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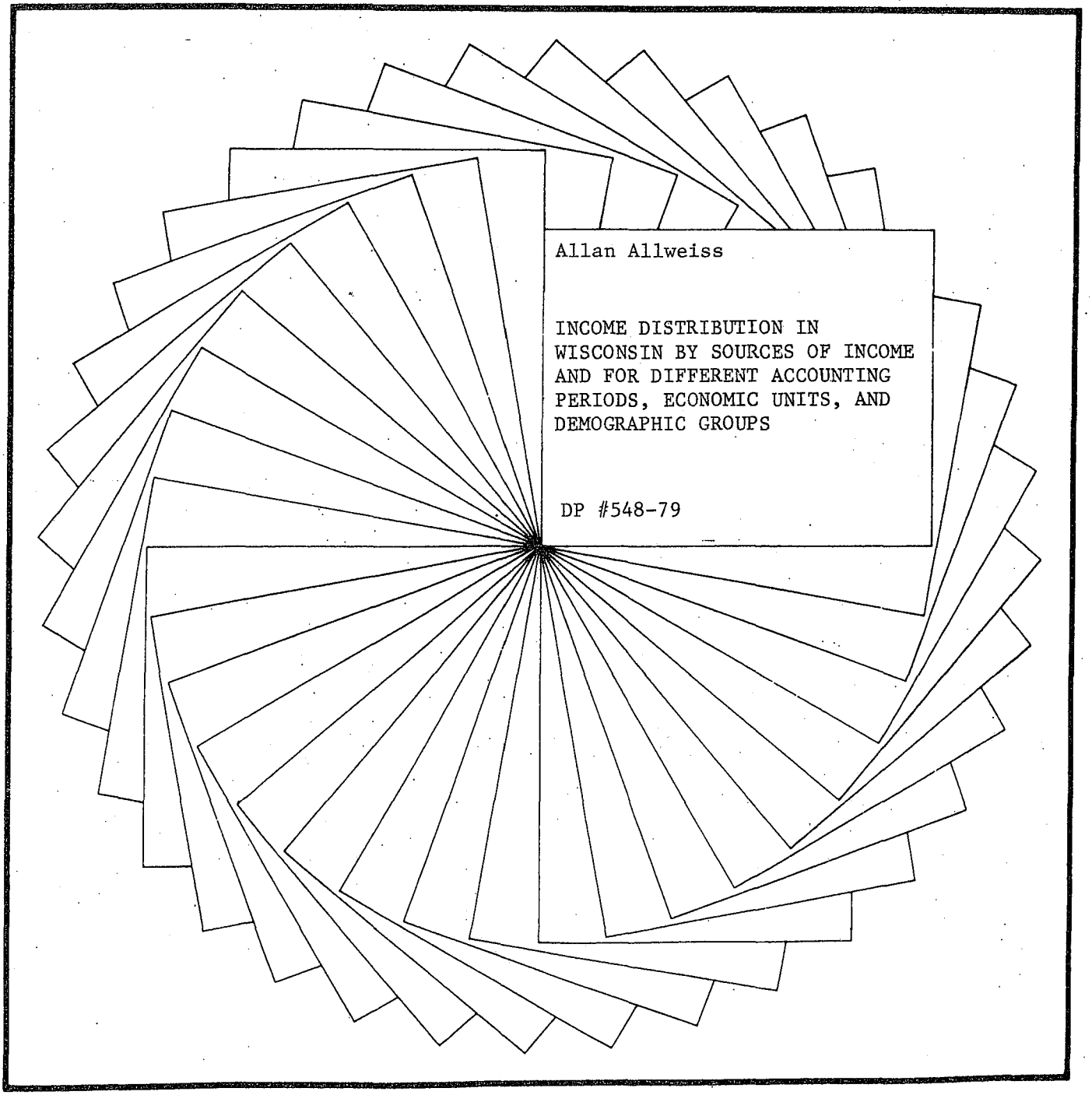

Income Distribution in Wisconsin by Sources of Income and for Different Accounting Periods, Economic Units, and Demographic Groups

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ABSTRACT

Many researchers have compiled summary statistics on the distribution of a fixed set of resources within a given population. Yet none of the empirical studies or theoretical measures to date has been accepted as a picture of the true distribution of resources.

