FURTHER ANALYSIS OF THE DISTRIBUTION OF INCOME AND TAXES, 1979-2002

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Different approaches have been used to measure the distribution of individual income over time. Survey data have been compiled with comprehensive enumeration, but underreporting of incomes, inadequate coverage at the highest income levels, and omission of a key income type jeopardize the validity of results. Administrative records, such as income tax returns, may be less susceptible to underreporting of income but exclude certain nontaxable income types and can be inconsistent in periods when the tax law has been changed. Record linkage studies have capitalized on the advantages of both approaches, but are costly and severely restricted by the laws governing interagency data sharing.

This paper is the sixth in a series examining trends in the distribution of individual incomes and tax burdens based on a consistent and comprehensive measure of income derived from individual income tax returns.[1,2,3,4,5] In the previous papers, we demonstrated that the shares of income accounted for by the highest income-size classes clearly have increased over time, and we also demonstrated the superiority of our comprehensive and consistent income measure, the 1979 Retrospective Income Concept, particularly in periods of tax reform. In this paper, we continue the analysis of individual income and tax distributions, adding for 3 years (1979, 1989, and 1999) Social Security and Medicare taxes to this analysis and using panel data. The paper has three sections. In the first section, we briefly summarize this measure of individual income derived as a "retrospective concept" from individual income tax returns. In the second section, we present the results of our analysis of time series data. We conclude with an examination of Gini coefficients computed from these data.

Derivation of the Retrospective Income Concept

The tax laws of the 1980's and 1990's made significant changes to both the tax rates and definitions of taxable income. The tax reforms of 1981 and 1986 significantly lowered individual income tax rates, and the latter also substantially broadened the income tax base. The tax law changes effective for 1991 and 1993 initiated rising individual income tax rates and further modifications to the definition of taxable income.[1,2,3,4,5] Law changes effective for 1997 substantially lowered the maximum tax rate on capital gains. The newest law changes, beginning for 2001, lowered marginal rates and the maximum tax rate on long-term capital gains, as well as decreased the maximum rates for most dividends. With all of these changes, the questions that arise are what has happened to the distribution of individual income, the shares of taxes paid, and average taxes by the various income-size classes?

In order to analyze changes in income and taxes over time, consistent definitions of income and taxes must be used. However, the Internal Revenue Code has been substantially changed in the last 24 years--both the concept of taxable income and the tax rate schedules have been significantly altered. The most commonly used income concept available from Federal income tax returns, Adjusted Gross Income (AGI), has changed over time making it difficult to use AGI for inter-temporal comparisons of income. For this reason, an income definition that would be both comprehensive and consistent over time was developed.[6, 7, 8, 9] The 1979 Retrospective Income Concept was designed to include the same income and deduction items from items available on Federal individual income tax returns. Tax Years 1979 through 1986 were used as base years to identify the income and deduction items, and the concept was subsequently applied to later years including the same components common to all years.

The calculation of the 1979 Retrospective Income Concept includes several items partially excluded from AGI for the base years, the largest of which was capital gains.[1,2,3,4,5] The full amounts of all capital gains, as well as all dividends and unemployment compensation, were included in the income calculation. Total pensions, annuities, IRA distributions, and rollovers were added, including nontaxable portions that were excluded from AGI. Social Security benefits (SSB) were omitted because they were not reported on tax returns until 1984. Also, any depreciation in excess of straight-line depreciation, which was subtracted in computing AGI, was added back. For this study, retrospective income was computed for all individual income tax returns in the annual Statistics of Income (SOI) sample files for the period 1979 through 2002. Loss returns were excluded, and the tax returns were tabulated into income-size classes based on the size of

retrospective income and ranked from highest to lowest. Percentile thresholds were estimated or interpolated for income-size classes ranging from the top 0.1 percent to the bottom 20 percent.[10,11,12] For each size class, the number of returns and the amounts of retrospective income and taxes paid were compiled. From these data, income and tax shares and average taxes were computed for each size class for all years.

The Distribution of Income and Taxes

With this database, we sought to answer the following questions--have the distribution of individual incomes (i.e., income shares), the distribution of taxes (i.e., tax shares), and the average effective tax rates (i.e., tax burdens) changed over time? As a first look at the data, we examined the income thresholds of the bottom (or entry level) of each income-size class, and a clear pattern emerged. While all of the income thresholds have increased over time, the largest increases in absolute terms, and on a percentage basis, were with the highest income-size classes.

For example, while $233,539 was needed to enter the top 0.1 percent for 1979, $1,278,479 was needed for entry into this class for 2002. This represents more than a 400-percent increase. Also, while $79,679 of retrospective income was needed to enter the top 1-percent size class for 1979, $315,937 was needed for entry into this size class for 2002, an increase of 297 percent. For the top 20 percent, the threshold increased by 162 percent, and, for the bottom 20 percent, the increase was only 130 percent. Since much of these increases are attributable to inflation, we computed constant dollar thresholds, using the Consumer Price Index.[13]

What is most striking about these data are the changes between 1979 and 2002 for the various income-size percentile thresholds (see Figure A). For example, the threshold for the top 0.1 percent grew (using a 1982-1984 base) from $321,679 for 1979 to $710,661 for 2002, an increase of 121 percent. Similarly, the threshold for taxpayers in the 1-percent group rose from $109,751 for 1979 to $175,618 for 2002, an increase of just over 60 percent. However, the thresholds for each lower percentile class show smaller increases in the period; the top 20-percentile threshold increased only 5.6 percent, and the 40-percent and all lower thresholds declined.

