have an equalizing effect on the distribution. Second, these data are based on income after taxes, and tax rates in these countries vary with respect to progressivity, and thus have different effects on the equality of the distribution of after tax income. Third, equality in the distribution of *earnings*, which account for about 70% of household income in the studies using LIS data, varies substantially as well.

For those countries for which data are available, there is a strong correlation between income shares at the lower end of the distribution and the share of GDP accounted for by transfer payments.[11] The evidence suggests, however, that for both the United States and Britain, given the amount of money that is transferred, those at the low end of the distribution do not benefit as much as they do in other countries.

Although taking into account taxes and transfers may affect cross-country comparisons of income inequality, for year-round full time workers the United States also exhibits relatively greater inequality in the distribution of earnings.

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[8] Anthony B. Atkinson, Lee Rainwater, and Timothy M. Smeeding, *Income Distribution in OECD Countries: Evidence From the Luxembourg Income Study*, Organisation for Economic Co-operation and Development, 1995.

[9] Timothy M. Smeeding, *Public Policy and Economic Inequality: The United States in Comparative Perspective*, Luxembourg Income Study Working Paper No. 367, February 2004.

[10] Timothy M. Smeeding and Lee Rainwater, *Comparing Living Standards Across Nations: Real Incomes at the Top, the Bottom and the Middle*, Luxembourg Income Study Working Paper No. 266, May 2001.

[11] Timothy M. Smeeding, "U.S. Income Inequality in a Cross-National Perspective: Why Are We So Different?," *Looking Ahead*, National Policy Association, vol. XIX, no. 2-3.

One explanation for the greater equality in earnings distributions abroad is that wage-setting tends to be more centralized in many other countries than it is in the United States. There are two reasons for this. First, in the private sector, union membership may be higher, and in some cases there is a considerable share of the labor force that is affected by union agreements whether they are union members or not. Second, in a number of these countries, the public sector also accounts for a greater share of employment than in the United States, and that serves as an equalizing force.[12]

A study published by the Chicago Federal Reserve Bank examined income inequality in five countries: the United States, Canada, Germany, Sweden, and Finland.[13] The study found that, after taxes and transfer payments, the U.S. income distribution was the most unequal of the five, followed by Canada, Germany, Finland, and Sweden. Of those countries, Germany did relatively little to redistribute income, either through taxes or transfers, but it had the most equal distribution of labor income. Sweden and Finland reduced income inequality through a combination of relatively high tax rates and high levels of transfer payments. Canada and the United States reduced income inequality with similar combinations of progressive income taxes and transfer payments.

To the extent that greater equality in the income distribution is a result of deliberate policy and not the result of market forces, that equality may not have been achieved without some cost. Assuming that these costs are appreciated, they may reflect varying degrees of willingness in different countries to tolerate inequality in the distribution of income.

Explaining Recent Trends

Most industrialized countries have, and certainly the United States has, experienced an increase in the degree of inequality in the distribution of income. More specifically, most countries have experienced an increase in the inequality of earnings. Those studies that focus more narrowly on wages have come to similar conclusions.

Two explanations are often cited for the trend toward greater inequality. The first has to do with trade liberalization ("globalization"), and the second has to do with technological progress.

With regard to trade liberalization, the argument is that because of reduced trade restrictions and an increasing volume of trade, less skilled U.S. workers have become more vulnerable to direct competition from lower paid workers in other countries. Thus, the production of goods that require less-skilled workers has shifted overseas

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[12] See Gottschalk and Smeeding, "Cross-National Comparisons of Earnings and Income Inequality," *Journal of Economic Literature*, vol. XXXV (June 1997).

[13] Mariacristina De Nardi, Liqian Ren, and Chao Wei, "Income Inequality and Redistribution in Five Countries," Federal Reserve Bank of Chicago *Economic Perspectives*, Second Quarter 2000, vol. XXIV, issue 2.

and the domestic demand for less-skilled workers has declined here. The reduced demand for less-skilled workers in manufacturing here has placed downward pressure on their wages, and therefore tended to increase the earnings gap between skilled and unskilled workers.

Whether that is the case is not completely settled, but the hypothesis has not been accepted by most economists. Although theoretically sound, the argument has not yet been supported by compelling empirical evidence. For one thing, the wage gap between skilled and unskilled workers has grown both in those industries that tend to compete in world markets as well as those that are generally less affected by international trade. Another reason economists have not found the trade argument convincing is that the number of jobs affected by the increase in trade is not sufficient to explain the magnitude of the earnings gap economy wide.[14]

The argument that changes in technology have affected the distribution of earnings has been more persuasive among many economists. The most often cited evidence for such an effect is the rapid growth in the wage premium paid to more highly skilled or educated workers that began in 1979. In 1979, men with bachelor's degrees earned 50% more than did those with a high school education. For women, the college premium in 1979 was 41%. In 2007, the advantage of a college education was significantly higher, with college-educated men and women earning 92% and 78% more, respectively, than those with a high school education. Further, that increased advantage coincided with a significant increase in the proportion of the labor force that was college educated, from 16.4% of adults in 1979 to 31% in 2005, according to the Census Bureau. Even though the supply of more highly educated workers was rising, it was apparently not rising fast enough to keep up with increasing demand.[15]

One theory behind these numbers is that technological changes over the past 20 years have not affected all jobs equally. The argument is that the kinds of technological advances that have occurred since the late 1970s have been biased in favor of those jobs that require higher levels of training and education.