The lack of consensus among economists may be a result of the difficulty in arriving at a satisfactory measure. Each summary statistic conforms to a different, individual notion of economic well-being: Should the distribution of resources be defined for wealth or income? Should resources be measured by the family, the living unit, or the individual? What accounting period should be used in such measurements?

Each of these questions has significant political and economic implications. In the domain of tax administration, the practice has been to use a limited measure of income for the household unit, generally for a one-year accounting period. But it is important to recognize the biases and distortions that may result from choosing one measure over another.

Ultimately, perhaps, there is no one best indicator. A measure that is conceptually appealing may be difficult to quantify (e.g., one that includes human capital gains). Another kind of measure may present administrative problems (e.g., the monitoring of in-kind income received by farmers), and simple, readily quantifiable measures may prove to be the least appealing conceptually) (e.g., one that includes only earned income).

We find that changing the definition of income can significantly alter the impression we get of the distribution of income. Adding government cash transfers to taxable income, for example, reduces measured inequality by 14%. But Wisconsin income taxes and Homestead Credits reduce measured inequality by only 2%. A per-capita money income measure reduces money income inequality by 4%; multi-year average income displays less inequality than single-year income. Finally, while the degree of income dispersion within subgroups of the Wisconsin population seldom differs greatly from that for the overall population, several interesting differences occur between various subgroups.

Income Distribution in Wisconsin by Sources of Income and for Different Accounting Periods, Economic Units, and Demographic Groups

INTRODUCTION

While describing the trend in income inequality in the U.S. for similar ten-year periods, the authors of three recent papers came to markedly different conclusions. Eugene Smolensky and Morgan Reynolds (1975) found that the distribution of post-fisc income (i.e., income after all taxes and public expenditures are allocated to income classes) remained roughly constant between 1961 and 1970. Edgar Browning (1976) reported that the adjusted relative income distribution (after transfers and other adjustments to family income) became significantly more equal in the ten-year period 1962 to 1972. He also argued that this distribution is more equal at each point in time than is usually found. Timothy Smeeding (1977) reworked Browning's estimates, correcting for what he thought were methodological errors in Browning's approach. Smeeding concludes:

> Whereas Browning finds that the income share of the lowest quintile of families increased by 61.5% from 1952 to 1972, the final adjusted figures presented here (in Smeeding's paper) indicate an increase of only 18.1% over the same period.

A larger sampling reveals that this lack of consensus is representative of the income distribution literature in general.

In light of this controversy, a useful exercise would be to measure and display the distribution of income for various definitions of income, economic units, and accounting periods.

This type of analysis serves three broad purposes. First, its detailed distributions indicate the implicit biases of measurement approaches that exclude various income factors. For example, a distribution of earned income may overstate inequality because it ignores receipt of transfer income. Second, detailed distributions indicate how each income factor is distributed among families, individuals, and other subgroups of the population, and how this distribution changes as the accounting period varies. Finally, this type of analysis, because it considers each component separately, permits more thorough exploration of measurement deficiencies than is possible when several components are considered together.

Earlier studies show that Wisconsin displays a more egalitarian distribution for some measures of income than does the nation as a whole (Census 1970). Whether this comparatively equal distribution is due to some inherent feature of the Wisconsin economy, to some institutional factor, or to the income measures being used is not certain. It is clear, however, that more needs to be learned about the distribution of resources in Wisconsin and elsewhere, because while little is known about the egalitarian issues, even less is known about how resources are actually distributed. This study will display and analyze a variety of distributions for several different income measures and for different subsets of the 1974 Wisconsin population.

THE WISCONSIN TAX MODEL

The Tax Model[1] of the Wisconsin Department of Revenue has been used to display detailed Wisconsin income distributions for 1974. The Tax Model

is a microdata set of some 2,000 variables for a stratified sample of 20,000 Wisconsin households for the years 1970 through 1976. The base year for the Tax Model is 1974. Data for 1974 households were compiled from a number of sources, including Wisconsin's good records. Along with tax records, data have been entered for the 1974 sample from the following sources:

1. The 1975-1976 Medicaid records, which show the family structure and the sources of government transfer payments received.
2. The 1976 Higher Education Aids Board (HEAB) records, which link parents to their dependents not living at home.
3. The 1976 Wisconsin Driver's License file, which gives age, race, and sex for most adults in the sample.

Other data were also included in the 1974 Tax Model records but are not useful to this study. The tax form data, combined with the information from these other files, enable the Tax Model to identify several characteristics for each family that would not otherwise be identifiable.

