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Ponds and Streams: Wealth and Income in the U.S

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Wealth and income are both indicators of household resources. Although they are interrelated, they may be taken to indicate different things about a household. In the usual intertemporal budget constraint, wealth is the residual flywheel in a decision problem focused on labor supply, portfolio allocation, and consumption. Generally such models predict that wealth rises with age up to the point of retirement, then income drops and assets are gradually decumulated. But household have wealth for other reasons–including other life cycle purposes (e.g., education for children), precautionary purposes, purposes of control, and a variety of other reasons. Wealth is a product of past choices and opportnities, whereas income reflects current choices and opportunities.

Wealth and income are terms used so commonly that it seems obvious what they mean. However, many subtle decisions underlie the definitions. Although wealth is a stock accumulated from a flow of past income, by some measure, the relationship between the two in the short run can be quite complicated. For example, sometimes high wealth is associated with decisions to minimize income. This paper examines the separate distributions of wealth and income and attempts to characterize their joint distribution in a variety of ways.

The paper uses data from the triennial Survey of Consumer Finances, (SCF) which is conducted by the U.S. Federal Reserve Board. The collects detailed information on household balance sheets and income, in addition to a variety of related information. The measures of income and net worth used here are describe in detail in Bucks, Kennickell amd Moore [2006], which also provides technical detail on the survey and references to supporting documents. Wealth (a term used interchangeably with net worth in this paper) is taken to include all assets over which the survey household has command net of all debts owed by the household at the time of the interview. It is noteworthy that this definition does not include any valuation of current or future annuity benefits or trust accounts that have no current cash value that could be accessed by the household under some circumstance. These excluded items may generate a stream of income. The income measure used includes returns from work, profits from a private business, interest, dividends, realized capital gains, annuity income, transfers and miscellaneous sources (for example, lottery winnings), all for the calendar year preceding the survey. Capital gains are an important source of income for some investors, particularly when such income is taxed at a lower rate than other capital income, as is typically the case in the U.S.; relatively long-term investors have an incentive to hold assets that generate minimal income flows before the point the assets are sold or transferred. An important component missing from income in this analysis is unrealized capital gains; although the survey does collect information on the total amount of unrealized gains from many sources, there is no straightforward way to allocate part of these amounts to current-period income.

All dollar amounts used in calculations or shown in figures below are denominated in constant 2004 dollars, unless otherwise specified.

- Figure 1: This figure shows statistics on the ratio of net worth to income for the six surveys from 1989 to 2004. The ratio of overall means ("aggregate ratio") and the median and 75th percentile of the individual ratios are given. The data show a rise in the ratio over this period, particularly for the time after 1995.
- Figure 2: This figure shows quantiles (25th, 50th, 75th and 90th) of the distribution of the

ratio of net worth to income, conditional on income for selected years from 1989 to 2004. The data show that across the upper half of the distribution of income, the ratio shifted upward from 1989 to 2004.

- Figure 3: This figure shows the quantiles (25th, 50th, 75th and 90th) of the distribution of the ratio of net worth to income, conditional on net worth for selected years from 1989 to 2004. The upward shift is clearer for net worth than for income.
- Figure 4: This figure shows the de-scaled joint distribution of income and net worth for 2004. Thus, the area under the entire surface sums to 100 percent. For each slice of 5 percent perpendicular to either the income or net worth axis, the mass under the surface sums to 5 percent and the average mass on one 5-by-5 square is 0.25 percent. Several interesting findings emerge from the figure. First, there is substantial clustering at the two extremes. Households with low incomes are relatively likely to have low wealth as well—and vice versa. More generally at the other extreme, higher income and wealth are more likely to go together–this is particularly so for the top 5 percent of income or net worth, where more than half of households in either group are in both groupts. Across the middle of the distributions of income and wealth, the surface is broad and relatively flat. This finding indicates that income and wealth are much more correlated (in a rank order sense) at the extremes than in the middle.
- Figure 5: This figure shows changes since 1989 in the distribution shown in figure 4. Because the plot is the difference in two surfaces that each cover 100 percent, the sum of all differences must be zero. The white areas shown in white had small changes, much of which may be due to measurement or sampling errors. The bluish areas are ones where the density of cases was lower in 2004 than was the case in 1989 and the reddish areas are ones where the density was higher in 2004. Taken alone, the overall pattern is at best suggestive. There appears to be somewhat more clustering in the areas around the extremes and some shifting of mass to around and particularly below the diagonal, implying for the latter group somewhat higher relative wealth for a given relative level of income. Because figures 4 and 4 are de-scaled, the cannot show the degree to which changes in scale may have affected the ratio of net worth to income.
- Figure 6: For each SCF beginning with the 1989 survey, this graph shows the difference at each common percentile of the distributions of net worth and income, where each has been standardized by subtracting the median and dividing by the intra-quartile range. For a given year, the points are computed for each common percentile as the value of standardized net worth in a given year minus the value of standardized income, as a percent of the value of standardized income. If both distributions were normal, the plot would show a horizontal line at zero, as is approximately the case for the area around the common median. In fact, the upper tail of the distribution of net worth is much heavier, as evidenced by the progressively larger percentage difference.
- Figure 7: This figure shows the conventional Lorenz curve for net worth and income for 1989 and 2004. The curve for net worth lies substantially to the right of that for income, reflecting the greater skewness of the net worth distribution. The curves for both variables shifted to the right between 1989 and 2004.
- Figure 8: This figure shows the coefficient of variation (standard deviation/mean) of the values of the income and net worth distributions across the surveys from 1989 to 2004 at each percentile of the distributions. Because changes over the period incorporate both a trend component (generally a positive one) and a pure variability component, the figure

overstates the degree of variation. However, transformation of the input data to remove the trend component does not notably change the shapes of the lines or their relative positions. Net worth is more variable overall than income. The most variable region for both income and wealth is the bottom of the distribution. Variability is roughly the same across the broad middle of the income distribution. For wealth, the variability increases steadily from the minimum at about 35th percentile.

- Figure 9: This figure show the relative quantile-difference plot for total income for the SCF years from 1989 relative to 2004 (the 2004 value minus the value in the earlier year, as a percent of the earlier value, computed for each percentile of the distribution of income). Growth was greatest for the top and the bottom of the distribution. Across the middle, growth was relatively flat.

- Figure 10: This figure show the relative quantile-difference plot for wages of household heads aged 25 to 65, for the years from 1989 relative to the 2004 distribution. The pattern is similar to that for total income.

- Figure 11: This figure shows the relative quantile-difference plot for net worth over the same periods.

- Figure 12: This figure shows the composition of income across the distribution of net worth. The composition is computed as the ratio of the average value of a given type of income as a proportion of average income at a given percentile of net worth. The solid line represents the estimates for 2004, and the dotted line represents he estimates for 1989. The classification of income considered includes wages; income from self-employment or closely held businesses,;interest, dividends and capital gains; income from pensions, social security and annuities; and other income sources (mainly transfer income from individuals or the government). Wages are by far the dominant income component across the wealth distribution except at the top, where business and capital income predominate. From 1989 to 2004, the most notable shifts are a general increase in the share of wage income, an increase in the share of pension income above about the median of net worth, a decline in transfer income at the bottom of the distribution, and some decrease in the share of capital income in the upper half of the distribution.

- Figure 13: This figure shows the portfolio composition across the distribution of net worth. The portfolio components considered include the gross value of residential real estate, the net value of businesses and commercial property, total tax-deferred assets (various types of legally designated retirement savings accounts), other financial assets, miscellaneous assets (largely vehicles), and total debts (taken as a negative number, so that the total of all share is 100). Housing is by far the largest positive portfolio share, except at the top of the wealth distribution where businesses become uch more important and a small region around the 10th percentile of net worth. Miscellaneous assets (vehicles) have a portfolio large at the bottom of the wealth distribution, but that share declines progressively as wealth increases. On average, households become progressively less leveraged (that is, the share of debt declines) across the wealth spectrum. From 1989 to 2004, there were three particularly notable changes. First, the importance of debt rose almost across the board. Second, the importance of housing rose for the group with less than the median level of wealth. Third, for the group above the median, the share of tax-deferred assets rose; this rise may account for part of the increase in the ratio of net worth to income, since these assets substitute to some degree for pure annuity pensions that were more common in the earlier period.

- Figure 14: This figure shows the income share in figure 12 dstributed across income, rather than net worth. The share of wages is dominant in the middle of the income distribution, but falls at both ends. At the bottom, pension income and other income (transfers) are at least as important. A the top, business and capital income become more important. From 1989 to 2004, the changes are much less clear than was the case for the distribtuion by net worth. The importance of other (transfer) income fell in the lower part of the distribtuion, offset to some degree by increases in wages and pension income. Across most of the distrbution, there was a decline in the share of capital income.
- Figure 15: This figure shows the portfolio shares in figure 13 distributed across income, rather than net worth. The shares of housing and debt are fairly constant across the board, except at the top of the income distrbituion, where the debt share falls and the shares of businesses and financial assets rise. The clearest changes from 1989 to 2004 are an increase in the share of debt, a rise in the share of tax-deferred assets in the upper half of the distribution, a fall in the share of financial assets below about the median, and some tendency for the share of housing to be higher below the median.
- Figure 16: This figure shows the income share across the distribution of the ratio of net worth to income, for 1989 (dotted lines) and 2004 (solid lines). As with the distributions by income and net worth, the dominant share of wages falls off for the highest values of the ratio, as the shares of business and capital income increase. From 1989 to 2004, the age share tended to rise, offsetting declines in capital income and other (transfer) income.
- Figure 17: This figure shows again the income shares by the distribution of the ratio of net worth to income for all households in 2004 (solid line) and it breaks out the group that have income above the median as determined at each percentile of the distribution of the ratio (dotted line). The above-median group tends to have a higher share of wage income and a lower share of pension income.
- Figure 18: This figure is like figure 17, except that the group broken out (dotted line) is the one that has assets above the median as deterined at each percentile of the distribution of the ratio of net worth to income. For most of the distribution, the data show a tendency toward somewhat higher wage and business shares for the higher-asset group, which largely offset a lower share of penson income.
- Figure 19: This figure is the analog for portfolio shares of figure 16. The patterns of shares and changes in shares are very similar to those in figure 13 (which distributes the portfolio shares by net worth).
- Figure 20: This figure is the analog for portfolio shares of figure 17. The group with assets above the median tend to have lower shares of housing and somewhat higher shares of tax-deferred assets, at least for the top half of the distribution of the ratio of net worth to income.
- Figure 21: This figure is the analog for portfolio shares of figure 18. In the lower half of the distribution of the ratio of net worth to income, the group with assets above the median tend to have higher shares of residential real estate, higher debt shares and lower shres of other assets (vehicles). In the upper half of the distribution of the ratio, the share of residential real estate tends to be lower, offsetting small increases for businesses, tax-deferred assets and financial assets; debts are nearly the same for the two groups.

