Shares of Income Received by Quintiles When Equivalent Income Is Used as the Measure of Income

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SHARES OF INCOME RECEIVED BY QUINTILES WHEN EQUIVALENT INCOME IS USED AS THE MEASURE OF INCOME

Data on the shares of aggregate income received by the various income quintiles are frequently calculated using households as the reference unit. That is, households are ranked by their level of income in order to determine which households are in the bottom quintile of the income distribution, and which are in the second, third, fourth, and top quintiles. It is then possible to determine the share of aggregate income that is received by each group of households.

A criticism of this method of measuring income shares is that the the average size and composition of households may change over time. For example, if there is a very large increase in the proportion of households with only one member, it may be that an observed change in the share of income received by households in the bottom quintile may be a reflection of this change rather than a real change in the distribution of economic well-being.

The tables below attempt to control for the effect of changes over time in the size and composition of households by adopting a modified measure of income. In this document, the modified measure is called Aequivalent income.@ The modified measure assigns to each individual (regardless of age), the income of his or her family. The income that is assigned to each individual is then modified by applying a value from an equivalence scale.

For the purpose of presenting a time series of average equivalent income that can be compared to more traditional income time series, the equivalent income assigned to each individual in each year has been raked by a factor equal to median household income in 1969 ($8,241) divided by the median unraked equivalent income in 1969 ($3,936).

For additional information on the calculation of equivalent income, see the appendix following the two tables of data. The appendix is taken from a 1999 paper by John McNeil presented at the Annual Meeting of the Western Economic Association, AChanges in the Economic Status of Children: 1969 to 1997.@

Year	Lowest quintile	Second quintile	Middle quintile	Fourth quintile	Highest quintile	Top five percent
1969	5.7	12.1	17.3	23.6	41.3	16.0
1970	5.6	12.0	17.3	23.6	41.6	16.1
1971	5.6	11.9	17.2	23.6	41.7	16.1
1972	5.5	11.8	17.2	23.6	41.9	16.3
1973	5.5	11.9	17.2	23.6	41.7	16.1
1974	5.7	12.0	17.4	23.8	41.2	15.7
1975	5.5	11.8	17.4	23.8	41.6	15.8
1976	5.5	11.7	17.5	23.8	41.4	15.8
1977	5.4	11.6	17.3	23.9	41.7	15.9
1978	5.4	11.8	17.3	23.9	41.7	15.9
1979	5.2	11.7	17.3	24.0	41.9	16.0
1980	5.1	11.6	17.3	24.1	41.8	15.7
1981	5.0	11.4	17.2	24.2	42.3	15.9
1982	4.7	11.1	17.0	24.1	43.1	16.3
1983	4.5	10.9	16.9	24.2	43.4	16.5
1984	4.6	10.9	16.9	24.2	43.5	16.5
1985	4.6	10.8	16.7	23.9	44.0	17.1
1986	4.5	10.8	16.7	23.9	44.2	17.4
1987	4.4	10.8	16.7	23.9	44.3	17.5
1988	4.4	10.7	16.6	23.9	44.5	17.6
1989	4.4	10.5	16.4	23.5	45.2	18.4
1990	4.4	10.6	16.4	23.6	44.9	18.0
1991	4.3	10.5	16.5	23.8	44.8	17.7
1992	4.2	10.3	16.4	23.8	45.3	18.1
1993	4.0	9.8	15.7	23.1	47.4	20.6

TABLE 1. SHARE OF INCOME RECEIVED BY INDIVIDUALS IN THE LOWEST TO HIGHEST QUINTILES AND IN THE TOP FIVE PERCENT OF THE INCOME DISTRIBUTION
(Based on distribution of "equivalent" income)

Year	Lowest quintile	Second quintile	Middle quintile	Fourth quintile	Highest quintile	Top five percent
1994	4.0	9.8	15.6	23.0	47.6	20.7
1995	4.2	9.9	15.7	22.9	47.3	20.6
1996	4.1	9.8	15.5	22.8	47.7	20.9
1997	4.0	9.8	15.5	22.7	48.0	21.3
1998	4.0	9.8	15.5	22.8	47.7	21.1
1999	4.1	9.8	15.3	22.8	48.0	21.1

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(Based on distribution of ›equivalent‹ income)