The greatest single capability of the Tax Model is to identify the tax burden of households in the sample and to project this burden from the sample to the 1974 Wisconsin population as a whole. In addition, it permits several income measures for each household, ranging from taxable income to a broad base of money plus nonmoney income. Some data for these income measures are taken directly from available records; other data can often be inferred. For example, consumption expenditures subject to Wisconsin sales tax can be inferred from income and family size (with a mean error of some (15%); the rental value of an owner occupied home can be inferred from its assessed value and from the income tax deduction for home mortgage interest.

In addition, data can often be inferred from a variety of sources outside the Tax Model. For example, regression fits from other data sets can be used to predict a needed dependent variable from independent variables already in the Tax Model data set. To predict consumption data, then, the Tax Model Group performed regressions using the Bureau of Labor Statistics Consumer Expenditure Survey. The same procedure was used to predict the value of transfer income and other income not available on the family's records.

Family units in the Tax Model are defined as the family or unrelated individuals. A "person" is represented in the Tax Model by all administrative records in the file belonging to a specific Social Security number. Explicit inclusion in the file is restricted to those receiving income; the number of other members of the family is inferred from data in the administrative records. A Tax Model family consists of persons linked together because: (1) they filed joint tax returns, (2) they had the same last name and mailing address, (3) they both appeared on a Medicaid record, or (4) one appeared as a dependent of the other on a HEAB record.

As a check against the Tax Model family and income data, the matrix of the Tax Model family size by money income was compared with a like matrix from the Survey of Income and Education (S.I.E.). The findings of these data files are compared in Table 1. The most striking aspect of Table 1 is the nearly exact prediction of the total number of families and unrelated individuals in Wisconsin made by the two data sets. Large discrepancies are apparent for the lowest income group for the Size One and Size Two family groups. Many other cells differ by statistically significant amounts but not so much as those mentioned here. The Z score is also

Table 1

COMPARISON OF TAX MODEL AND S.I.E. COUNTS OF FAMILIES
BY SIZE AND INCOME

Survey Money Income	1	2	3	4	5	6 or more	Total
Less than 1830	51,000 ± 6,000 79,000 ± 5,000 -3.585	6,000 ± 2,000 20,000 ± 3,000 -3.883	3,000 ± 1,000 13,000 ± 2,000 -4.472	3,000 ± 1,000 6,000 ± 1,000 -2.121	* 4,000 ± 1,000 -4.000	3,000 ± 1,000 10,000 ± 1,000 -4.950	67,000 ± 9,000 132,000 ± 6,000 -6.009
1830 to 3664	125,000 ± 8,000 112,000 ± 6,000 1.300	22,000 ± 4,000 28,000 ± 4,000 -1.061	8,000 ± 2,000 9,000 ± 2,000 -0.354	5,000 ± 1,000 3,000 ± 1,000 1.414	1,000 ± 600 2,000 ± 1,000 -0.857	1,000 ± 600 2,000 ± 1,000 -0.857	162,000 ± 13,000 156,000 ± 7,000 0.406
3665 to 5499	73,000 ± 7,000 101,000 ± 6,000 -3.037	47,000 ± 4,000 40,000 ± 4,000 1.237	13,000 ± 2,000 12,000 ± 2,000 0.354	9,000 ± 2,000 10,000 ± 2,000 -0.354	5,000 ± 1,000 10,000 ± 2,000 -2.236	4,000 ± 1,000 3,000 ± 1,000 0.707	150,000 ± 13,000 169,000 ± 8,000 -1.245
5500 to 7329	60,000 ± 6,000 66,000 ± 5,000 -0.768	53,000 ± 5,000 25,000 ± 3,000 4.802	15,000 ± 2,000 22,000 ± 3,000 -1.941	11,000 ± 3,000 10,000 ± 2,000 0.354	6,000 ± 2,000 4,000 ± 1,000 0.894	5,000 ± 1,000 3,000 ± 1,000 1.414	150,000 ± 13,000 130,000 ± 7,000 1.355
7330 to 9159	44,000 ± 5,000 63,000 ± 6,000 -2.433	48,000 ± 4,000 24,000 ± 4,000 4.243	16,000 ± 3,000 18,000 ± 3,000 -0.471	12,000 ± 2,000 15,000 ± 3,000 -0.832	7,000 ± 2,000 6,000 ± 7,000 0.354	7,000 ± 2,000 4,000 ± 1,000 1.342	134,000 ± 12,000 130,000 ± 8,000 0.277
9160 to 10,994	27,000 ± 4,000 34,000 ± 5,000 -1.093	39,000 ± 4,000 27,000 ± 4,000 2.121	25,000 ± 3,000 22,000 ± 4,000 0.600	18,000 ± 3,000 18,000 ± 3,000 0.000	11,000 ± 2,000 6,000 ± 2,000 1.768	10,000 ± 2,000 12,000 ± 3,000 -0.555	130,000 ± 12,000 118,000 ± 8,000 0.832