Income Shares

The share of income accounted for by the top 1 percent of the income distribution has climbed steadily from a low of 9.58 percent (3.28 for the top 0.1 percent) for 1979 to a high of 21.55 (10.49 for the top 0.1 percent) for 2000. With the recession and, then, the stagnating economy of 2001 and 2002, this share had declined to 16.89 percent (7.10 for the top 0.1 percent) for 2002. While this increase has been mostly steady, there were some significantly large jumps, particularly for 1986, due to a surge in capital gains realizations after the passage, but prior to implementation, of the Tax Reform Act of 1986 (TRA). The top 1-percent share

Figure A-Constant Dollar Income Thresholds, 1979-2002 (1982-84=100)

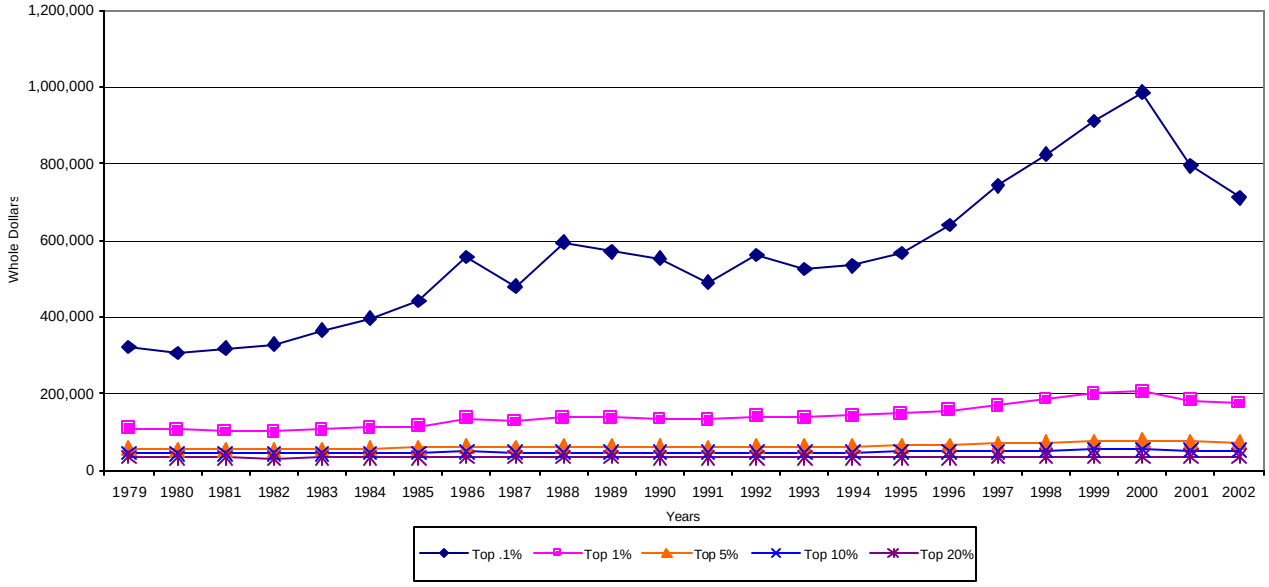
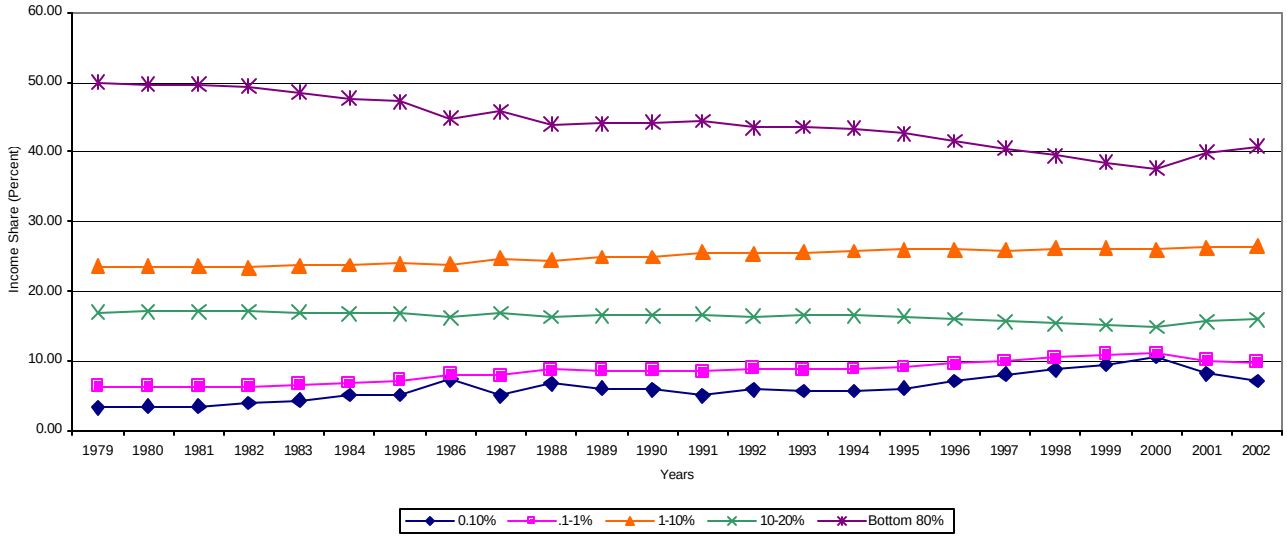