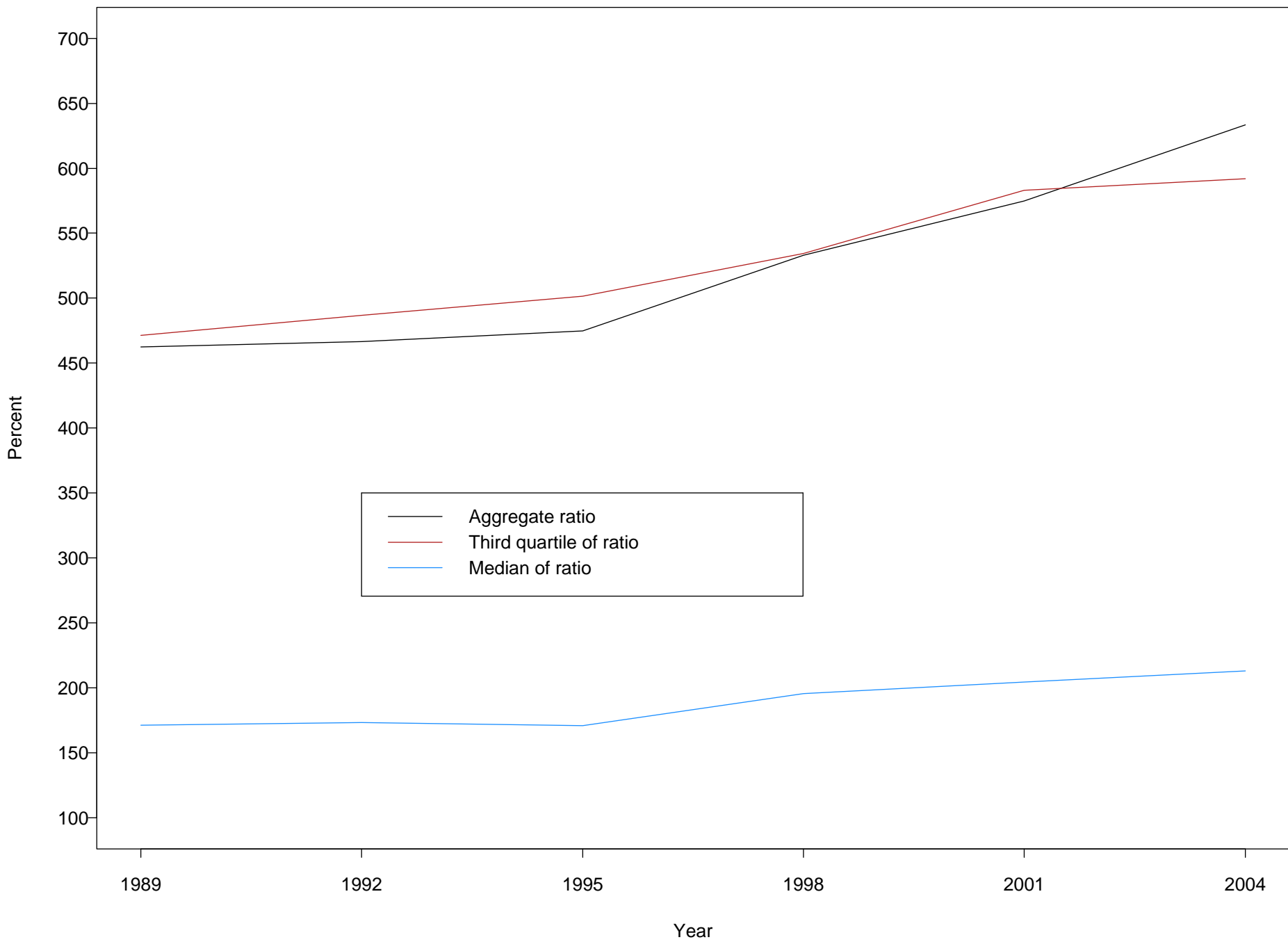Figure 1: Ratio of Income to Net Worth, 1989–2004.

Figure 2: 25th, 50th, 75th and 90th Percentiles of the Distribution of the Ratio of Net Worth to Income, Conditional on Income, 1989-2004.
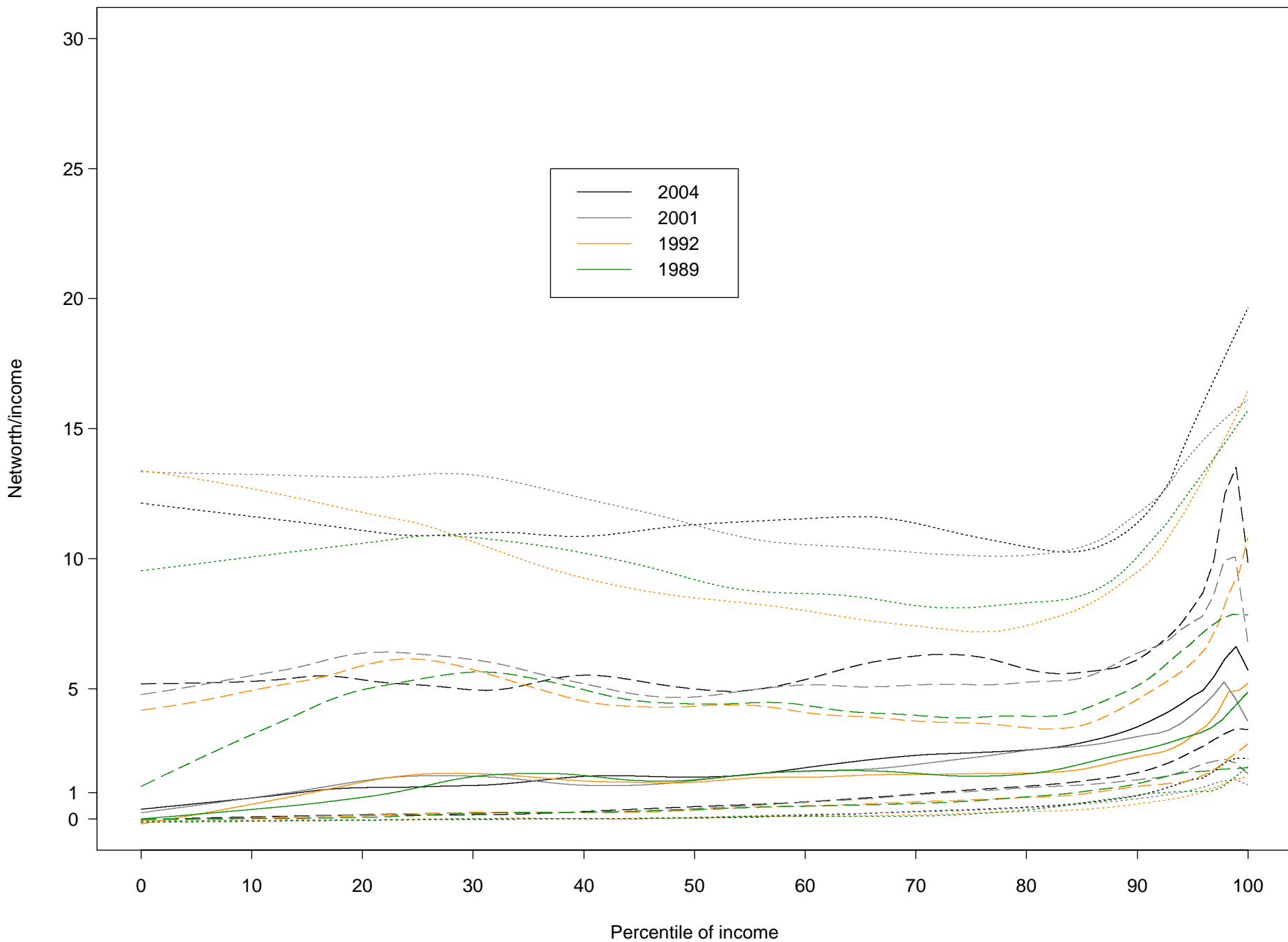
Figure 3: 25th, 50th, 75th and 90th Percentiles of the Distribution of the Ratio of Net Worth to Income, Conditional on Net Worth, 1989-2004.
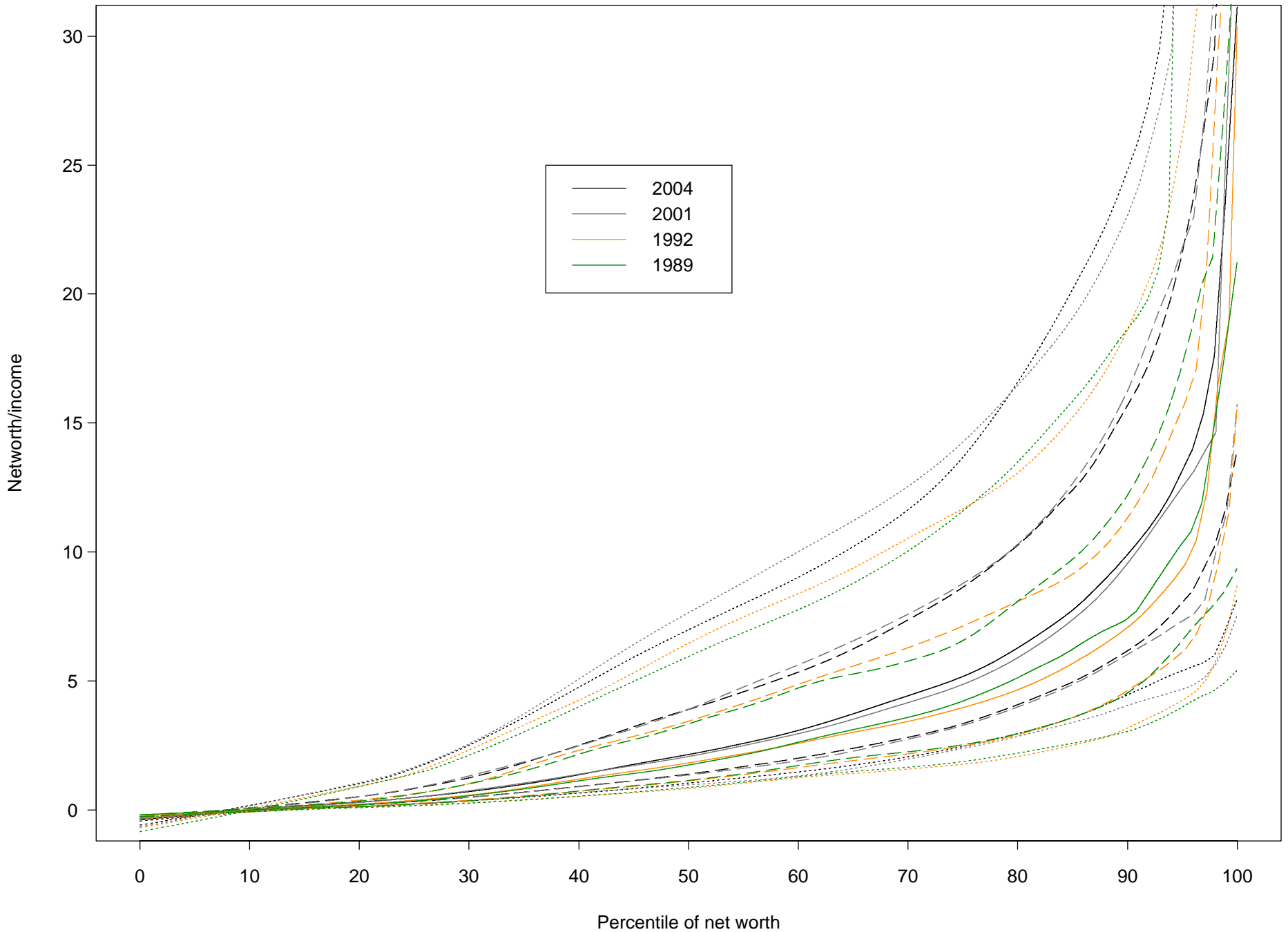
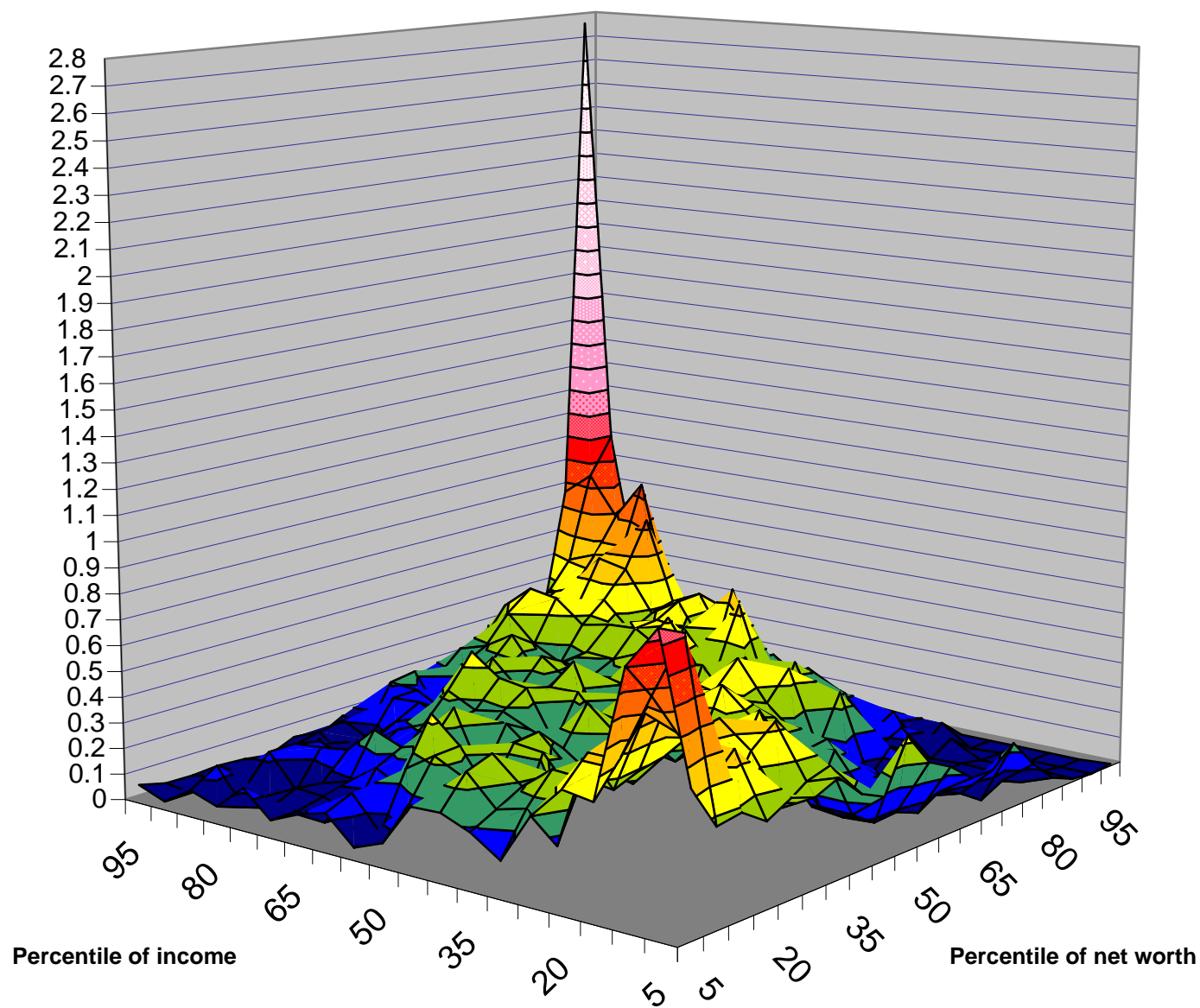Figure 4: De-Scaled Joint Distribution of Income and Net Worth, 2004.