* < 2,000

Sources: Money Income and Poverty Status in 1975 of Families and Persons in the United States Over the North Central Region, by Divisions and States (Spring 1976 Survey of Income and Education, Table 8A).

The Wisconsin Tax Model

Each Cell: The top number is the predicted SIE cell population size ± standard error

The middle number is the predicted Tax Model 1 population size ± standard error

The bottom number is the cell $\hat{z}$-score

Table 1 **(continued)**

COMPARISON OF TAX MODEL AND S.I.E. COUNTS OF FAMILIES
BY SIZE AND INCOME

10,995 to 13,774	25,000 ± 4,000 37,000 ± 5,000 -1.874	60,000 ± 5,000 37,000 ± 5,000 3.253	36,000 ± 4,000 35,000 ± 5,000 -0.312	44,000 ± 9,000 24,000 ± 4,000 3.536	19,000 ± 3,000 18,000 ± 3,000 0.236	14,000 ± 2,000 18,000 ± 3,000 -1.109	199,000 ± 12,000 172,000 ± 9,000 1.800
13,775 to 18,324	22,000 ± 4,000 22,000 ± 4,000 0.000	85,000 ± 6,000 48,000 ± 5,000 4.481	58,000 ± 5,000 51,000 ± 6,000 0.896	57,000 ± 5,000 43,000 ± 5,000 1.980	33,000 ± 4,000 43,000 ± 5,000 -1.562	25,000 ± 3,000 40,000 ± 4,000 -3.000	278,000 ± 23,000 247,000 ± 10,000 1.236
18,325 to 22,905	6,000 ± 2,000 5,000 ± 1,000 0.447	45,000 ± 4,000 28,000 ± 4,000 3,005	30,000 ± 3,000 30,000 ± 4,000 0.000	37,000 ± 4,000 37,000 ± 4,000 0.000	32,000 ± 4,000 28,000 ± 3,000 0.800	22,000 ± 3,000 32,000 ± 3,000 -2.357	172,000 ± 14,000 159,000 ± 6,000 0.853
22,910 to 45,814	3,000 ± 2,000 4,000 ± 1,000 -0.447	35,000 ± 4,000 19,000 ± 2,000 3.578	31,000 ± 3,000 38,000 ± 3,000 -1.650	42,000 ± 4,000 39,000 ± 3,000 0.600	23,000 ± 3,000 38,000 ± 3,000 -3.536	29,000 ± 4,000 42,000 ± 3,000 -2.600	163,000 ± 13,000 179,000 ± 5,000 -1.149
45,815 and over	1,000 ± 800 1,000 ± 300 0.000	5,000 ± 2,000 2,100 ± 300 1.434	1,000 ± 600 3,500 ± 400 -3.883	3,000 ± 1,000 5,000 ± 1,000 -1.414	1,000 ± 600 4,000 ± 1,000 -2.572	4,000 ± 1,000 6,000 ± 1,000 -1.414	14,000 ± 4,000 22,000 ± 1,000 -1.940
Total	439,000 ± 15,000 523,000 ± 11,000 -4.516	442,000 ± 13,000 296,000 + 11,000 8.573	236,000 ± 9,000 257,000 + 10,000 -1.561	241,000 ± 10,000 210,000 + 9,000 2.304	139,000 ± 8,000 156,000 + 8,000 -1.503	124,000 ± 7,000 176,000 + 7,000 -4.748	1,621,000 ± 34,000 1,614,000 + 8,000 0.200

***** < 2,000

Sources: Money Income and Poverty Status in 1975 of Families and Persons in the United States Over the North Central Region, by Divisions and States (Spring 1976 Survey of Income and Education, Table 8A).