Figure B-Income Shares by Income Percentile Size-Classes, 1979-2002



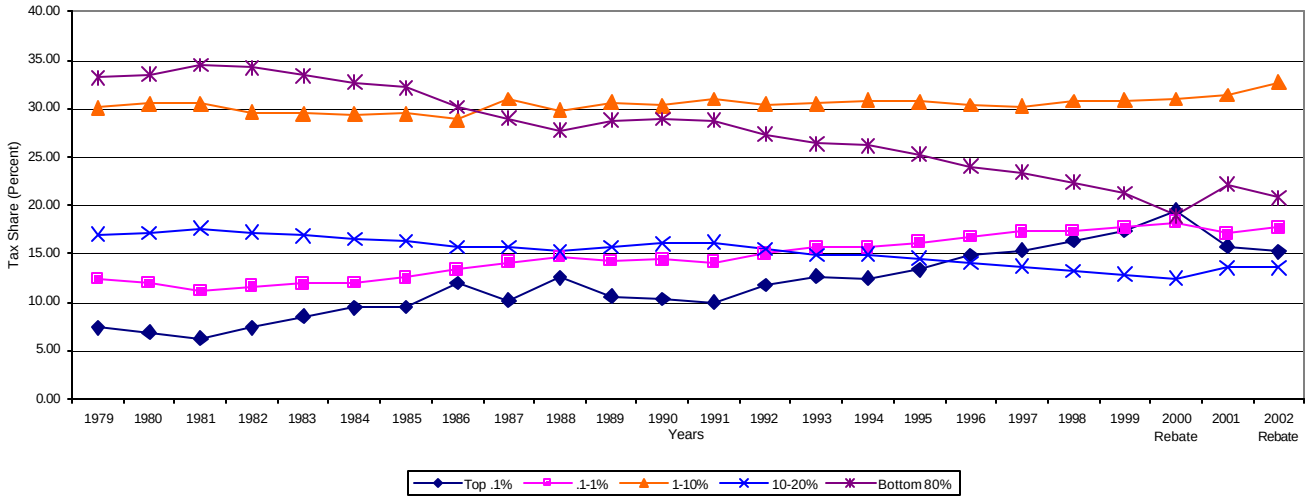
also increased rapidly for 1996 through 2000, when sales of capital assets also grew considerably each year. Notable declines in the top 1-percent share occurred in the recession years of 1981, 1990-1991, and 2001.

This pattern of an increasing share of total income is mirrored in the 1-to-5 percent class but to a considerably lesser degree. For this group, the income share increased from 12.60 percent to 15.14 percent in this period. The 5-to-10 percent class's share of income held fairly steady over this period, going from 10.89 percent for 1979 to 11.28 percent for 2002. The shares of the lower percentile-size classes, from the 10-to-20 percent classes to the four lowest quintiles, show declines in shares of total income over the 24-year period (see Figure B).

Tax Shares -- Income Tax

The share of income taxes accounted for by the top 1 percent also climbed steadily during this period, from 19.75 percent (7.38 for the top 0.1 percent) for 1979, then declined to a low of 17.42 percent (6.28 for the top 0.1 percent) for 1981, before rising to 36.30 percent (18.70 for the top 0.1 percent) for 2000 (Figure C). The corresponding percentages for 2000 for the 1-percent and 0.1-percent groups are 37.68 percent and 19.44 percent, respectively, accounting for the 2000 tax rebate, which is discussed below. For the recession

Figure C-Income Tax Shares by Income Percentile Size-Classes, 1979-2002



year of 2001 and the subsequent year (2002) with its large decline in net gains from the sale of capital assets, these shares declined to 32.53 percent for the top 1 percent and 15.06 percent (15.25 percent including the rebate of the child tax credit) for the top 0.1-percent group (32.95 percent and 15.25 percent, respectively, including a rebate of a portion of the child tax credit). As with incomes, there were some years with unusually large increases though a common feature for these years was double-digit growth in net capital gains.[8,9]

The 1-to-5 percent size class exhibited relatively modest change in its share of taxes, increasing from 17.53 percent to 20.29 percent (20.52 including the rebate for the child tax credit) in the period. The 5-to-10 percent class, and all lower income-size classes, had declining shares of total tax.

Average Tax Rates -- Income Tax

What is most striking about these data is that the levels of the average tax burdens increase with income size in most years (the only exceptions being 1986 for just the two highest groups). The progressive nature of the individual income tax system is clearly demonstrated.