Figure 5: Change in De-Scaled Joint Distribution of Income and Net Worth from 1989 to 2004 (2004 level minus 1989 level).
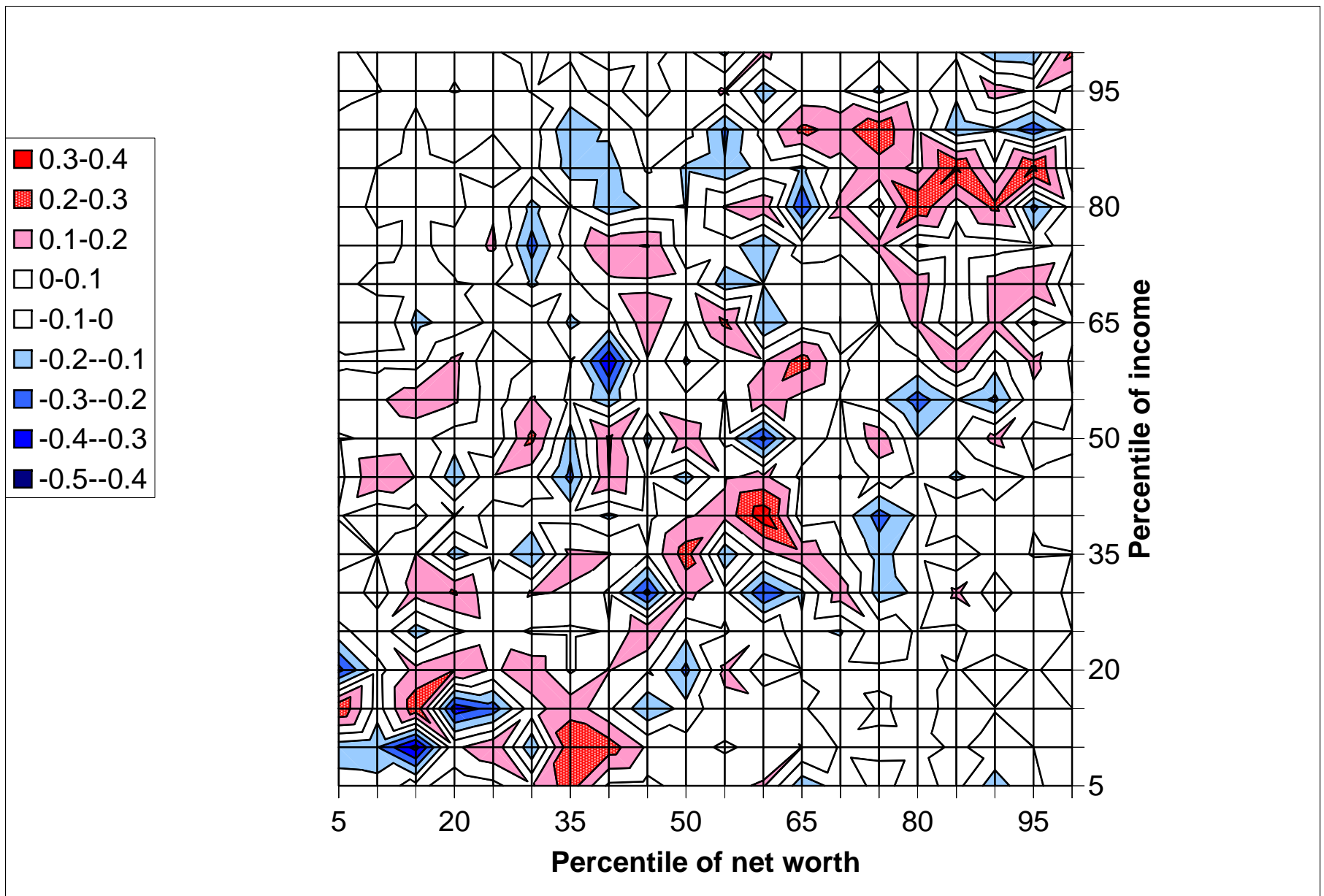
Figure 6: Relative Quantile-Difference Plot of Income and Net Worth Standardized to have the Same Median and Interquartile Range, 1989-2004 (Difference Between Net Worth and Income as a Percent of Income)
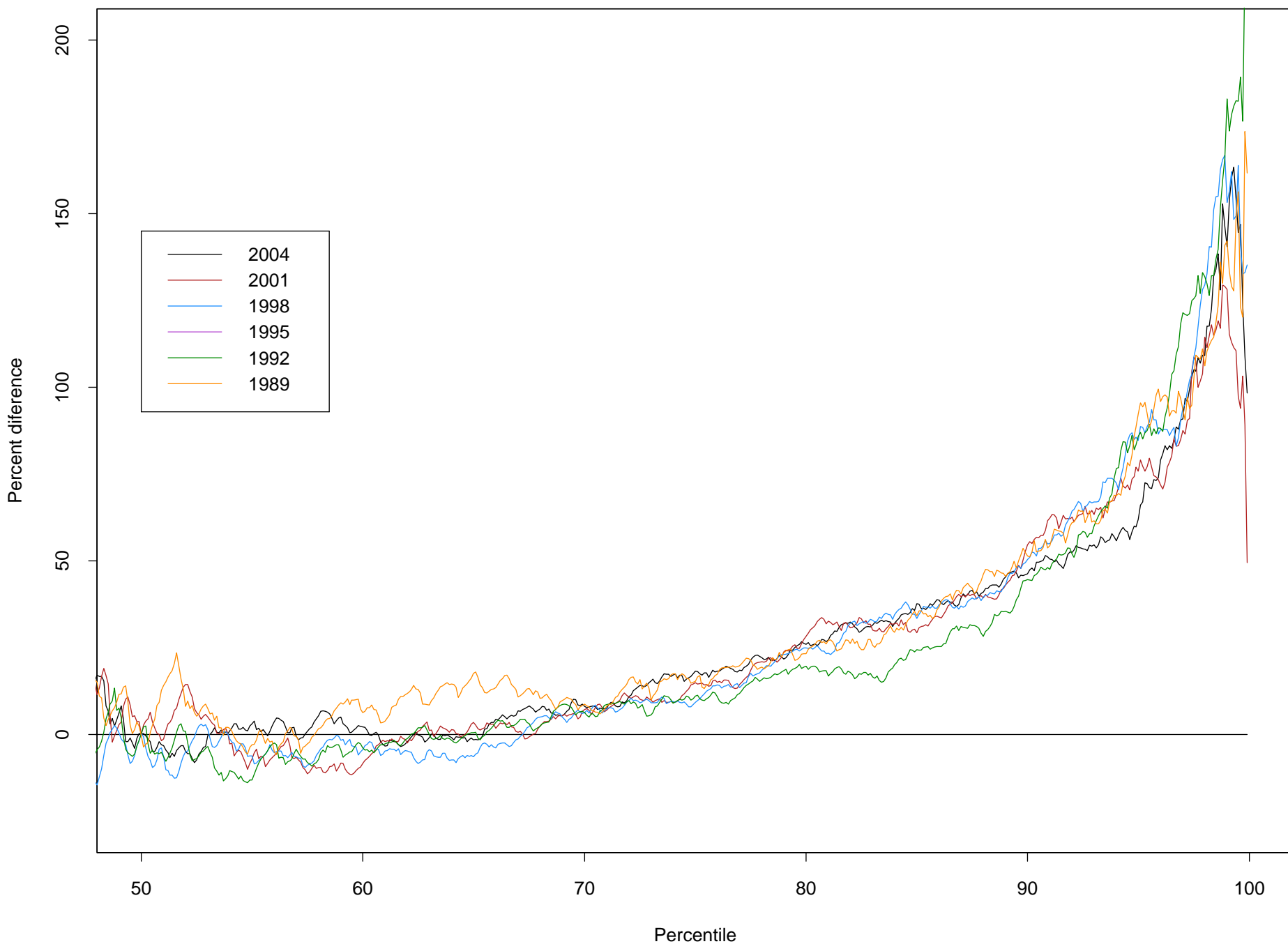
Figure 7: Lorenz Curve for Net Worth and Total Income, 1989 and 2004.
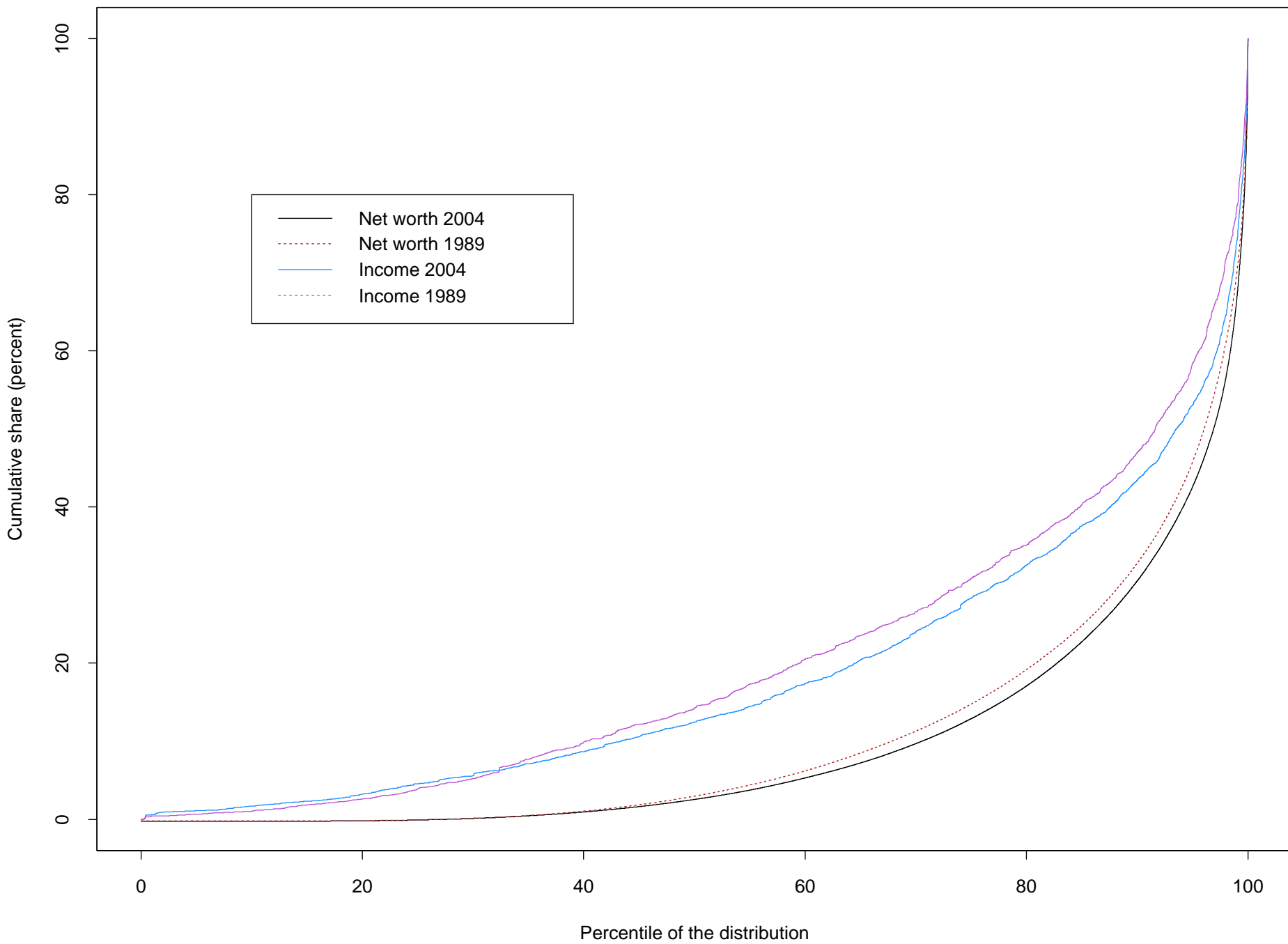