Not all advances require more educated workers to exploit them. Retail clerks may no longer need to be as proficient at math and some assembly line jobs may have become simpler and more repetitive. But the evidence shows that demand for more highly educated workers has increased substantially. Further, those who use computers in their work have experienced relatively larger wage gains than have other occupations. The wage gap between less and more highly educated workers has also been found to be correlated with rising outlays on research and development.[16]

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[14] See Gary Burtless, "International Trade and the Rise in Earnings Inequality," *Journal of Economic Literature*, vol. XXXIII (June 1995).

[15] Peter Gottschalk, "Inequality, Income Growth, and Mobility: The Basic Facts," *Journal of Economic Perspectives*, vol. 11, no. 2, spring 1997.

[16] Gary Burtless, "Technological Change and International Trade: How Well Do They Explain the Rise in U.S. Income Inequality?" *Looking Ahead*, National Policy Association,

(continued...)

The case for "biased" technological change explaining increased income inequality has gained wide acceptance among economists. Autor, Levy, and Murnane published a study suggesting that technological progress affected the equality of the earnings distribution in two ways.[17] First, information technology (IT) served as a *substitute* for low-skill workers reducing demand for their labor. Second, IT served as a *complement* to educated and relatively high-skilled workers increasing demand for their services. Both factors appear to have contributed to an increase in inequality in the distribution of earnings.

Some trends in the labor market do not easily fit in the skill-biased technological change hypothesis. Card and DiNardo examined the data to see how well events agreed with the implications of skill-biased change.[18] They found a number of contradictions. For example, the biased change hypothesis would seem to predict that groups that typically have lower skills would have experienced relatively slower wage growth. Card and DiNardo argue that although women tend to be less skilled on average than men, and that nonwhite workers tend to be less skilled than white workers, those two groups did not experience slower wage growth and the wage gaps between groups did not widen as the theory might have predicted. The authors also found that the wages of college graduates with degrees in the humanities grew more rapidly than the wages of graduates with degrees in engineering or science.

A study published by the Federal Reserve Bank of Minneapolis examined the changing distribution of earnings since 1961.[19] Eckstein and Nagypál found that, for men, there was a substantial increase in the inequality of the earnings distribution beginning in the mid-1970s. Between 1973 and 1995, the real earnings of men in the bottom 25% of the earnings distribution fell. Over that same period, the real earnings of men in the top 25% of the distribution made significant gains. They also found that beginning in 1995, the year productivity growth picked up, the real earnings of men in the bottom 25% of the distribution began to rise along with earnings all across the distribution. However, the earnings of men at the top of the distribution grew more rapidly. While the distribution continued to grow more unequal after 1995, the rate of increase in that inequality slowed. Women's earnings exhibited similar although less pronounced changes in inequality.

A study by the Kansas City Federal Reserve Bank examined the connection between productivity growth and income growth.[20] The authors found that between

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[16] (...continued)
vol. XIX, no. 2-3. See also U.S. Department of Commerce, U.S. Census Bureau, *Money Income in the United States: 1998*, P60-206, September 1999.

[17] David Autor, Frank Levy, and Richard Murnane, "The Skill Content of Recent Technological Change: An Empirical Exploration," NBER Working Paper 8337, June 2001.

[18] David Card and John E. DiNardo, "Skill-Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles," *Journal of Labor Economics*, vol. 20 no.4 2002.

[19] Zvi Eckstein and Éva Nagypál, "The Evolution of U.S. Earnings Inequality: 1961-2002," *Federal Reserve Bank of Minneapolis Quarterly Review*, December 2004.

[20] Jonathan L. Willis and Julie Wroblewski, "What Happened to the Gains From Strong (continued...)

1974 and 1995 only the top quintile (the 20% with the highest incomes) in the income distribution experienced income growth equal to the growth rate of productivity. Between 1995 and 2005, the authors found, even the top quintile in the distribution experienced income growth below the rate of productivity increase. They point out that limitations of the survey on which those data are based make it difficult to identify trends at the upper end of the income distribution.

Dew-Becker and Gordon examined the relationship between labor income and productivity and concluded that the benefits of productivity growth have been unequally distributed.[21] Dew-Becker and Gordon looked at Internal Revenue Service (IRS) income data from 1966 to 2001. They concluded that over that entire period, only the top 10% of the distribution experienced income gains equal to or greater than the overall rate of productivity growth. Further, they found that the top 1% of the distribution accounted for 21.6% of the income gains for that period and for 21.3% of the gains between 1997 and 2001, after productivity growth had accelerated. Finally, they found that the top 0.1% of the distribution received as much of the real rise in earnings as the bottom 50% between 1997 and 2001.[22] The authors suggest that some of this is may be due to the expansion of opportunities available to "economic superstars" such as sports stars and other top celebrities because of technologies such as cable television and the Internet.