Year	All income levels	In lowest quintile	In second quintile	In middle quintile	In fourth quintile	In fifth quintile	In top five percent
1969	$40,322	$11,504	$24,391	$34,937	$47,470	$83,337	$128,973
1970	40,418	11,298	24,273	34,865	47,648	83,999	130,019
1971	40,729	11,389	24,233	35,064	48,021	84,932	131,096
1972	43,415	11,885	25,632	37,354	51,189	91,012	141,404
1973	44,934	12,436	26,729	38,710	53,115	93,668	145,297
1974	43,875	12,414	26,301	38,082	52,159	90,418	137,695
1975	42,924	11,826	25,288	37,250	51,080	89,176	135,637
1976	44,201	12,215	25,940	38,449	52,876	91,567	139,719
1977	45,308	12,279	26,402	39,242	54,176	94,445	144,162
1978	46,915	12,592	27,558	40,537	56,048	97,845	149,225
1979	47,479	12,382	27,701	41,046	56,857	99,408	151,622
1980	46,043	11,811	26,645	39,841	55,578	96,345	144,386
1981	45,522	11,313	25,848	39,185	55,070	96,215	144,330
1982	45,460	10,654	25,226	38,681	54,809	97,922	148,238
1983	46,028	10,434	25,103	38,987	55,640	99,964	151,707
1984	47,625	10,877	26,058	40,131	57,538	103,523	157,188
1985	48,855	11,135	26,472	40,824	58,414	107,443	166,686
1986	50,838	11,338	27,372	42,351	60,796	112,329	176,348
1987	52,015	11,494	27,957	43,401	62,116	115,102	181,840
1988	52,565	11,652	27,993	43,544	62,689	116,977	185,269
1989	53,657	11,874	28,227	43,931	63,051	121,231	197,754
1990	52,026	11,491	27,556	42,686	61,511	116,891	187,688
1991	50,713	10,964	26,749	41,868	60,403	113,587	179,302

TABLE 2. MEAN EQUIVALENT INCOME BY INCOME QUINTILE AND WHETHER IN TOP FIVE PERCENT OF INCOME DISTRIBUTION
(In 1999 dollars)

Year	All income levels	In lowest quintile	In second quintile	In middle quintile	In fourth quintile	In fifth quintile	In top five percent
1992	$50,406	$10,497	$26,065	$41,319	$60,058	$114,089	$182,320
1993	52,099	10,329	25,548	40,710	60,273	123,601	214,656
1994	53,244	10,680	26,212	41,566	61,174	126,594	220,663
1995	53,814	11,201	26,757	42,103	61,622	127,378	221,880
1996	54,759	11,214	26,937	42,541	62,542	130,552	229,184
1997	56,722	11,419	27,851	43,915	64,271	136,168	241,186
1998	58,500	11,820	28,801	45,424	66,782	139,677	246,311
1999	60,265	12,389	29,353	46,321	68,622	144,653	254,426

APPENDIX: CALCULATING EQUIVALENT INCOME

TABLE 2. MEAN EQUIVALENT INCOME BY INCOME QUINTILE AND WHETHER IN TOP FIVE PERCENT OF INCOME DISTRIBUTION
(In 1999 dollars)

The equivalent income of an individual is defined as the family income of the individual adjusted for differences in family size. Unrelated individuals are considered to be 1-person families. Each member of a given family has the same equivalent income, regardless of age or family relationship.

The assumption underlying an equivalent income measure is that larger families need more income than smaller families to reach a given level of economic well-being. It would then follow that a four-person family with an income of $40,000 has a lower level of economic well-being than a two-person family with the same income level.

A critical element in the calculation of equivalent income is the equivalence scale that is used to adjust family incomes so that the incomes of the members of one family of a given size can be compared directly with the incomes of another family of a different size. When the equivalent income measure used in this report was developed, three equivalence scales were considered. The first was the scale that is used to calculate the official poverty thresholds, the second was a scale suggested by Patricia Ruggles in her book, Drawing the Line (The Urban Institute Press, Washington, D. C., 1990), and the third was a version of a scale suggested by the Panel on Poverty and Family Assistance in their report, Measuring Poverty: A New Approach (National Academy Press, Washington, D. C., 1995).

The scale used to calculate the official poverty thresholds cannot be described by an equation. The scale is based primarily on the cost of basic food plans for families of given sizes and compositions. The scale has been used for many years but does have some peculiarities that have long been noticed. For example, the poverty threshold for a couple who are both 65 years of age is considerably lower than the poverty level for a 65 year old individual and his or her grandchild (in 1997, the first threshold was $9,701 and the second threshold was $11,021).

The other two scales can be described by equations:

$$\text{Ruggles} = \text{FAMSIZE}^{.5}$$

$$\text{Poverty Panel} = (\text{ADULTS} + .7\ \text{KIDS})^{.7}$$

The table on the next page (Appendix Table 1) shows the official poverty thresholds for families of varying sizes and composition for 1997 and also shows the relative equivalence scales that are obtained from the three scales discussed above. Each of the three has one or more characteristics that seem undesirable. An oddity in the equivalence scale used for poverty thresholds has already been noted. A problem with the Ruggles scale is that it goes rather flat as family size increases. For example, the scale used in the poverty definition implies that a 7-person family that included 5 children would need 48 percent more income than a 4-person family that included 2 children to

TABLE 2. MEAN EQUIVALENT INCOME BY INCOME QUINTILE AND WHETHER IN TOP FIVE PERCENT OF INCOME DISTRIBUTION
(In 1999 dollars)