Figure 8: Distributions of Coefficient of Variation for Net Worth and Income.
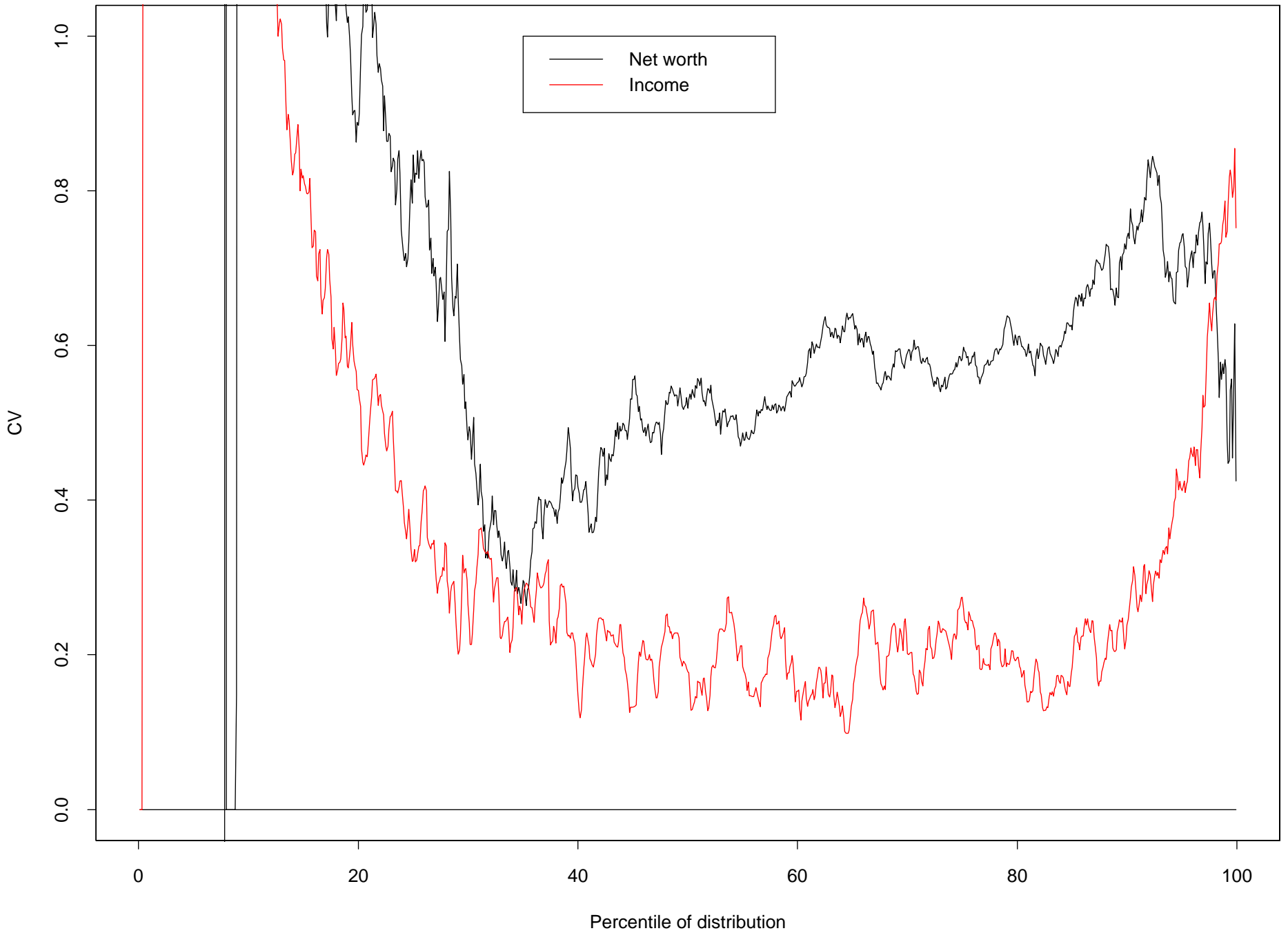
Figure 9: Relative Quantile-Difference Plot for Total Income, 1989-2004 (Difference Between 2004 Value and Earlier Value as a Percent of Earlier Value).
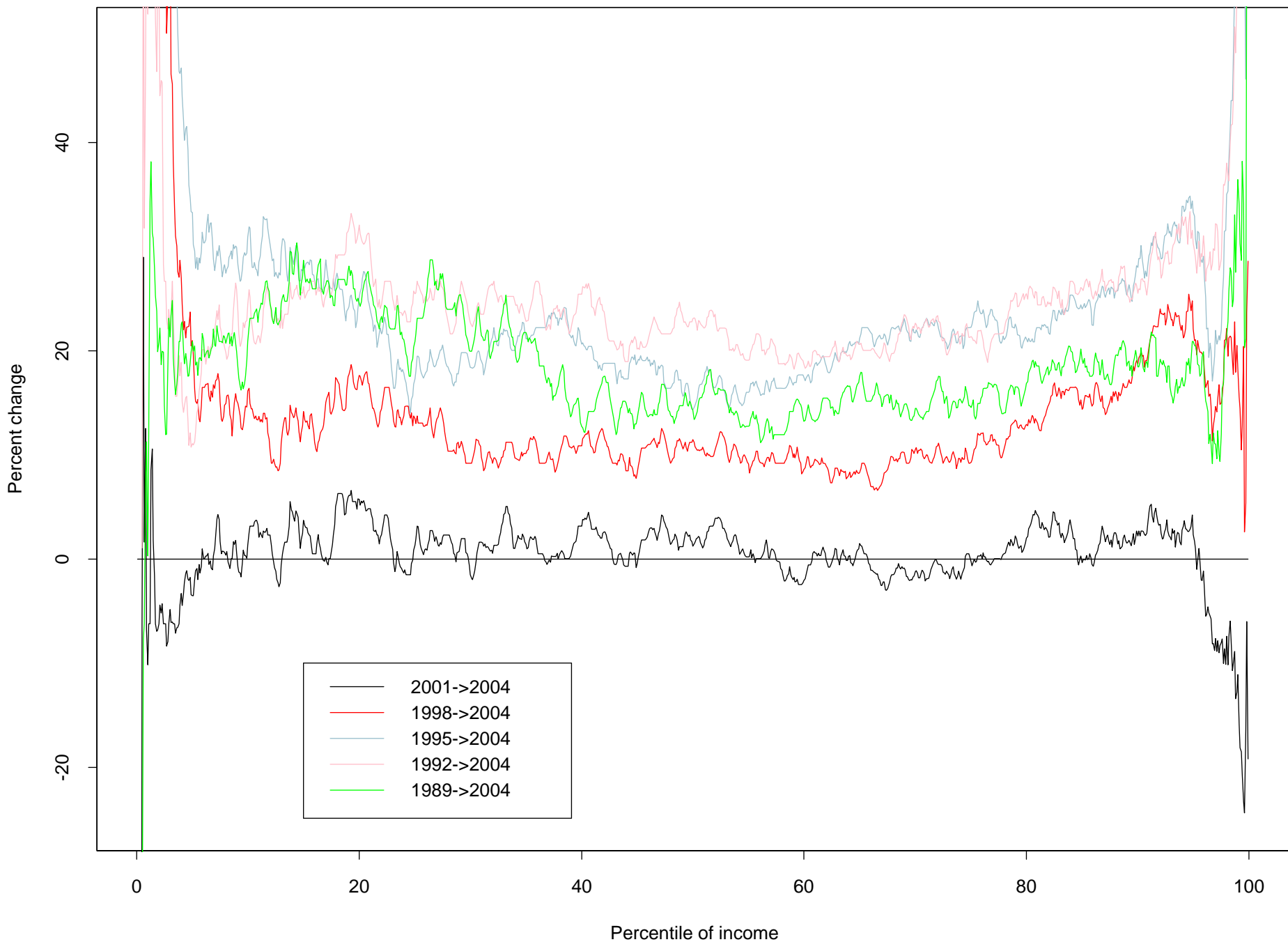
Figure 10: Relative Quantile-Difference Plot for Total Wages, Household Head Aged 25-65, 1989-2004 (Difference Between 2004 Value and Earlier Value as a Percent of Earlier Value).
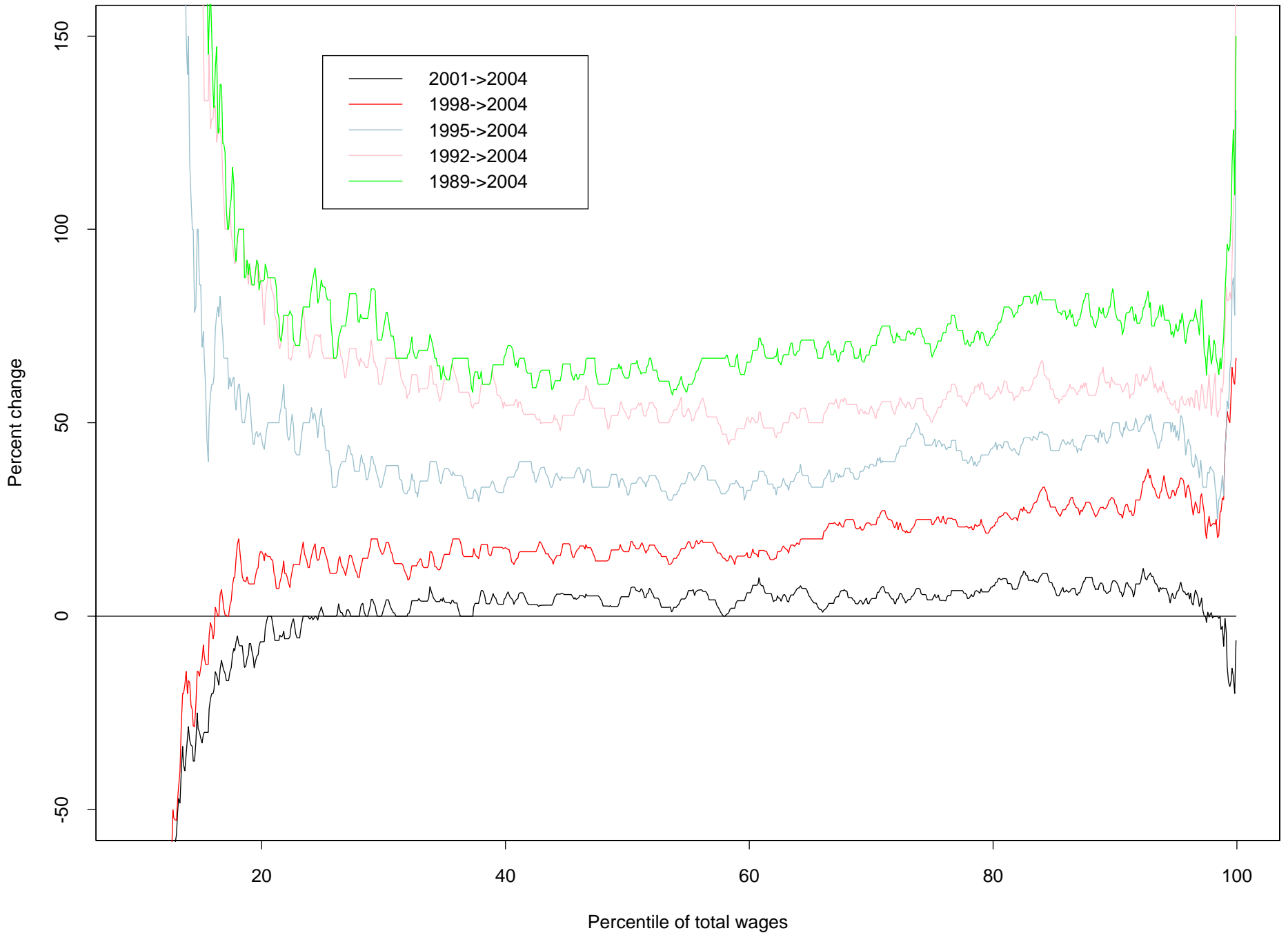