The Wisconsin Tax Model

Each Cell: The top number is the predicted SIE cell population size ± standard error

The middle number is the predicted Tax Model 1 population size ± standard error

The bottom number is the cell Z -score

reported for each cell. The Tax Model findings involving small-family and low-income groups should therefore be viewed with caution.

The principal advantages of the Tax Model for a study of income distribution are as follows:

1. It is a microdata set. Many published studies have relied on published census data (e.g., Budd 1970; Kuznets 1975). Group data force the researcher to assume that all members of an income class have incomes equal to the class midpoint. Grouped data do not allow the researcher to vary the income measure for each household.
2. The Tax Model contains detailed income data and tax data, along with demographic variables for each household.
3. The Tax Model has records for over 20,000 Wisconsin families for the period 1970-76.

DISPLAY STATISTICS

Social scientists have developed several statistics to measure and display inequality. The Lorenz curve is the most frequently used graphic display of income distribution. The Gini coefficient and decile (or, alternatively, quintile, ventile, or percentile) shares are commonly used statistical indicators. The Tax Model can compute each of these directly from its microdata file. As stated in the previous section, we have computed each statistic directly from ungrouped family data. For example, the Gini was computed from a weighted version of the following algorithm:

$$G = 1 + \frac{1}{n} - \frac{2}{n^2\bar{y}} \quad (y_1 + 2y_2 + 3y_3 + \ldots + ny_n)$$

where: n is the number of income units in the population;

$\bar{y}$ is mean income (i.e., the income that each family would have if income were divided perfectly equally);

$y_1 \ldots y_n$ is the income of the 1st through n^{th} family.

(Cowell 1977, p.116)

For each income measure used and for each subset of the population considered, families were ranked by the income measure of interest.

These three distribution measures and displays--Lorenz curves, Gini coefficients, and decile shares--were chosen for three reasons. First, they are relatively easy to derive. Similarly, because of their widespread usage, each is easily interpreted. Moreover, these three approaches conform to accepted notions of inequality; transfer from X to Y results in greater measured inequality if X is poorer than Y, and less inequality if X is richer than Y. (This does not appear at all in the decile shares distribution if the transfer is between families in the same decile.)

However, the Gini measure has been criticized because it is not equally sensitive to transfers among income units at each point on the curve; that is, G is more sensitive to a transfer between X and Y when the two are near the middle of the distribution than when they are at either end of the distribution.

And, as a means of comparing different distributions, Lorenz curves have been criticized because they are often indecisive. If two or more Lorenz curves intersect, it is uncertain which distribution is more unequal. In such instances, the relative equities of the distributions are determined

by each observer's value judgements--how much one values the gains or losses of one group in the population relative to the gains or losses of some other group. This indecisiveness is neither peculiar to the Lorenz curve, nor is it necessarily an undesirable characteristic for a distribution measure: it forces one to be explicit about who benefits, and in the policy making arena, about whose welfare is valued most.

The greatest objection to the Lorenz and Gini concept "lies buried in the implications of the line of perfect equality" (Paglin 1975, p. 598). Many economists have argued that the line of perfect equality has been invested with too much normative burden; that is, while perfect equality may be a goal for some, most people generally agree that some income inequality is desirable and unavoidable. Other measures have been proposed which use counterfactual distributions other than absolute equality, but none of these has enjoyed such widespread usage or has the intuitive appeal, ease of understanding and derivation, and breadth of application of the Gini, Lorenz, and decile shares indices. These three statistical systems, along with means and medians, will be referred to throughout the text as a means of summarizing and comparing distributions in Wisconsin.

INCOME DISTRIBUTION IN WISCONSIN

In distribution analysis, the distribution of different components of total income across income classes has received the most attention. Using a single definition of the family unit and considering only annual income, we will examine the measured distribution by sources of income for Wisconsin in 1974.

By far the largest component of total money income is that of wages and salaries, which accounted for roughly 75% of total money income in Wisconsin in 1974. Income from property represented an additional 8%, and that from self-employment another 8%. The remaining 9% was from government cash transfers. Since earnings compose such a large proportion of total money income, the final distribution of income depends largely on how these earnings are distributed.