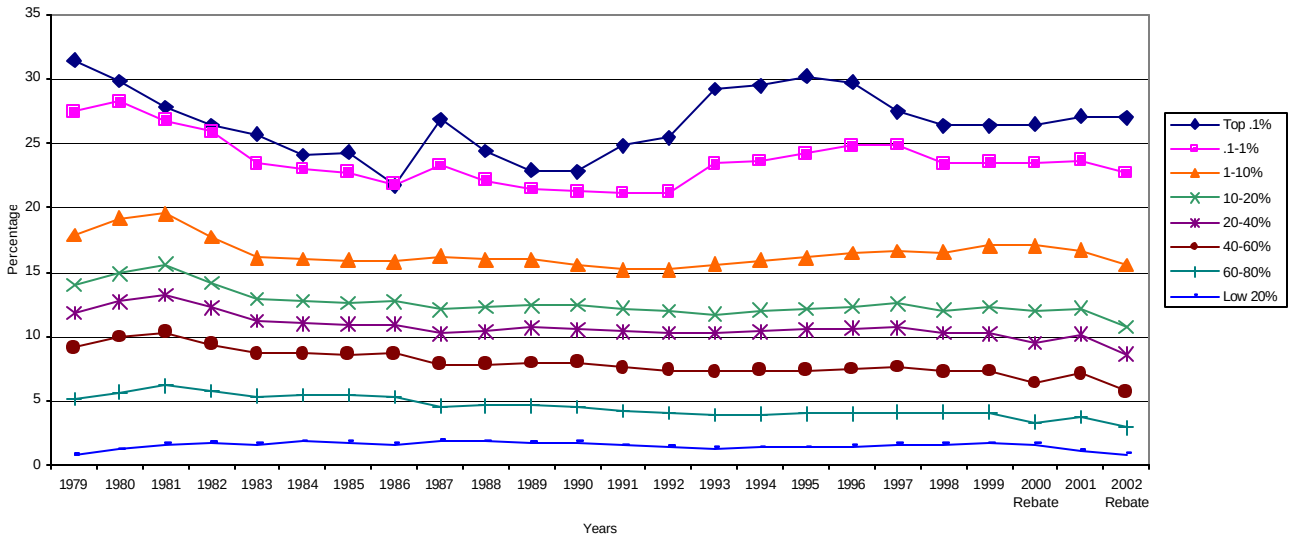
Despite the fact that the overall average tax rate remained virtually the same for 1979 and 2001, the average rate for all but the very lowest size class actually declined (see Figure D).[14] While this at first appears to be inconsistent, it is clear how this did in fact occur -- over time, an increasing proportion of income has shifted to the upper levels of the distribution where it is taxed at higher rates (see Figure B). For 2002, including the child tax credit rebate, the average tax rate fell to 12.56 percent, close to the lowest rate over the 24 years of this study of 12.53 percent for 1991.

In examining the average tax data by income size, four distinct periods emerge. First, the average tax rates were generally climbing up to the implementation of the Economic Recovery Tax Act (ERTA) effective for 1982. This was an inflationary period, and prior to indexing of personal exemptions, the standard deduction, and tax brackets, which caused many taxpayers to face higher tax rates. (Indexing became a permanent part of the tax law for Tax Year 1985.[7]) Also, this period marked the recovery from the recession in the early 1980's.

Similarly, average taxes also climbed in the period after 1992, the period affected by the Omnibus Budget and Reconciliation Act (OBRA). This was not surprising for the highest income-size classes, ones affected by the OBRA-initiated 39.6-percent top marginal tax rate, but the average tax rate increases are also evident in the smaller income-size classes for most years in the 1993-to-1996 period as well.

For the majority of intervening years (i.e., 1982 through 1992), average tax rates generally declined by small amounts for most income-size classes, although the period surrounding the implementation of the 1986 Tax Reform Act (TRA) gave rise to small increases in some classes. Despite the substantial base broadening and rate lowering initiated by TRA, for most income-size classes, the changes to average rates were fairly small. However, it should be kept in mind that individuals can and do move between income-size classes.

Figure D-Average Income Tax Rates by Size-Classes, 1979-2002



The rates for the top 0.1 percent clearly show the effects of the 1986 capital gains realizations, in anticipation of the ending of the 60-percent long-term gains exclusion, which began in 1987. The average tax rate for this income-size class dropped for 1986, but it rose sharply for 1987, before dropping again for each of the next 3 years.

To assess what happened, it is important to look at the underlying data. The substantial increase in capital gains realizations for 1986 swelled the aggregate income and tax amounts for upper income classes and also raised the income thresholds of these top classes. However, since much of the increase in income for these size classes was from net long-term capital gains, which had a maximum effective tax rate of 20 percent, it is not surprising that the average tax rate for these top size classes declined.

Next, to consider are those years affected by the Taxpayer Relief Act of 1997 (1997 through 2000), where the top rate on long-term capital gains was reduced significantly from 28 percent to 20 percent. For 1997, the first year under this law, when the lower rates were only partially in effect, the average tax rate fell for the top 0.1-percent group of taxpayers but increased for all other groups. However, for 1998, the first full year under lower capital gains rates, all groups above and including the 40-to-60 percent class had reduced average tax rates (while the lowest two quintiles had virtually the same average tax rates). For all groups (except for the 20-to-40 and the 60-to-80 percent groups in 1999), the average rates returned to increasing for both 1999 and 2000.

The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) further reduced marginal tax rates over several years. One of these reductions was the introduction of a 10-percent bracket on the first $6,000 ($12,000 if married filing a joint return) of taxable income. In an attempt to fuel a recovery from recession, this reduction was introduced retroactively in the form of a rebate based on Tax Year 2000 filings. Therefore, we simulated the rebate on the Tax Year 2000 Individual File to see its effects on average tax rates. When the rebate (estimated at $37.9 billion) is taken into account, the average rates for 2000 decreased for all groups, except for the top 0.1 percent and the 1-to-5 percent, reversing the pre-rebate increases. Tax Year 2001 was a mixture of increases and decreases in average tax rates by income group. Most groups paid higher average taxes; however, the 1-to-5 percent and 5-to-10 percent groups paid lower average taxes along with the bottom 20-percent group.