Size of family, age of householder, and number of related children	Official poverty thresholds for 1997		Relative equivalence scales		
	Family	Per person	Official	Ruggles	Poverty panel
1 person:					
Under 65 years	$8,350	$8,350	.51	.50	.42
65 years and over	$7,698	$7,698	.47	.50	.42
2 persons:					
Householder under 65 years:					
No related children	$10,748	$5,374	.66	.71	.69
1 related child	$11,063	$5,532	.68	.71	.62
Householder 65 years and over:					
No related children	$9,701	$4,851	.60	.71	.69
1 related child	$11,021	$5,511	.68	.71	.62
3 persons:					
No related children	$12,554	$4,185	.77	.87	.92
1 related child	$12,919	$4,306	.79	.87	.85
2 related children	$12,931	$4,310	.79	.87	.78
4 persons:					
No related children	$16,555	$4,139	1.02	1.00	1.12
1 related child	$16,825	$4,206	1.03	1.00	1.06
2 related children	$16,276	$4,069	1.00	1.00	1.00
3 related children	$16,333	$4,083	1.00	1.00	.94
5 persons:					
No related children	$19,964	$3,993	1.23	1.12	1.31
1 related child	$20,255	$4,051	1.24	1.12	1.25

2 related children	$19,634	$3,927	1.21	1.12	1.20
3 related children	$19,154	$3,831	1.18	1.12	1.14
4 related children	$18,861	$3,772	1.16	1.12	1.08
Size of family, age of householder, and number of related children	Official poverty thresholds for 1997		Relative equivalence scales		
	Family	Per person	Official	Ruggles	Poverty panel
6 persons:					
No related children	$22,962	$3,827	1.41	1.22	1.49
1 related child	$23,053	$3,842	1.42	1.22	1.44
2 related children	$22,578	$3,763	1.39	1.22	1.38
3 related children	$22,123	$3,687	1.36	1.22	1.33
4 related children	$21,446	$3,574	1.32	1.22	1.27
5 related children	$21,045	$3,508	1.29	1.22	1.22
7 persons:					
No related children	$26,421	$3,774	1.62	1.32	1.66
1 related child	$26,586	$3,798	1.63	1.32	1.61
2 related children	$26,017	$3,717	1,60	1.32	1.56
3 related children	$25,621	$3,660	1.57	1.32	1.51
4 related children	$24,882	$3,555	1.53	1.32	1.45
5 related children	$24,021	$3,432	1.48	1.32	1.40
6 related children	$23,076	$3,297	1.42	1.32	1.35
8 persons:					
No related children	$29,550	$3,694	1.82	1.41	1.82
1 related child	$29,811	$3,726	1.83	1.41	1.77
2 related children	$29,274	$3,659	1.80	1.41	1.72
3 related children	$28,804	$3,601	1.77	1.41	1.67
4 related children	$28,137	$3,517	1.73	1.41	1.62

5 related children	$27,290	$3,411	1.68	1.41	1.57
6 related children	$26,409	$3,301	1.62	1.41	1.52
7 related children	$26,185	$3,273	1.61	1.41	1.47

Ruggles scale=Number of family members to the power of .5.
Poverty panel scale=Number of adults plus .7 times number of children, all to the power of .7.

reach an equivalent level of well-being. But the Ruggles scale puts the differential at only 32 percent. The Poverty Panel scale produces an equivalence factor for 1-person families that presents a serious problem. The scale implies that a 1-person family would need only 42 percent of the income of a 4-person family that included two children to reach the same level of economic well-being. In 1997, the poverty threshold for the latter type of family was $16, 276, so the Poverty Panel scale would set the poverty threshold for a 1-person family at $6,836, a level that seems unreasonably low.

The scale chosen for the equivalent income data shown in this paper is a slightly modified version of the Poverty Panel scale. The only modification is the use of a replacement value for 1-person families. The modification brings the relative equivalence scale value for 1-person families up to .5, the same as the Ruggles scale and very close to the value produced by the scale used in the poverty definition.

In the calculation of an equivalent income level, actual family income is divided by a factor determined by the equivalence scale. For example, the actual income of a 4-person family that includes 2 children is divided by $(2 + .7*2)^{.7}$ or 2.355. This operation results in a set of equivalent incomes, but the level of incomes will be lower than the level of actual incomes because actual incomes are being divided by a number larger than 1. To bring the level of equivalent incomes up to a level

similar to actual incomes, a raking factor was developed. The raking factor was set equal to median household income in 1969 divided by median equivalent income (unraked) in 1969 ($8,241/$3,936=2.09375).

The table below shows the relationship between actual and equivalent incomes for several types of families.

TABLE A2. RELATIONSHIP BETWEEN ACTUAL AND EQUIVALENT INCOME

Family type	Actual income (Col. 1)	Equivalence factor (Col. 2)	Column 1 divided by Column 2	Raking factor	Equivalent income
1-person	$40,000	1.178	$33,956	2.09375	$71,095
2 adults	$40,000	1.625	$24,615	2.09375	$51,538
4 adults	$40,000	2.639	$15,157	2.09375	$31,735
2 adults, 2 children	$40,000	2.355	$16,985	2.09375	$35,562
2 adults, 4 children	$40,000	2.998	$13,342	2.09375	$27,935