Measured over all households, wage and salary income exhibits a wide dispersion. This is represented by a Gini coefficient of .5021. This very large dispersion is due largely to the fact that many households have no such income. Farm families, families on pensions, entrepreneurs, and families with property income sometimes receive no wages and salaries. Thus, 240,000, or 15% of the families in Wisconsin, had no wage and salary income in 1974. The Gini is reduced significantly (to .4160) when only households with earnings greater than zero are included in the rank-order measure. This measure would decrease even more if only those families with at least one full-time worker were included in the rank ordering. Table 2 displays the relative shares distribution for wages and salaries.

Earnings represent only one component of economic family income, broadly defined as consumption outlays plus change in net worth during a given income period (Simons 1950). While this broad measure is conceptually appealing, it presents difficulties in estimating values. At the other extreme is a measure of houshold income that is easy to capture but conceptually unappealing: the income captured on Wisconsin tax forms, or Wisconsin adjusted gross income (WAGI). WAGI is objectionable because

Table 2

Distribution of Wages and
(Wisconsin, 1974) Salaries

Ranking on 1974 wages and salaries	Share of earnings of all families	Share of earnings, earnings over zero
bottom 10%	0.0%	0.8% ± .1
second 10%	0.3% ± .03	2.4% ± .1
second 20%	6.6% ± .2	9.9% ± .4
middle 20%	16.7% ± .5	17.5% ± .5
fourth 20%	27.0% ± .7	25.0% ± .7
ninth 10%	18.2% ± .6	16.4% ± .6
top 10%	31.1% ± .8	28.0% ± .9
Gini	.5021	.4160

SOURCE: Wisconsin Tax Model

it excludes money income from several sources, such as government cash transfers, and all forms of nonmoney income. Yet because it is so convenient, WAGI is sometimes used for distribution analyses.

The Tax Model file provided a Gini coefficient of .4708, using WAGI as the income measure. This is slightly lower than the Danziger and Plotnick Gini of .4765 for the U.S. in 1974, which used an income measure closely parallelling WAGI (Danziger and Plotnick 1977, p.9). Because of several exclusions from the WAGI base, the bottom 20% of all families had

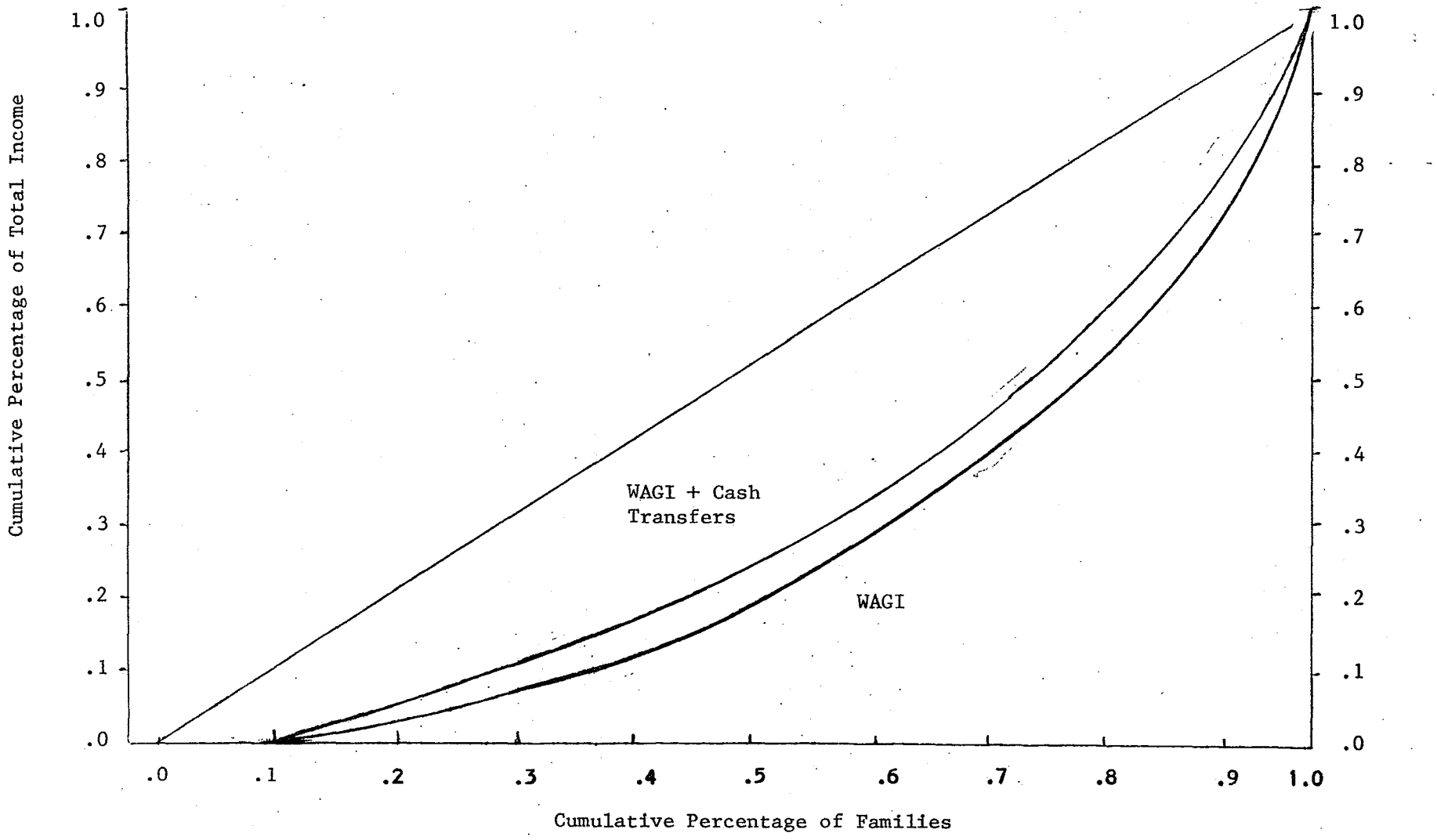
only 1.2% of the total WAGI, while 30.3% of all WAGI was held by the richest 10% of the families (Table 3). Note that the Tax Model estimates reported here do not need to agree with those for the U.S. as reported elsewhere. Most important is the trend that can be observed among the different definitions of income. Some insights may be gained by comparing these trends with those observed for comparable income measures that use other data sets. Any large discrepancies will be cause to be cautious about the data displayed here.