For 2002, when the 10-percent rate applied to all returns and all rates above 15 percent were reduced by one-half of 1 percentage point, the average tax rate fell for every group. Further, as the economy stagnated, another rebate of $400 per child was sent to individuals who received a child tax credit for that year. This was in lieu of receiving the additional amount for 2003 as part of the increased child tax credit provided by the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA). Simulating this on Tax Year 2002, we estimated that $14.2 billion was sent to taxpayers further reducing average taxes for 2002. The individuals who gained the most from this rebate were in the 5-to-10 percent group through the 40-to-60 percent group.

Tax Shares --Income Plus Social Security Tax

For individual taxpayers, Social Security taxes compose a fairly large portion (about 37 percent for 1999) of the Federal tax burden.[15] To broaden our analysis, we merged data from W-2's with individual income tax records for the years 1979, 1989, and 1999. Total Social Security taxes included self-employment taxes and taxes on tips reported on tax returns and two times the Social Security taxes (representing both the taxpayers' and the employers' shares) reported on W-2's. The employers' share of this tax was added into retrospective income, as well. To further help our analysis, the U.S. Treasury Department's Office of Tax Analysis (OTA) model was used to simulate the effect of the two new tax laws, EGTRRA and JGTRRA, on the 1999 data.[16]

Even including Social Security taxes, the shares of the higher income groups increased (the top 0.1-percent group's share more than doubled from 5.06 percent for 1979 to 11.05 percent for 1999), while the shares of the lower income groups (each group from the 10-to-20 percent group and lower) declined (see Figure E).

However, when we simulated all of the provisions of EGTRRA/JGTRRA on 1999 data, tax shares for the top two groups (the 0.1 percent and the 0.1-to-1 percent

Figure E-Tax Shares (Including Social Security Taxes) by Percentile Size-Classes, 1979-1999

Year	Top 0.1%	0.1-1%	1-5%	5-10%	10-20%	Top 20%	20-40%	40-60%	60-80%	Low 20%
1979	5.06	8.97	14.69	11.87	17.70	58.28	22.97	12.42	5.12	1.22
1989	6.29	9.43	15.42	12.51	17.63	61.29	21.94	11.18	4.44	1.15
1999	11.05	12.27	16.84	12.03	15.98	68.17	18.83	9.28	3.09	0.63
1999 JGTRRA	9.52	11.31	17.75	12.50	16.39	67.47	19.22	9.54	3.11	0.65

groups) declined from 1999 levels, while all other groups increased. Still, for these two groups and the 1-to-5 percent, the tax shares were still higher than 1989 levels. Interestingly, the 1-to-5 percent group is the only group whose share increased from 1989 to 1999 (from 15.42 percent to 16.84 percent) and then increased again (to 17.85 percent) under new tax law provisions. This is most likely due to the effect of the alternative minimum tax (AMT) offsetting lower marginal and capital gain rates for this group of taxpayers.

Average Tax Rates Including Social Security Taxes

Unlike the tax shares data, average taxes, including Social Security taxes, vary considerably over time from average income taxes. Including Social Security taxes for 1979, the overall tax system (like the income tax system) was progressive, with each higher income class paying a higher percentage average tax than the classes preceding it (see Figure F). However, this is not entirely true for any of the other years that we merged income tax with W-2 data. For 1989, the system was progressive up to the 5-to-10 percent income class. Above this level, each successively higher income class paid a lower rate than the ones below it, falling to 23.33 percent for the top 0.1-percent income group. In fact, for 1989, the top 0.1-percent group faced a lower rate than all groups from the 10-to-20 percent income group and higher. The highest rate for that year was paid by those individuals in the 5-to-10 percent income group at 25.09 percent, 1.76 percentage points higher than those in the 0.1-percent group.

In contrast, the 5-to-10 percent group paid an average tax of 22.59 percent in 1979, 9.33 percentage points lower than those in the 0.1-percent group. A large reason for this increase in rate for the 5-to-10 percent group was the increase in Social Security taxes. For 1979, wage earners and their employers paid a combined rate of 8.1 percent in Social Security taxes on earnings up to $22,900. By 1989, this had increased to 13.02 percent on earned income up to $48,000. For 1999, this had further increased to 15.3 percent on earned income up to $72,600. Furthermore, for 1999, for any earned income above the $72,600 maximum, the employee and employer continued to pay Medicare taxes at a combined rate of 2.9 percent.

Despite this rise in Social Security taxes, 1999 combined average taxes returned to a mostly progressive system. The only exception to this progressive tax structure was the 5-to-10 percent income group that paid higher average rates (26.18 percent) than the 1-to-5 percent income group (25.97 percent). However, the 0.1-to-1 percent and the 0.1-percent income groups paid the highest average taxes at 26.70 percent and 27.51 percent, respectively.

When we simulated the provisions of the two new tax laws (EGTRRA and JGTRRA) on 1999 data (without allowing for the sunset provisions), the overall tax system returns to a system looking more like 1989 than 1999. Under the simulation, average tax rates continue to increase until the 1-to-5 percent income class that paid the highest average tax at 25.76 percent. From there, average taxes fall to 23.34 percent for the 0.1-to-1 percent income group and decline further to 22.57 percent for the 0.1-percent income group. Both of these groups would pay a lower average tax than individuals in the 10-to-20 percent income class. The highest income group winds up paying an average tax that is less than all of the groups above the 20-to-40 percent class. Under the new laws, the 0.1-percent group would pay average taxes that are 3.19 percentage points less than the 1-to-5 percent income group, 2.91 percentage points less than the 5-to-10 percent income group, and 1.24 percentage points less than the 10-to-20 percent group. In fact, under the provisions of EGTRRA/JGTRRA, individuals in the 0.1-percent group wind up paying less than one percentage point (0.99) more than the 20-to-40 percent income group. In contrast, the highest income group paid average combined taxes that were 12.03 percentage points higher than the 20-to-40 percent income group in 1979 and 4.29 percentage points higher than this group under existing 1999 laws.