Figure 11: Relative Quantile-Difference Plot for New Worth, 1989-2004 (Difference Between 2004 Value and Earlier Value as a Percent of Earlier Value).
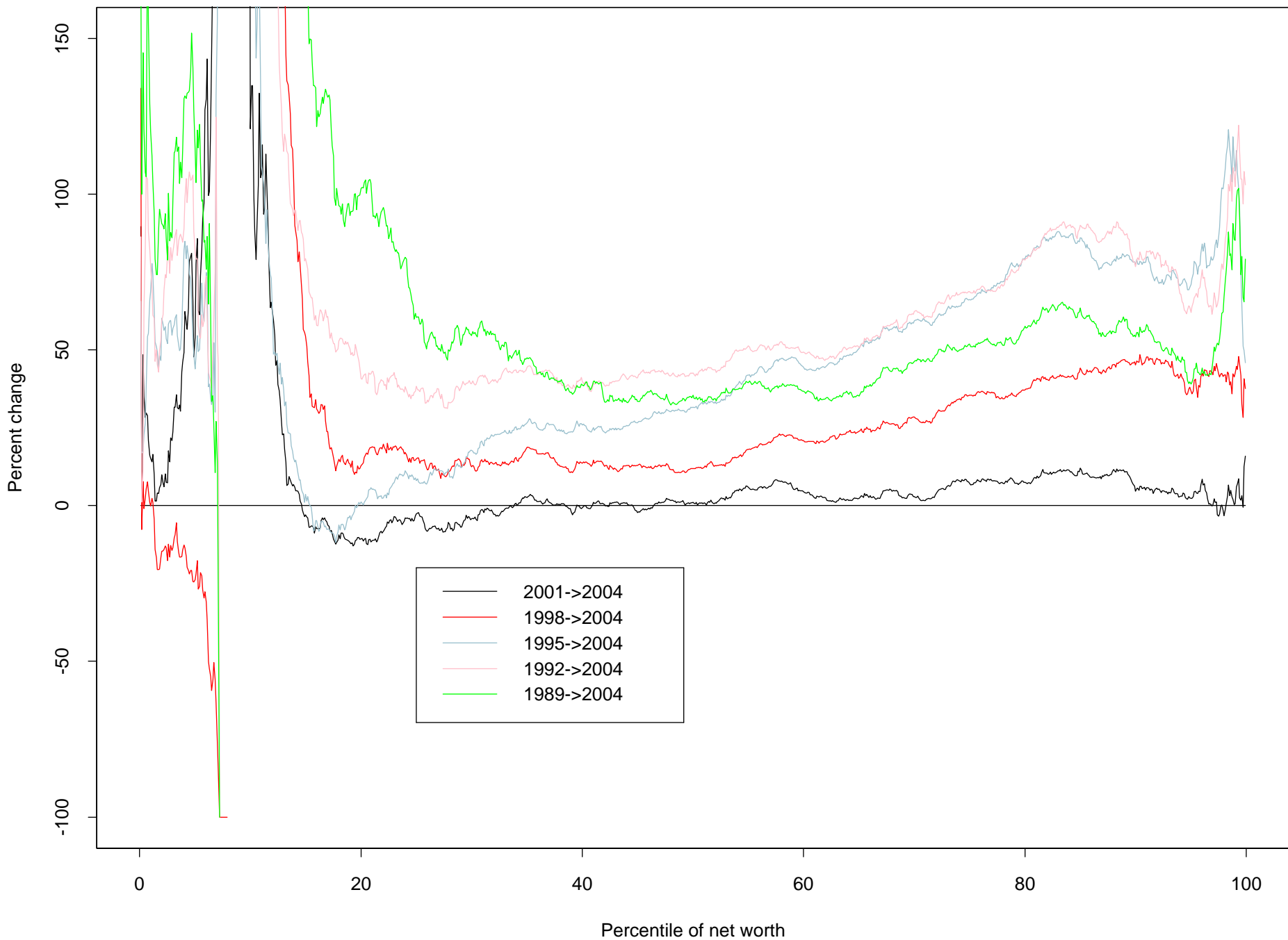
Figure 12: Average Contribution to Total Income of Various Components, by Percentile of the Distribution of Net Worth, 1989 (dotted line) and 2004 (solid line).
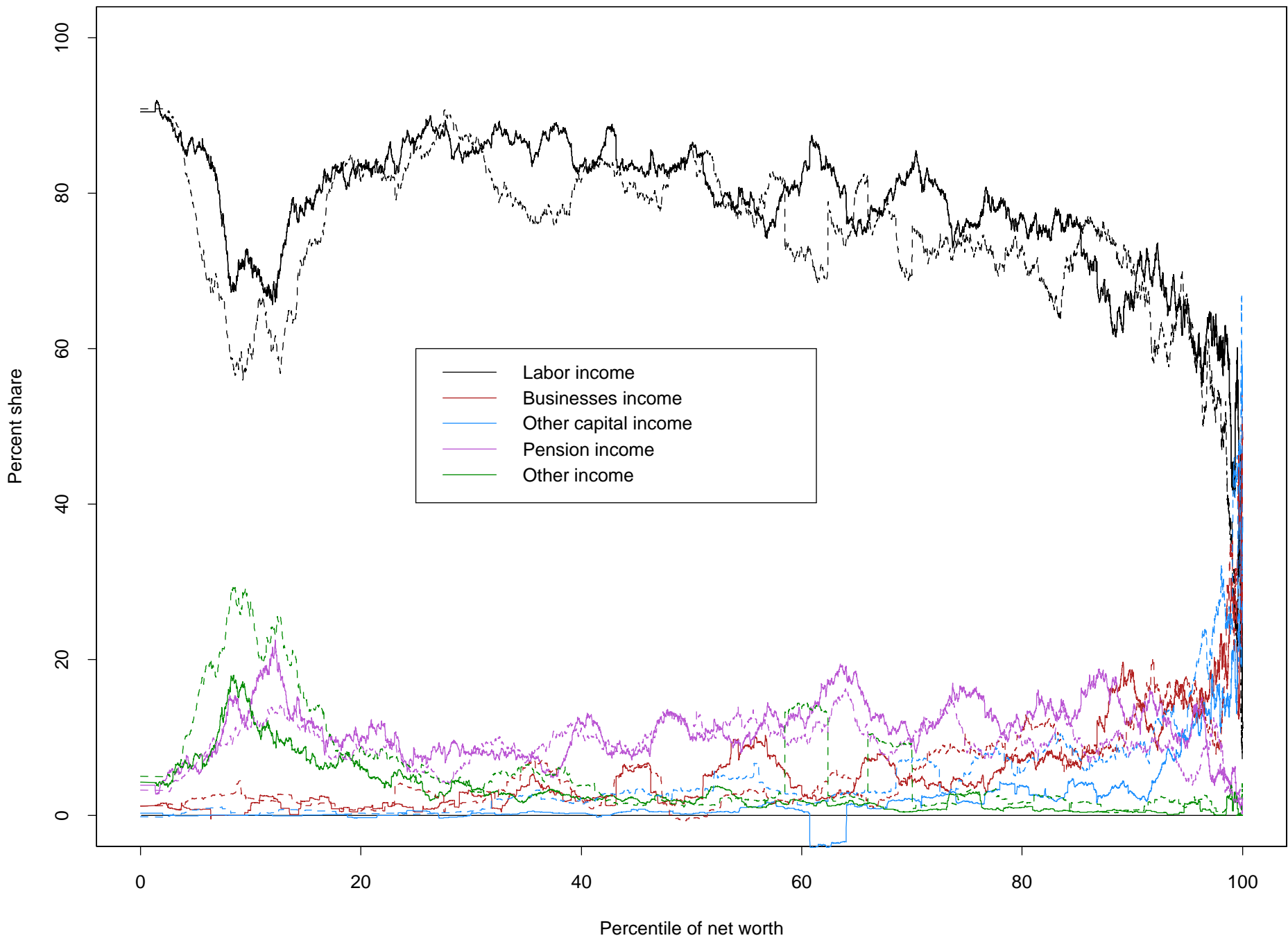
Figure 13: Average Portfolio Share of Various Assets and Debt, by Percentile of the Distribution of net Worth; 1989 (dotted line) and 2004 (solid line).