A broader concept than that of WAGI includes government cash transfers. The combination of cash transfers and WAGI more closely approximates what is generally considered to be money income. The cash transfers in this estimate include those from Social Security and railroad retirement, Veteran's benefits, welfare assistance, Workman's Compensation, GI benefits, and scholarships and fellowships. In-kind transfers and imputed income are excluded from this definition of family income.

The introduction of cash transfers reduced income inequality as measured by the Gini from .4708 to .4051--a reduction of 14%. The share of the bottom-20% income group increased by over 350% to 4.4% of all income. The share of the top five deciles decreased from 83% of total income to 78% (see Table 3). The Lorenz curve overlay displayed in Figure 1 shows that the distribution of WAGI plus cash transfers is unambiguously more equal than for WAGI alone.

Figure 1

Lorenz Curves for WAGI and WAGI + Cash Transfers
(Wisconsin, 1974)



SOURCE: Wisconsin Tax Model

Two separate studies have determined that government cash transfers reduced measured inequality by 10.4-14.4% (Danziger and Plotnick 1977, p. 10; Smolensky et al. 1974, p. 43). It is not surprising that the effect of cash transfers is comparable for Wisconsin, since this component represents roughly the same proportion of money income in Wisconsin as it does for the U.S. (Taubman 1978, p. 13).

Both Wisconsin and federal adjusted gross income exclude other forms of money income from their bases. For example, Wisconsin excludes the first $100 of dividend income. Adding this and other modifications back into the income measure with cash transfers gives a more complete measure of family money income. The resulting money income measure shows a less equal distribution than does WAGI plus cash transfers, but one that is over 11% less unequal than that previously shown by WAGI. The bottom 20% of the households, corresponding to those with incomes less than 4,800 had less than 5% of the total Wisconsin money income in 1974. The complete distribution is displayed along with the other distributions in Table 3.

In addition to government cash transfers, many households receive in-kind transfers. The Tax Model employs estimated values for Medicaid, Medicare, and food stamps received by each household from regression and discriminant functions. Allocating in-kind transfers is difficult because households do not necessarily value the services or goods they receive at the providers' costs. It is often argued that by imputing a value for

Table 3
Distribution of Income for a Variety of Income Measures
(Wisconsin, 1974)