Figure F-Average Tax Rates (Including Social Security Taxes) by Percentile Classes, 1979-1999

Year	Total	< 0.1%	0.1 - 1%	1-5%	5-10%	10-20%	20-40%	40-60%	60-80%	Low 20%
1979	20.71	31.92	29.50	24.14	22.59	21.63	19.89	17.35	12.65	8.72
1989	22.24	23.33	24.22	24.84	25.09	23.90	22.37	19.29	13.93	11.47
1999	23.59	27.51	26.70	25.97	26.18	24.96	23.22	19.70	11.83	7.29
1999 JGTRRA	21.90	22.57	23.34	25.76	25.48	23.81	21.58	18.25	10.94	6.97

Using Panel Data

For 1979, 1989, and 1999, we used a panel of individual tax returns that were selected at a 1-in-5,000 return random sample embedded in each year's Individual Statistics of Income (SOI) sample. These returns were based on the primary taxpayer having certain Social Security Number endings and are part of

Figure G-Movement From 1979 to 1999 of More Than One Class

1979 Percent Class	1999 Percentile Class					Dropouts
	TOP 20	20 to 40	40 to 60	60 to 80	BOTTOM 20	
TOP 20	70.7%		5.9%	2.1%	0.5%	20.8%
20 to 40		64.8%		4.8%	1.4%	29.0%
40 to 60	14.7%		41.8%		2.4%	41.1%
60 to 80	8.4%	13.0%		28.8%		49.8%
BOTTOM 20	7.6%	13.7%	14.2%		12.4%	52.10%

Social Security's Continuous Work History Sample (CWHS). The reason for studying a panel of returns is to obtain a more well-rounded approach to analyzing tax returns over time. While "the rich" may appear to be getting greater concentrations of income over time, the composition of who "the rich" are may also be changing over time. By looking at the panel, we defined income groups from the combined data (indexed for inflation) over the 1979, 1989, and 1999 period. In order to have a better income concept over time, we altered retrospective income by including total Social Security benefits. Since this was not on a tax return for 1979, in that sense, income would be understated for that year (SSB for 1979 was estimated at $29 billion). Then, we analyzed how income and taxes changed in each of these years, classifying each year's returns in quintile classes.

In analyzing this panel over time, we classified returns into quintile classes for each of the three years, 1979, 1989, and 1999. We started with 90.6 million returns filed for 1979 and followed these returns. We looked at movement of returns between quintile classes over time (see Figure G). In order to not include small changes in income causing returns to change classes, we only showed movement of more than one quintile. As can be seen, movement increased greatly the lower the quintile for the first year (1979). While 70.7 percent of the highest income individuals remained high-income in 1999, just 12.4 percent of the lowest quintile remained low-income in 1999. Also, the percent of returns dropping out of the panel decreased consistently with the size of 1979 income.

In further analyzing this panel over time, we only included returns that were filed for each of the 3 years, 1979, 1989, and 1999. This left us with 58.8 million returns out of the 90.6 million returns filed for 1979. Using inflation-indexed income, we then combined the income and taxes over time to create a "combined income and tax" for each of the tax returns. We then reclassified each return into percentile classes, with the 5-percent income class being the highest class analyzed (due to the high sampling variability at levels above this). Looking at average taxes for the combined income groups, the 1979 and 1999 data look progressive, similar to our analysis above in looking at cross-sectional income and Social Security taxes (Figure H). For 1989, the combined 5-percentile class paid lower average taxes than the 5-to-10 percent combined income group. Again, this regressivity is similar to what we found previously using the annual cross-section data. Comparing tax shares for the combined panel in comparison to the cross-section, we found that the trends are the same for the top 10 percent and top 10-to-20 percent classes, but the high-income panel returns paid a lower share for each year (Figure H1). The trend was also the same for the bottom 80 percent of returns, but, in this case, the panel returns paid a consistently higher share of taxes.

Figure H-Combined Panel 'P': Average Tax Rates (Including Social Security Taxes) by Size-Classes, 1979-1999

Year	Top 5% 'P'	5-10% 'P'	10-20% 'P'	20-40% 'P'	40-60% 'P'	60-80% 'P'	Low 80% 'P'
1979	26.98	23.27	21.24	20.42	19.37	18.08	14.4
1989	23.52	23.87	22.98	22.18	20.69	18.88	15.25
1999	25.67	24.46	23.04	21.14	19.32	17.95	12.67

Figure H1-Comparison of Combined Panel ('P') vs. Cross-Sectional Data: Tax Shares (Including Social Security Taxes) by Size-Classes, 1979-1999

Year	Top 10%	Top 10% 'P'	10-20%	10-20% 'P'	Bottom 80%	Bottom 80% 'P'
1979	40.59	29.39	17.70	15.07	41.72	55.54
1989	43.66	35.78	17.63	15.45	38.71	48.77
1999	52.19	47.38	15.98	14.04	31.83	38.58

Figure I-Gini Coefficients for Retrospective Income, Before and After Taxes, 1979 – 2002