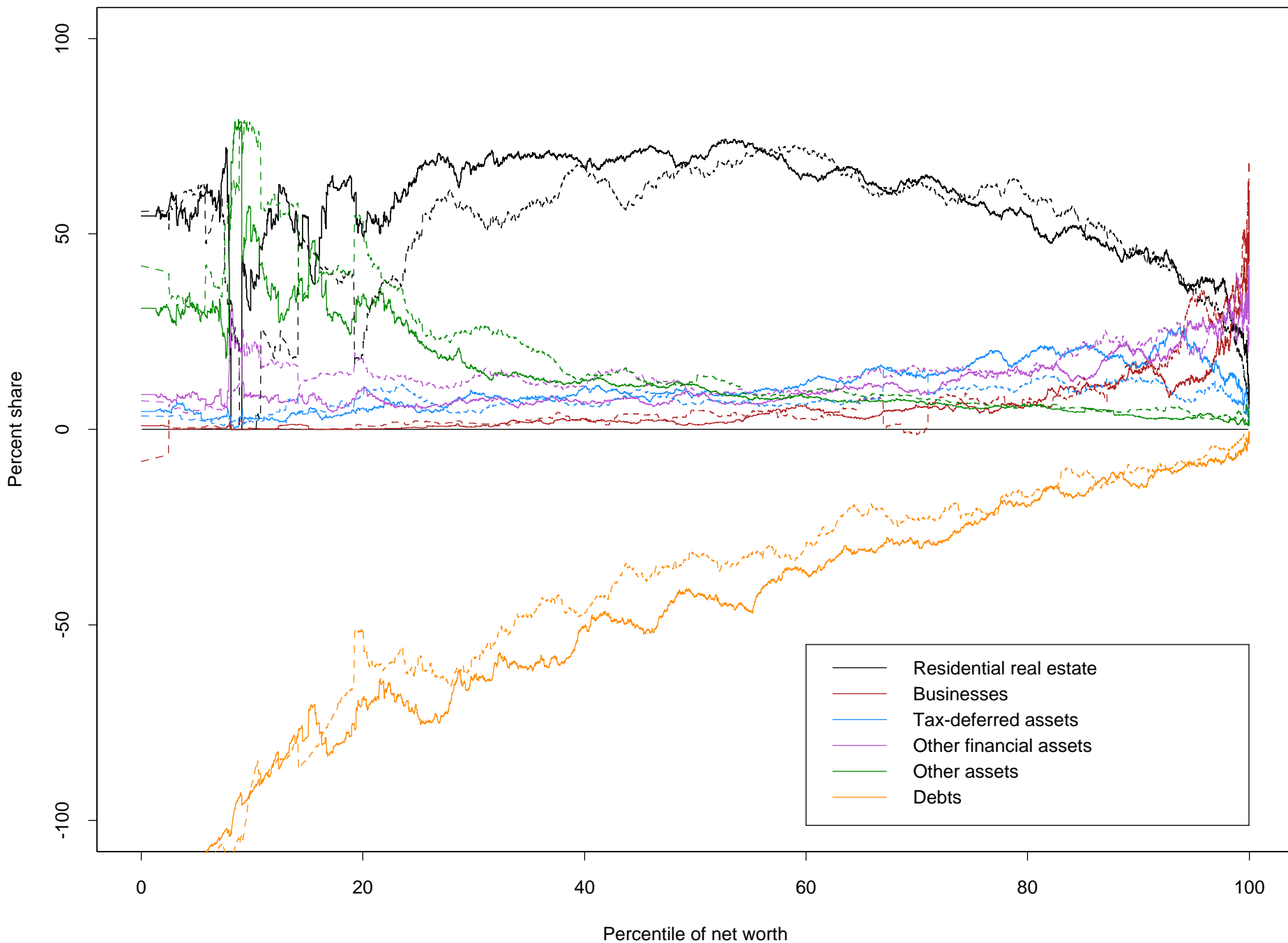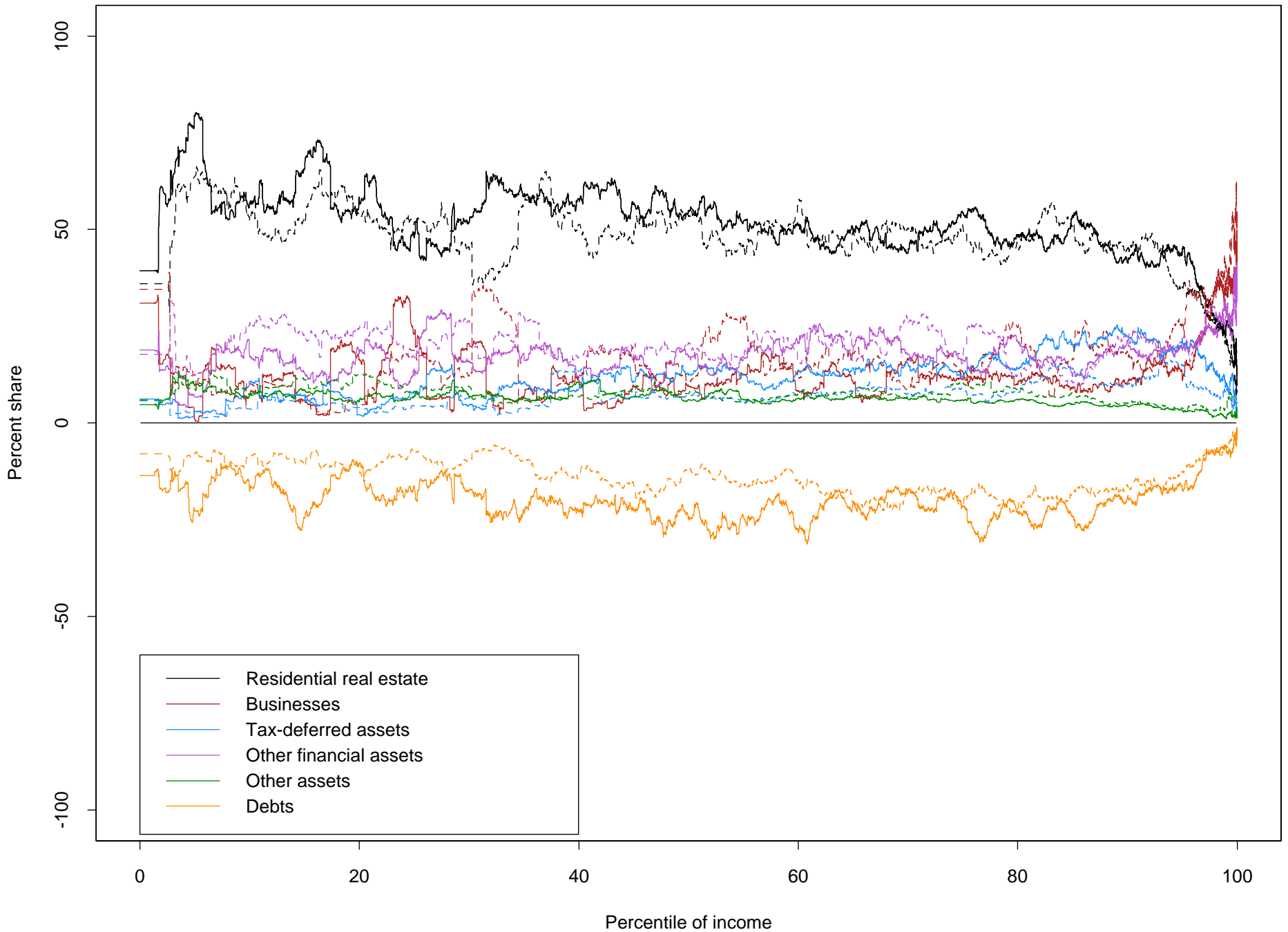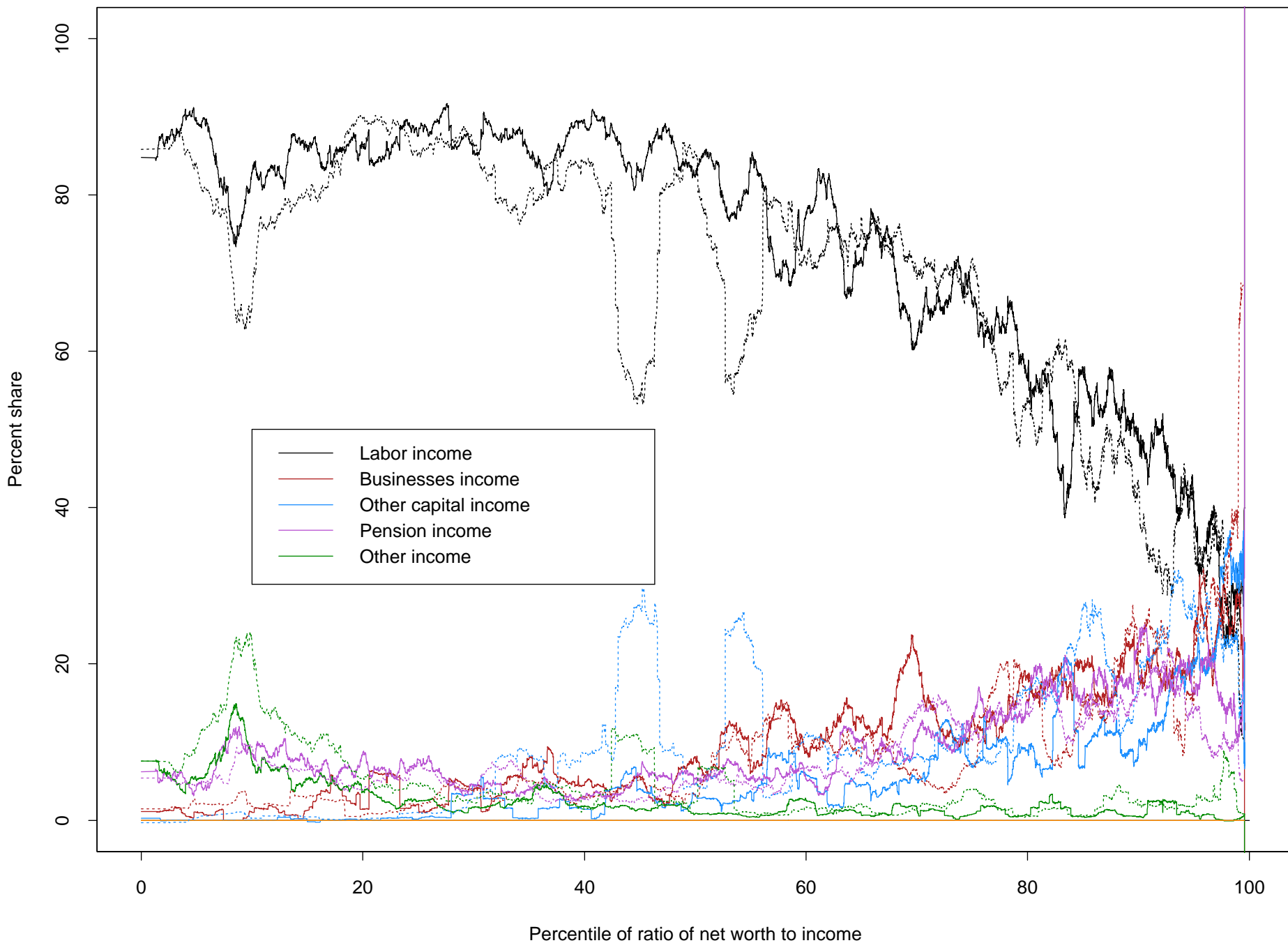
Figure 14: Average Contribution to Total Income of Various Components, by Percentile of the Distribution of Income;1989 (dotted line) and 2004 (solid line).
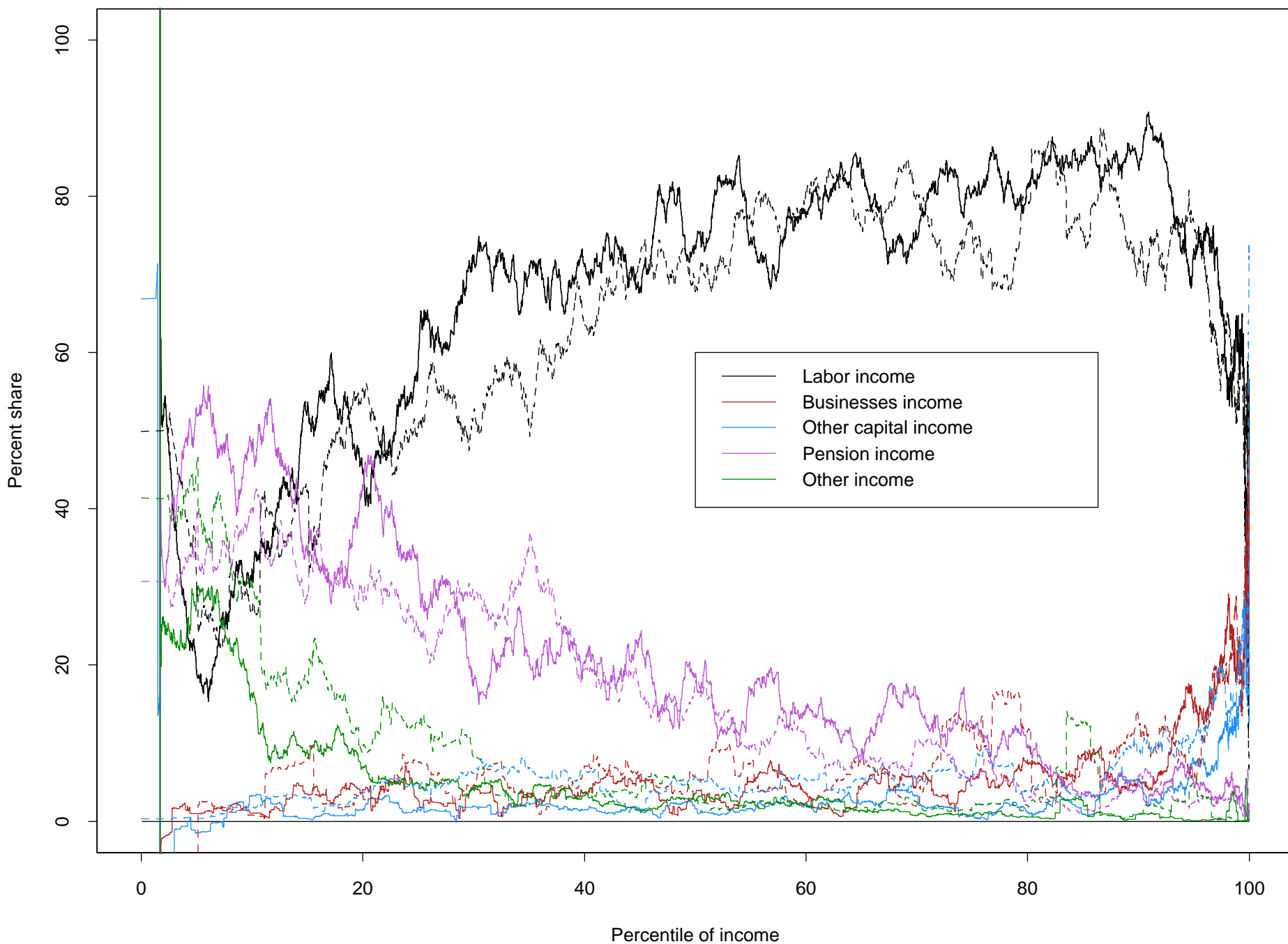
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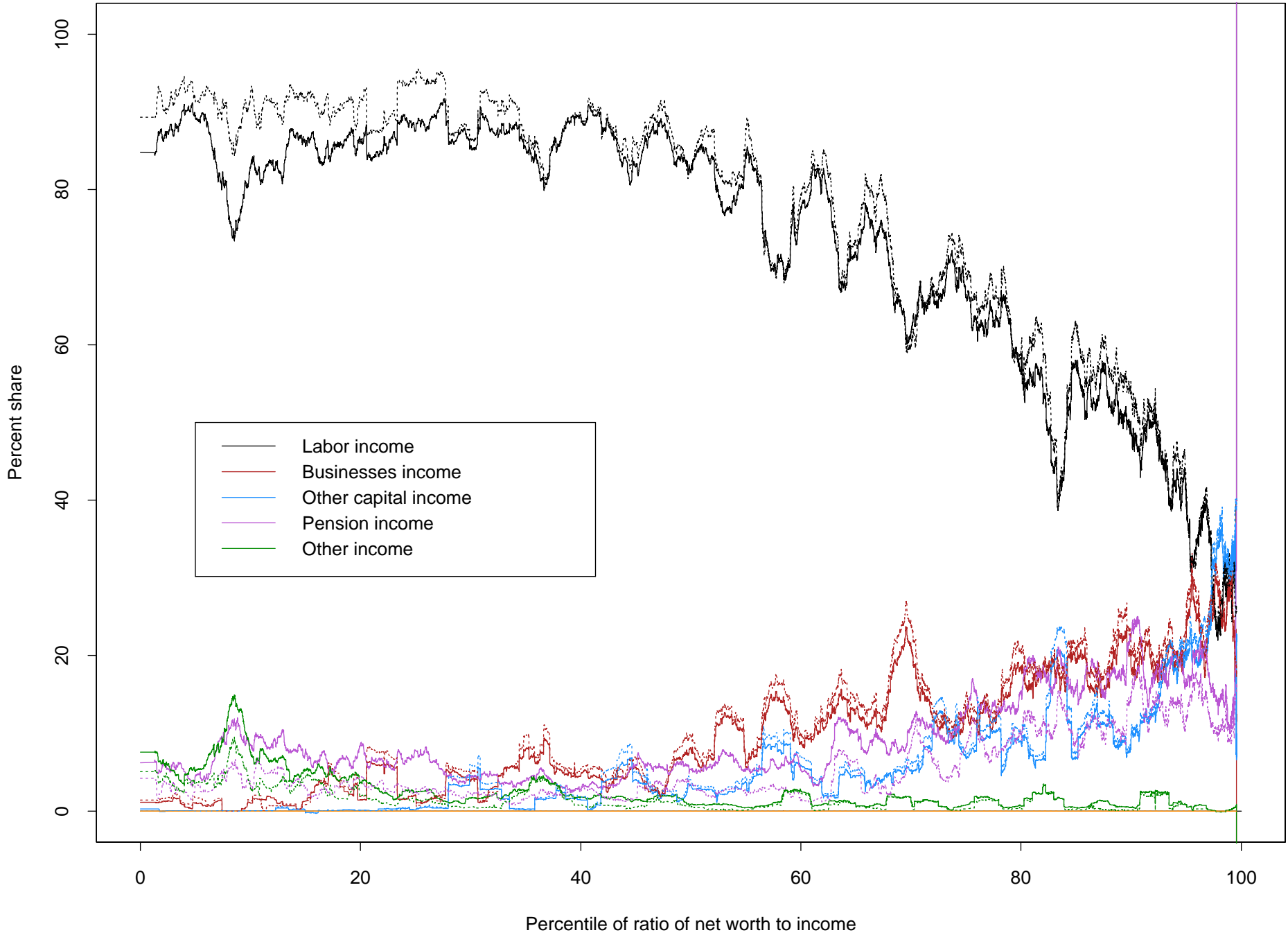
Figure 16: Average Contribution to Total Income of Various Components, by Percentile of the Distribution of the Ratio of Net Worth to Income; 1989 (dotted line) and 2004 (solid line).