Although the effects of trade liberalization and technological growth are the two most often discussed factors which might explain the increase in inequality, there are other factors at work in the changing shape of the household income distribution.

Shifting demographic factors have also played a role. One of the most important shifts has been the large rise in the labor force participation of women. Specifically, there has been a substantial increase in the number of households with working wives. In 1970, just over half of all married mothers had some work experience during the year. In 2005, that proportion had risen to 66%. The share of married mothers who worked full time rose from 16% to 47% over the same period.[23]

In those families with working wives, their contribution to family income has been growing.[24] Traditionally, wives' earnings tend not to be highly correlated with

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[20] (...continued)
Productivity Growth?," Federal Reserve Bank of Kansas City, *Economic Review*, First Quarter 2007.

[21] Ian Dew-Becker and Robert J. Gordon, *Where Did the Productivity Growth Go? Inflation Dynamics and the Distribution of Income*, National Bureau of Economic Research Working Paper 11842, December 2005.

[22] Aside from the direct effects of productivity on earnings Dew-Becker and Gordon found that the acceleration in productivity resulted in a 1.2% slower rate of inflation between 1995 and 2005. That meant an increase in the purchasing power of all workers.

[23] Howard V. Hayghe and Suzanne M. Bianchi, "Married Mother's Work Patterns: The Job-Family Compromise," *Monthly Labor Review*, June 1994.

[24] Howard V. Hayghe, "Working Wives' Contribution to Family Incomes," *Monthly Labor*
(continued...)

their husbands' earnings, part of which is due to the negative correlation between husbands earnings and wives' labor force participation. Thus, the distribution of husbands' earnings has been less equal than is the distribution of total household earnings. However, wives' earnings have in recent years become more highly correlated with their husbands' earnings; consequently, that has been a factor in the rising inequality in the distribution of household income.[25]

Changes in the distribution of wealth may have also had an effect on the income distribution over time. The distribution of household wealth is more unequal than is the distribution of either earnings or total income.[26]

An analysis by Burtless attempted to identify the proximate causes of the increase in inequality. By controlling for both changes in earnings inequality and changes in the composition of households, he was able to estimate how much of the change in inequality each variable accounted for between 1979 and 1996.[27]

Of the total increase in U.S. personal income inequality Burtless found that 28% was accounted for by increased inequality in men's earnings and 5% by increased inequality in women's earnings. The changing composition of households also played a role. Between 1979 and 1996 there was an increase in the correlation between husband and wife earnings, and that contributed an estimated 13% to the overall increase in inequality. This is the result of a surge in women's employment and the general tendency of married couples to have similar educational backgrounds and earnings potential. The increase in correlation resulted in a rise in the share of income accruing to households in the upper income classes.

At the same time there was a decline in the percentage of husband-wife households. Income is more unequally distributed among single adult households than it is among married-couple households. Burtless estimated that this shift accounted for 21% of the increase in inequality between 1979 and 1996. Thus, changes in the composition of households accounted for a third of the overall increase in inequality.

Conclusions and Policy Considerations

Existing measures of income fall well short of the theoretical ideal that would indicate how well off individuals or households are. Not all kinds of income are

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[24] (...continued)
Review, August 1993.

[25] Peter Gottschalk and Timothy Smeeding, "Cross-National Comparisons of Earnings and Income Inequality," *Journal of Economic Literature*, vol. XXXV (June 1997).

[26] Interestingly, there is a fairly low correlation between wealth and income, which may largely be due to the fall in income that typically follows retirement.

[27] Gary Burtless, "Has Widening Inequality Promoted or Retarded US Growth?" *Canadian Public Policy - Analyse de Politiques*, vol. xxix, supplement/numéro spécial 2003.

counted, and thus the distribution of a household's assets may affect one's apparent position in the income distribution.

Taking the existing measures at face value, however, several observations can be made. First, the distribution of income in the United States has become increasingly unequal since the late 1960s. Second, the U.S. income distribution is more unequally distributed than is the case for a large selection of other industrialized countries.

The distribution of earnings is more unequal than is the distribution of household income. Of particular interest is that the gap in earnings between highly educated or skilled workers and less skilled workers has grown substantially. Several explanations have been offered, but the one most widely accepted is that technological advances in recent years have increased the demand for more highly skilled labor relative to its supply. Policies that boosted the supply of skilled workers would thus seem likely to narrow that gap and act as an equalizing influence on the income distribution.

Given the large gap in pay between skilled and unskilled workers that has developed, it might seem there is little need for additional incentives for prospective and current workers to continue their education and training. Any additional incentive would likely pale in comparison to a lifetime of higher earnings, assuming workers understand these relationships. That is one reason some have advocated doing more to improve the education of the very young.

In many cases there may be costs associated with policies designed to reduce income inequality. Changes in tax rates, subsidies for the unemployed, or other transfers for low-income households may also have undesirable effects in the labor market and discourage some from taking jobs.

Some of the greater income equality found in other countries, however, may be due to the fact that existing transfers are more directly targeted at lower income households. Redirecting transfer payments from middle to lower class households could increase equality in the distribution without an increase in the amount of income being redistributed.