Year	Gini Before Tax	Gini After Tax	Difference	Percent Difference
1979	0.469	0.439	0.030	6.325
1980	0.471	0.441	0.031	6.477
1981	0.471	0.442	0.029	6.233
1982	0.474	0.447	0.027	5.731
1983	0.482	0.458	0.025	5.132
1984	0.490	0.466	0.024	4.933
1985	0.496	0.471	0.024	4.860
1986	0.520	0.496	0.024	4.573
1987	0.511	0.485	0.026	5.101
1988	0.530	0.505	0.026	4.817
1989	0.528	0.504	0.024	4.592
1990	0.527	0.503	0.024	4.498
1991	0.523	0.499	0.024	4.582
1992	0.532	0.507	0.025	4.709
1993	0.531	0.503	0.028	5.207
1994	0.532	0.503	0.028	5.292
1995	0.540	0.510	0.029	5.404
1996	0.551	0.521	0.030	5.496
1997	0.560	0.530	0.030	5.368
1998	0.570	0.541	0.029	5.136
1999	0.580	0.550	0.030	5.185
2000	0.588	0.558	0.031	5.222
2000 Rebate	0.588	0.557	0.032	5.417
2001	0.564	0.534	0.030	5.352
2002	0.555	0.525	0.030	5.339
2002 Rebate	0.555	0.525	0.030	5.334

Analysis of Gini Coefficients

To further analyze the data, we estimated Lorenz curves and computed Gini coefficients for all years. The Lorenz curve is a cumulative aggregation of income from lowest to highest, expressed on a percentage basis. To construct the Lorenz curves, we reordered the percentile classes from lowest to highest and used the income thresholds as "plotting points" to fit a series of regression equations for each income-size interval in the 24 years, both before- and after-taxes.

Once the Lorenz curves were estimated for all years, Gini coefficients were calculated for all 24 years for before- and after-tax and are presented in Figure I. The Gini coefficient, which is a measure of the degree of inequality, generally increased throughout the 24-year period signifying rising levels of inequality for both the pre- and post-tax distributions. This result was not unexpected since it parallels the rising shares of income accruing to the highest income-size classes. Over this period, the before-tax Gini coefficient value increased from 0.469 for 1979 to 0.588 (25.4 percent) for 2000, while the after-tax Gini value increased from 0.439 to 0.558 for a slightly higher percentage increase (25.5 percent). The economic downturn in 2001 and 2002 actually decreased the levels of inequality to 0.555 (pre-tax) and 0.525 (after-tax).

So what has been the effect of the Federal tax system on the size and change over time of the Gini coefficient values? One way to answer this question is to compare the before- and after-tax Gini values.[17] Looking at this comparison, two conclusions are clear. First, Federal income taxation decreases the Gini coefficients for all years. This is not surprising in that the tax rate structure is progressive, with average rates rising with higher incomes so after-tax income is more evenly distributed than before-tax income. A second question is whether the relationship between the before-tax and after-tax Gini coefficient values has changed over time. From Figure I, the after-tax series closely parallels the before-tax series, with reductions in the value of the Gini coefficient ranging from 0.024 to 0.032. The largest differences, which denote the largest redistributive effect of the Federal tax system, have generally been in the periods of relatively high marginal tax rates, particularly 1979-81 and for 1993 and later years. In fact, simulating the tax rebate for Tax Year 2000 results in the largest difference (0.032) over all the years. If this were the only change in marginal rates of the new tax law (EGTRRA), the results would be to increase the redistributive effects of Federal taxes. However, for Tax Year 2001 and beyond, the marginal rates of higher income classes will also be reduced over time until the highest rate will be reduced from its current value of 38.6 percent to 35 percent for 2003. The effects of the new tax laws (EGTRRA/JGTRRA) can be seen in Figure J. This figure illustrates Gini values before and after taxes when including Social Security taxes with income taxes. The new law decreases the difference between before- and after-tax Gini values for 1999 from 0.025 to 0.022.

To investigate further, the percentage differences between before-tax and after-tax Gini values were computed and are shown as the fourth column in Figure I. These percentage changes in the Gini coefficient values, a "redistributive effect," show a decline ranging from 4.5 percent to 6.5 percent. As for the differences, the largest percentage changes are for the earliest years, a period when the marginal tax rates were high. The largest percentage reduction was for 1980, but the size of the reduction generally declined until 1986, fluctuated at relatively low levels between 1986 and 1992, and then increased from 1993 to 1996. However,

Figure J-Gini Coefficients for Retrospective Income (Including Social Security Taxes), Before and After Taxes, 1979 - 1999

Year	Gini Before Tax Including Social Security Taxes	Gini After Tax Including Social Security Taxes	Difference	Percent Difference
1979	0.469	0.444	0.025	5.354
1989	0.529	0.511	0.018	3.415
1999	0.574	0.549	0.025	4.340
1999 JGTRRA	0.574	0.553	0.022	3.790

coinciding with the capital gains tax reduction for 1997, the percentage change again declined for 1997 and 1998. Nevertheless, it increased for 1999, 2000, and 2001 (although the 2001 percentage increased slightly if the rebate is included with the 2000 data).

Figure J shows the Gini coefficients for before and after tax (including Social Security taxes) for 1979, 1989, 1999, and 1999 incorporating the new tax laws. The differences between before and after tax are much smaller than for the income tax, ranging from 0.018 for 1989 to 0.025 for 1979 and 1999. This results in percentage differences of 3.4 percent to 5.4 percent. In all years, except 1999, the after-tax Gini coefficients are somewhat higher than those that result from simply including income taxes. Further, when Gini coefficients were calculated for these 3 years using the combined panel data, the trends over time were almost exactly the same. However, these coefficients were consistently lower for the panel, showing that there is less inequality than what is suggested by looking at cross-sectional data only.