Figure 17: Average Contribution to Total Income of Various Components, by Percentile of the Distribution of the Ratio of New Worth to Income; All Cases (solid line) and Casses with Income Above the Median at the Percentile (dotted line); 2004.
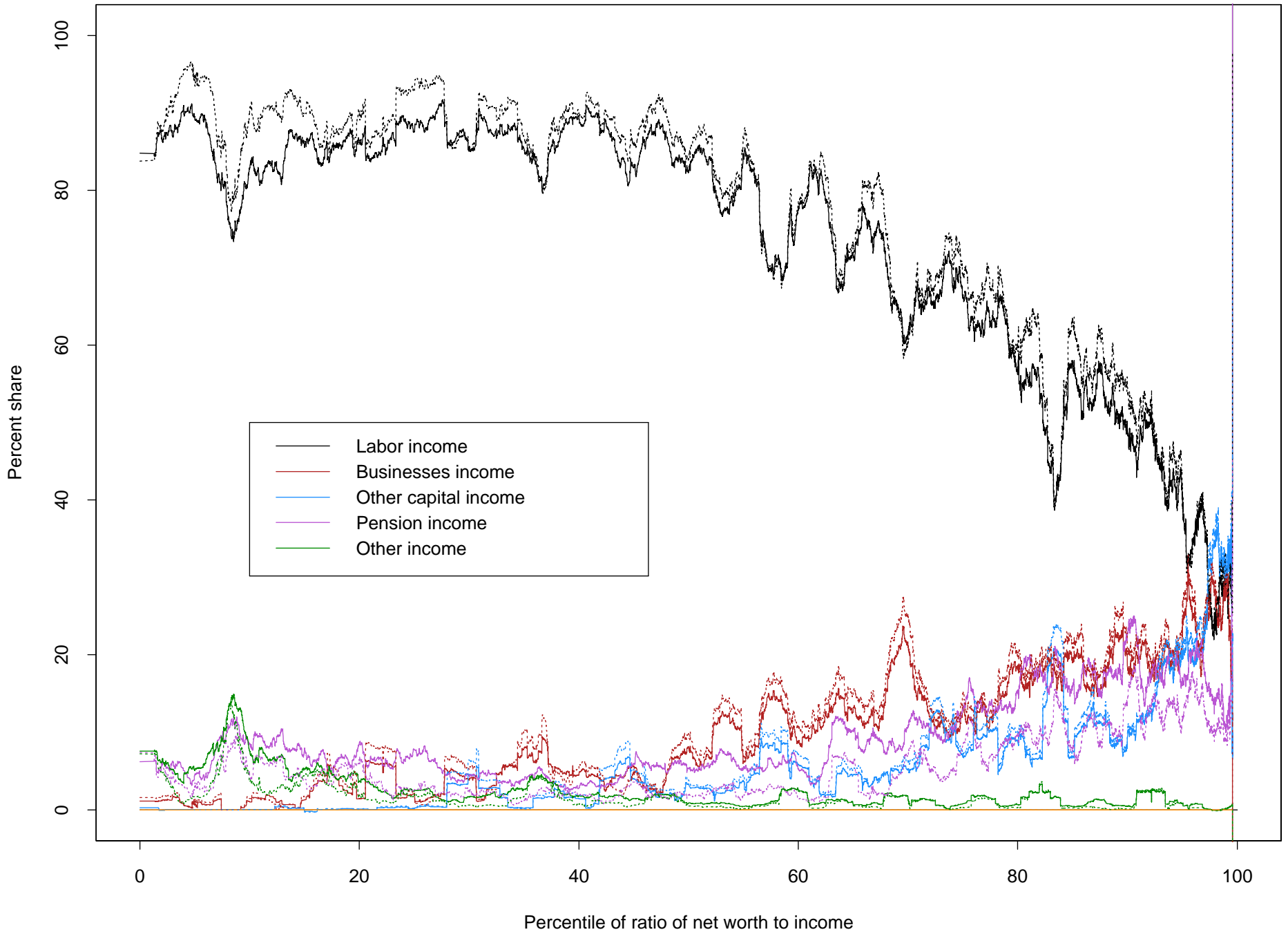
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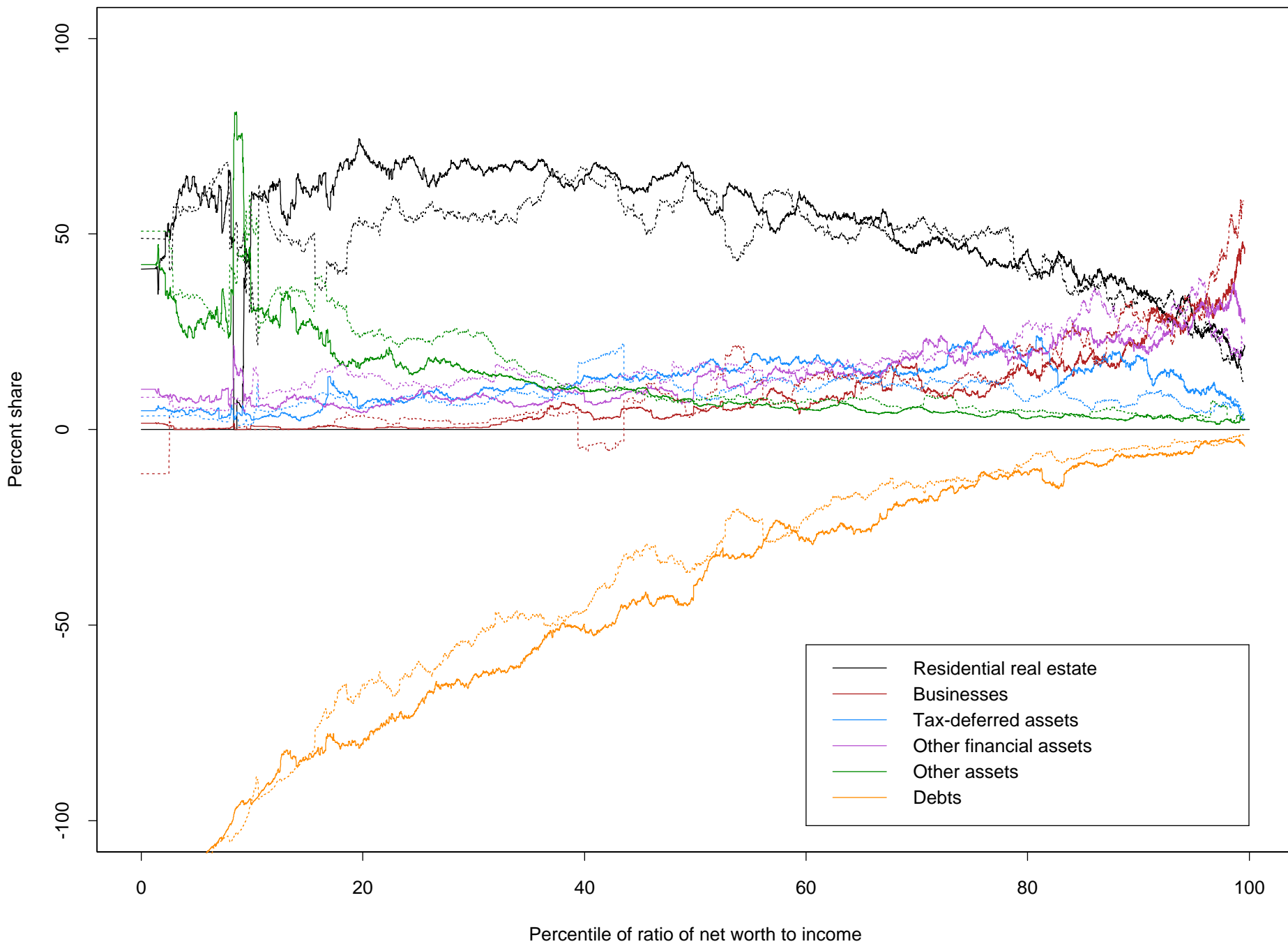
Figure 20: Average Portfolio Share of Various Assets and Debt, by Percentile of the Distribution of the Ratio of Net Worth to Income; All Households (solid line) and Households with Income Above the Median at the Percentile (dotted line); 2004.
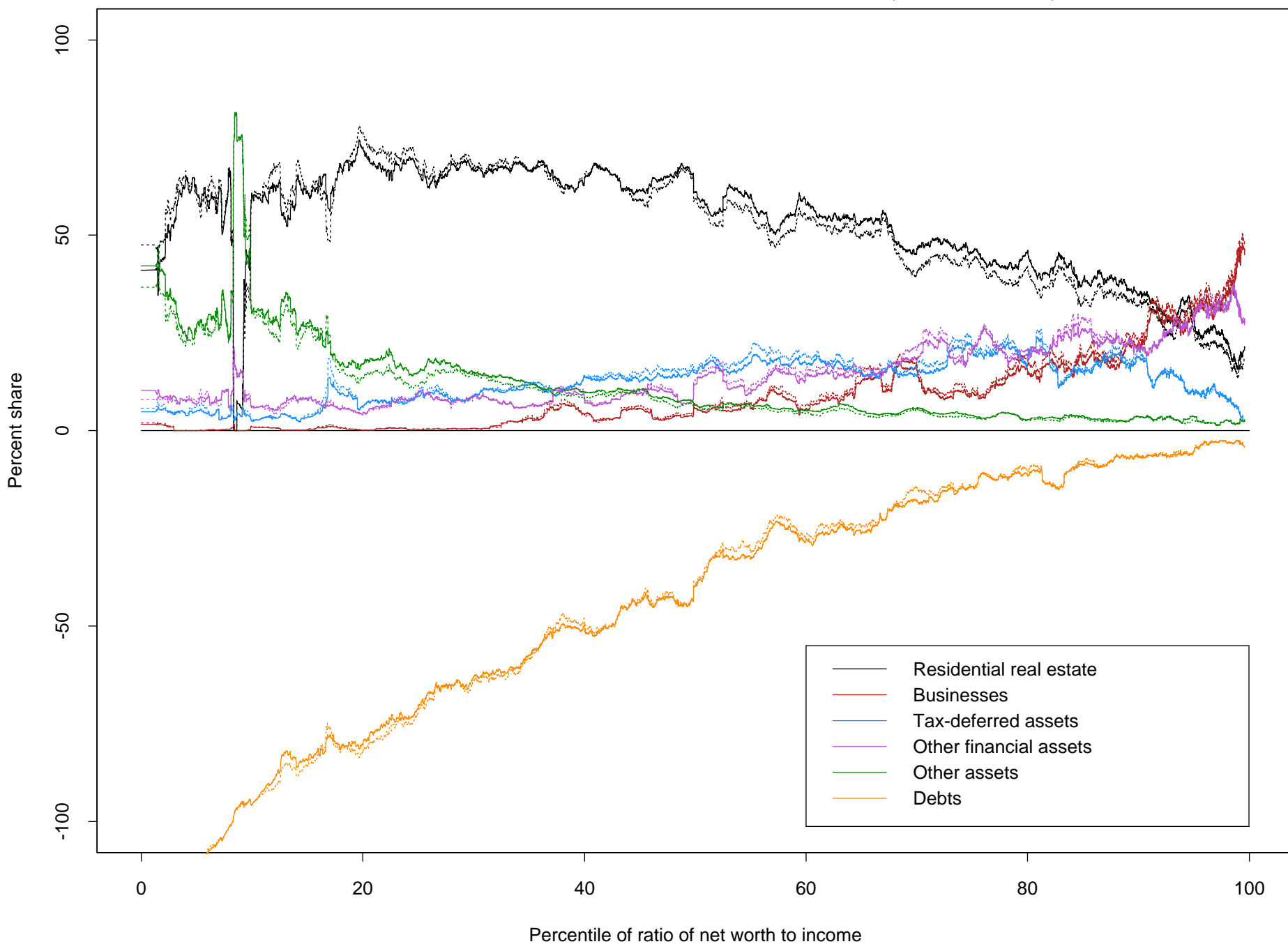