So what does this all mean? First, the high marginal tax rates prior to 1982 appear to have had a significant redistributive effect. But, beginning with the tax rate reductions for 1982, this redistributive effect began to decline up to the period immediately prior to TRA 1986. Although TRA became effective for 1987, a surge in late 1986 capital gains realizations (to take advantage of the 60-percent long-term capital gains exclusion) effectively lowered the average tax rate for the highest income groups, thereby lessening the redistributive effect.

For the post-TRA period, the redistributive effect was relatively low, and it did not begin to increase until the initiation of the 39.6-percent tax bracket for 1993. But since 1997, with continuation of the 39.6-percent rate but with a lowering of the maximum tax rate on capital gains, the redistributive effect again declined. It appears that the new tax laws will continue this trend. Analysis of panel data shows that these trends are not quite as great as seen by looking at annual cross-section data, but the trends cited above are still apparent.

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Notes and References

[1] Petska, Tom; Strudler, Mike; and Petska, Ryan, New Estimates of Individual Income and Taxes, *2002 Proceedings of the 95th Annual Conference on Taxation, National Tax Association*, 2003.

[2] Petska, Tom; Strudler, Mike; and Petska, Ryan, Further Examination of the Distribution of Income and Taxes Using a Consistent and Comprehensive Measure of Income, *1999 Proceedings of the American Statistical Association, Social Statistics Section*, 2000.

Figure J1-Gini Coefficients for Retrospective Income (Including Social Security Taxes), Before and After Taxes Using All CWHS, Combined 1979 - 1999

Year	Gini Before Tax	Gini After Tax	Difference	Percent Difference
1979	0.311	0.291	0.019	6.272
1989	0.416	0.403	0.014	3.247
1999	0.498	0.477	0.021	4.217
Combined	0.447	0.428	0.019	4.199

[3] Petska, Tom and Strudler, Mike, The Distribution of Individual Income and Taxes: A New Look at an Old Issue, presented at the annual meetings of the American Economic Association, New York, NY, January 1999, and published in *Turning Administrative Systems Into Information Systems: 1998-1999*.

[4] Petska, Tom and Strudler, Mike, Income, Taxes, and Tax Progressivity: An Examination of Recent Trends in the Distribution of Individual Income and Taxes, *1998 Proceedings of the American Statistical Association, Social Statistics Section*, 1999.

[5] Strudler, Michael and Petska, Tom, An Analysis of the Distribution of Individual Income and Taxes, 1979-2001, *2001 Proceedings of the American Statistical Association, Social Statistics Section*, 2002.

[6] Nelson, Susan, Family Economic Income and Other Income Concepts Used in Analyzing Tax Reform, *Compendium of Tax Research*, Office of Tax Analysis, U.S. Department of the Treasury, 1987.

[7] Hostetter, Susan, Measuring Income for Developing and Reviewing Individual Tax Law Changes: Exploration of Alternative Concepts, *1987 Proceedings of the American Statistical Association, Survey Research Methods Section*, 1988.

[8] Internal Revenue Service, *Statistics of Income—Individual Income Tax Returns*, Publication 1304, (selected years).

[9] Parisi, Michael and Campbell, Dave, Individual Income Tax Rates and Tax Shares, 1999, *Statistics of Income (SOI) Bulletin*, Winter 2001-2002, Volume 21, Number 3.

[10] For the years 1979 through 1992, the percentile threshold size classes were estimated by osculatory interpolation as described in Oh and Oh and Scheuren.[11,12] In this procedure, the data were tabulated into size classes, and the percentile thresholds were interpolated. For 1993 through 2000, the SOI individual tax return data files were sorted from highest to lowest, and the percentile thresholds were determined by cumulating records from the top down.

[11] Oh, H. Lock, Osculatory Interpolation with a Monotonicity Constraint, *1977 Proceedings of the American Statistical Association, Statistical Computing Section*, 1978.

[12] Oh, H. Lock and Scheuren, Fritz, Osculatory Interpolation Revisited, *1987 Proceedings of the American Statistical Association, Statistical Computing Section*, 1988.

[13] The CPI-U from the U.S. Department of Labor, *Monthly Labor Review*, was used for deflation of the income thresholds.

[14] Taxes, taxes paid, tax liabilities, tax shares, and average or effective tax rates are based on income tax, defined as income tax after credits plus alternative minimum tax (AMT) less the nonrefundable portion of the earned income credit (for 2000 and 2001, AMT was included in income tax after credits). However, for Figure F, tax includes Social Security and Medicare taxes less all of the earned income credit and refundable child credit.

[15] Internal Revenue Service, *Data Book 1999*,– Publication 55B. Total Individual Income Taxes collected from withholding and additional taxes paid with tax forms filed were $1,102.2 billion, while total Social Security taxes were $587.5 billion.

[16] Actually, the OTA model was computed on 1998 individual income tax data and programmed to take all aspects of JGTRRA into account under the assumption that all of the sunset provisions will remain in place. After the results were calculated, the data were increased to 1999 levels. Therefore, income is exactly the same as the rest of the 1999 data, and only the taxes paid differs.

[17] A comparison of the before- and after-tax Gini coefficients does not exclusively measure the effects of the tax system in that the tax laws can also affect before-tax income. For example, capital gain realizations have been shown to be sensitive to the tax rates.