Figure 21: Average Portfolio Share of Various Assets and Debt, by Percentile of the Distribution of the Ratio of Net Worth to Income; All Households (solid line) and Households with Assets Above the Median for the Percentile (dotted line); 2004.
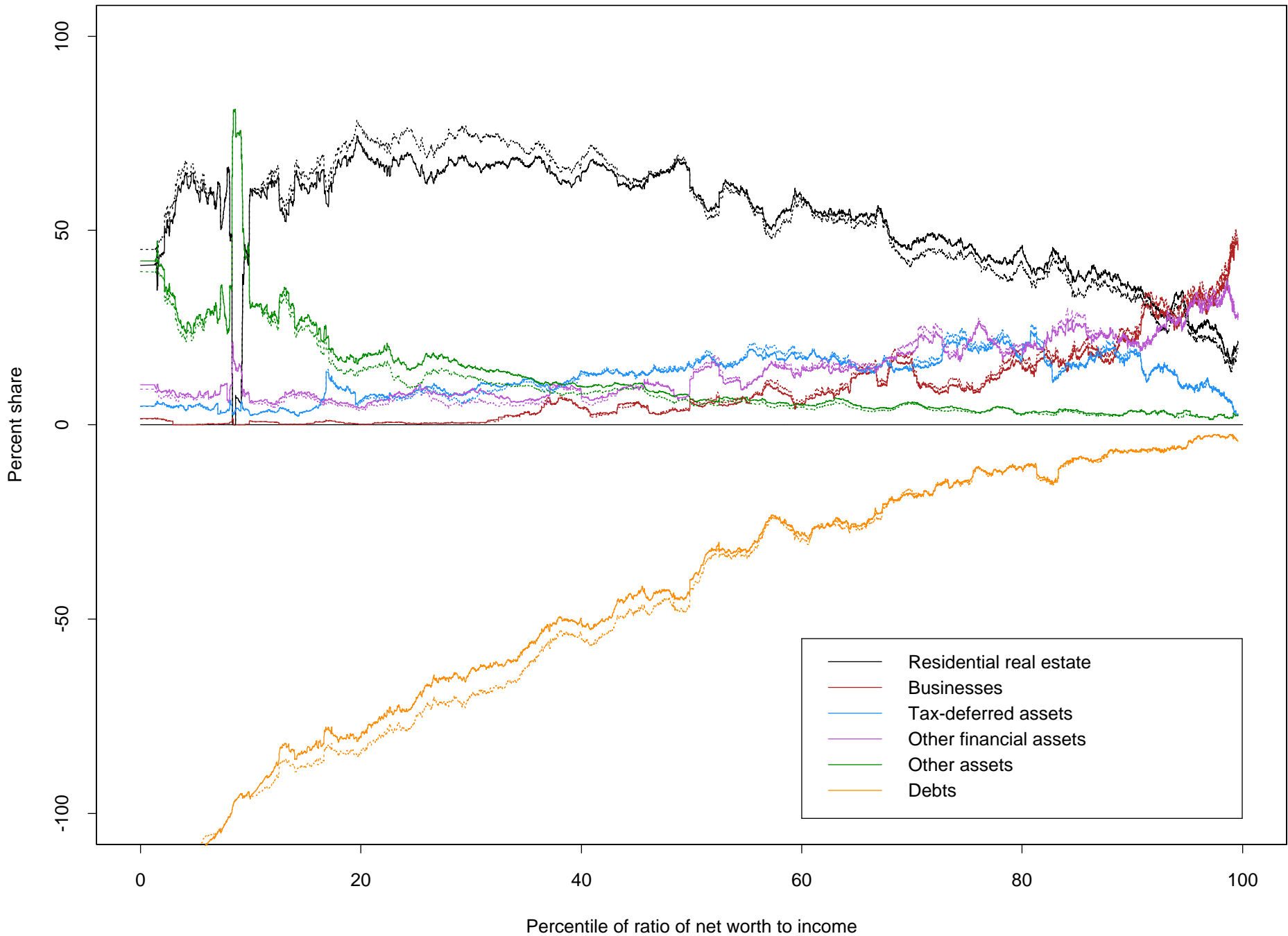
Figure 9a: Relative Quantile-Difference Plot for Total Income, with 95 Percent Confidence Intervals, 1989-2004 (Difference Between 2004 Value and Earlier Value as a Percent of Earlier Value).
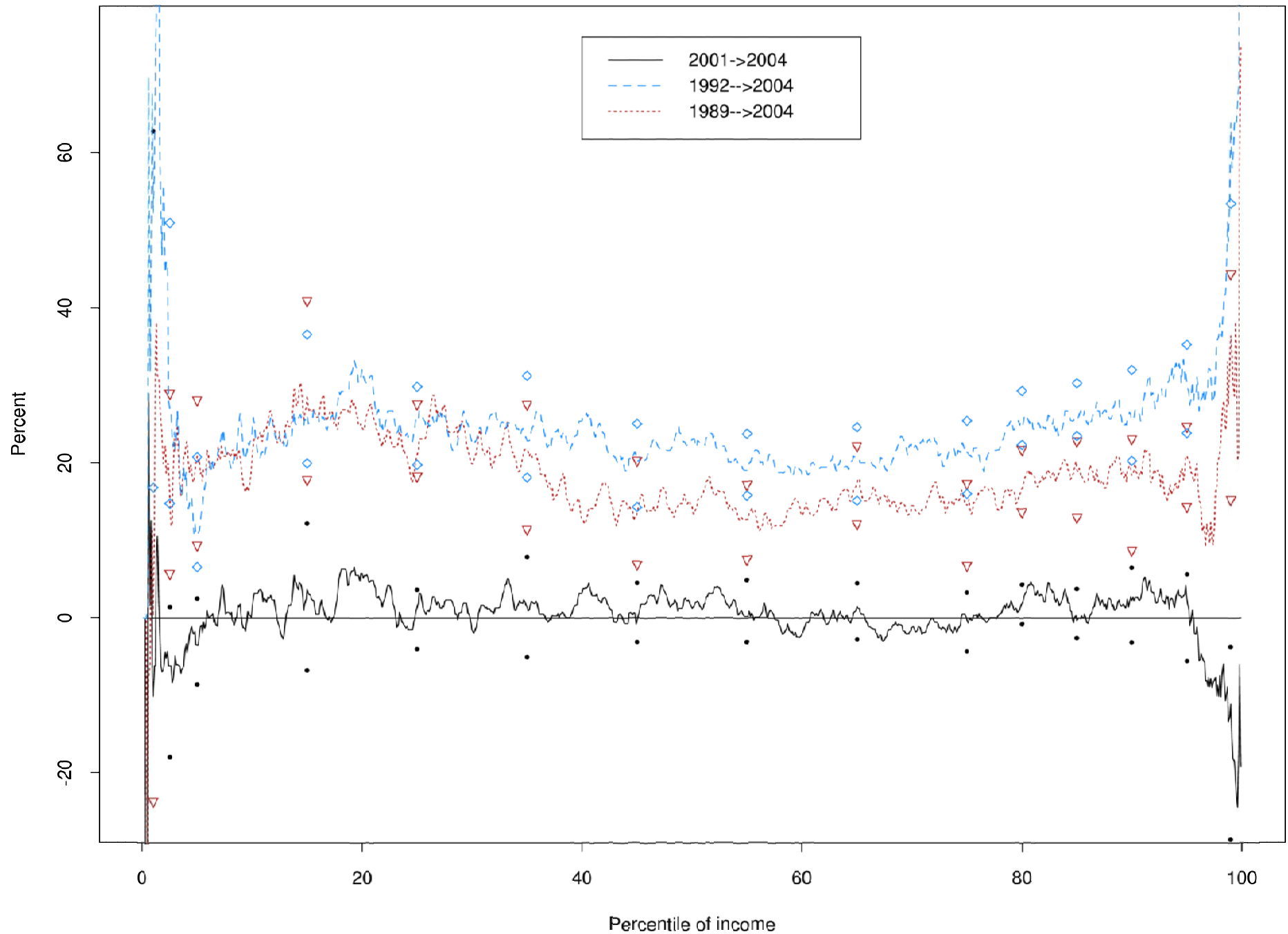
Figure 11a: Relative Quantile-Difference Plot for Net Worth, with 95 Percent Confidence Intervals, 1989-2004 (Difference Between 2004 Value and Earlier Value as a Percent of Earlier Value).
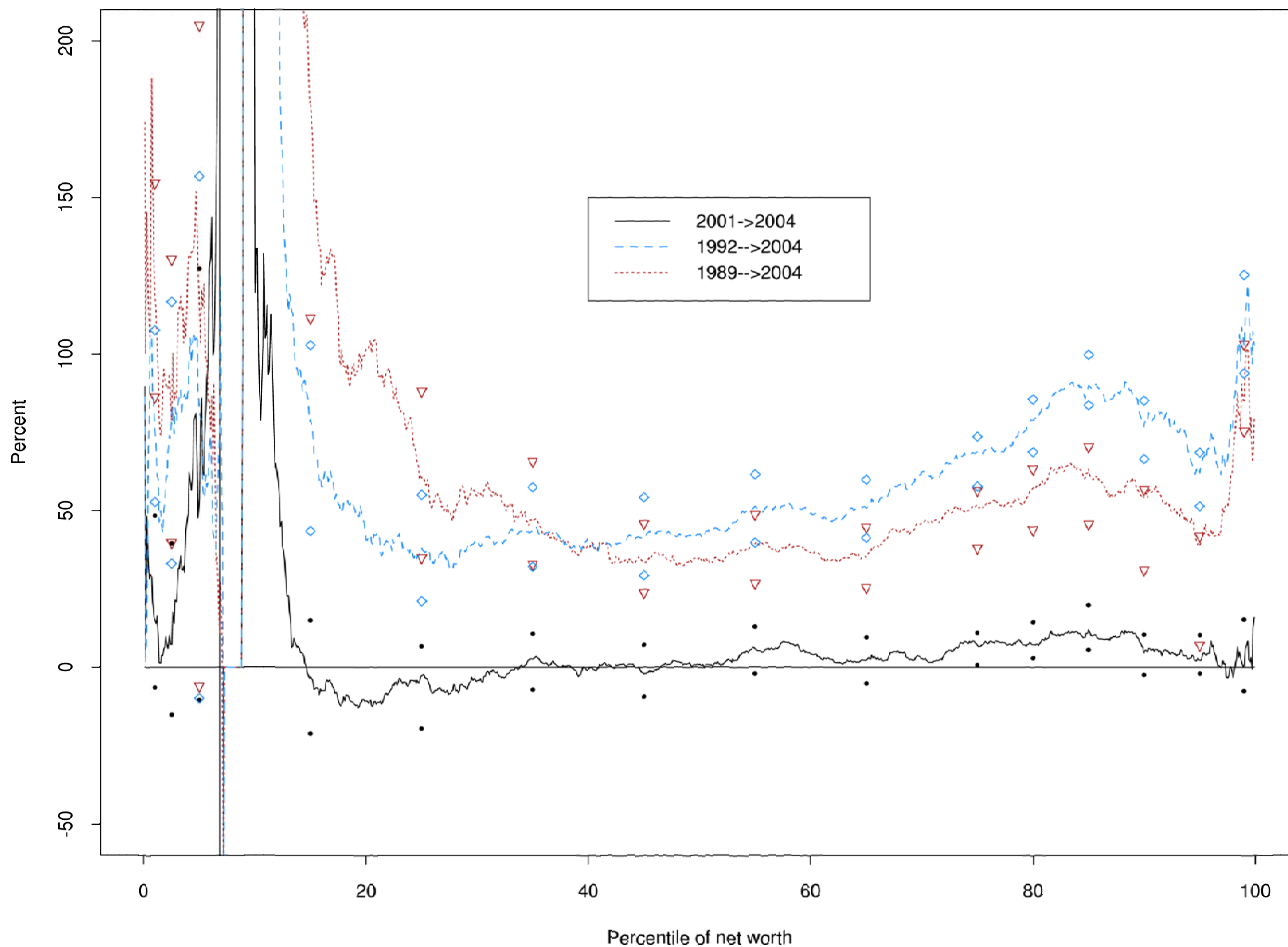
Figure 5: Change in De-Scaled Joint Distribution of Income and
Net Worth, 1989-2004 (2004 level minus 1989 level).