Percentage of Families	Money Income	Percentage of Money Income	Percentage 1974 WAGI	Percentage WAGI + Cash Transfers	Percentage of Money Income + In-kind Transfers	Percentage WAGI + Fringes	Percentage Economic Income
Bottom 20%	$ 4,800	4.6±.2	1.2±.1	4.4±.2	5.6±.2	1.2±.1	4.8±.2
Second 20%	9,000	9.8±.3	8.5±.3	10.0±.3	10.6±.4	8.4±.3	10.1±.3
Middle 20%	13,500	16.3±.5	16.9±.4	16.9±.4	16.3±.5	16.8±.4	16.0±.4
Fourth 20%	19,200	23.3±.6	25.6±.5	24.4±.5	22.8±.6	25.8±.5	23.0±.5
Ninth 10%	24,700	15.7±.5	17.4±.6	16.3±.5	15.3±.5	17.5±.6	15.5±.6
Top 10%	------	30.4±.9	30.3±.4	28.1±.8	29.5±.9	30.4±.4	30.5±.9
Gini coefficient	------	.4182	.4708	.4051	.3930	.4731	.4155
Mean		$13,800	$11,400	$12,700	$14,500	$12,000	$16,600
Median		$11,200	$9,700	$10,800	$11,800	$10,100	$13,100

SOURCE: Wisconsin Tax Model

in-kind transfers equal to their estimated market value, the true benefit derived from the transfer is overstated. In some instances, more of the good is transferred to a recipient than he/she would have purchased at that price. Smolensky et al. have attempted to estimate the ratio of dollar benefit to the direct subsidy at market prices given to recipients. A benefit weight of one indicates that the transfer program is a de facto cash transfer. Smolensky et al. estimate benefit weights of one for food stamps and less than (but not widely different from) one for Medicaid (Smolensky et al. 1974, pp. 32-39).

A second question regarding in-kind and cash transfers is that of the benefits derived by the donors. The idea of "consumption of redistribution" stems from the notion that taxpayer and recipient utility functions are interdependent. Taxpayers maximize their welfare by making transfers up to the point at which an additional dollar of transfers given exceeds the benefits derived from the transfer. (In a societal context where the transfers are legislated according to the group's preferences, this transfer can be viewed as occurring up to the point at which the median voter's utility would be diminished by an additional unit less or more of the transfers.)

The Gini coefficient derived by use of the Tax Model for money income plus recipient benefits from in-kind transfers is .3930. This agrees with the national result of Smolensky et al., who found that adding recipient benefits to a measure of money income lowers measured inequality by over 6%. In addition, Smolensky et al. estimate that adding donor benefits increases the Gini coefficient by just over 2%. Recipient benefits are distributed in a

manner favoring the poor, while donor benefits are distributed in a pattern highly favorable to the rich (Smolensky et al.. 1974, p. 43).

Several additional components of household economic well-being are not captured in money income measures. Fringe benefits represent employee compensation that is largely excluded from the tax base and from most income distributions. It is generally believed that fringe benefits add to the dispersion of income in the economy (Atkinson 1975, p. 61-62). A value for fringe benefits was imputed to each household in the Tax Model on the basis of federal data displaying such benefits as an increasing proportion of earnings as earnings rise, peaking at 7.8% for earnings between $16,000 and $17,000, and falling to 7.3% on earnings above $19,000.[2] Note that the estimation function used here imputes the values on the basis of current receipts and not on claims against future income (e.g., employee pension plans).

The Gini coefficient for WAGI plus fringe benefits is .4731, representing an increase of roughly .5% over simple WAGI. Table 3 shows the small gains in the relative shares of the top four deciles, and the slight losses in the income shares of the bottom 60%.

The measure of household economic income includes income from each of the sources already listed, plus imputed net rent on owner-occupied dwellings, net income from accrued capital gains, and in-kind transfers. The Gini for this broad income base is .4155, which is 12% less than the Gini corresponding to 1974 WAGI, 0.7% less than the Gini for family money income, and roughly 2.6% greater than the Gini for WAGI plus cash transfers. The addition of imputed net rent and accrued capital gains appears to offset the equalizing effect of adding in in-kind transfers.

The comparison of distributions for different definitions of the income base can be summarized as follows:

1. The distribution of wages and salaries--which comprise 75% of all household money income in Wisconsin--is widely disbursed among all households, with a Gini of .5021. It is significantly smaller (.4160) only among those families with wages and salaries greater than zero.
2. The addition of other factor income excluding modifications and all transfers (i.e., WAGI), results in a Gini of .4708.
3. Cash transfers have a strong equalizing effect, reducing the Gini coefficient by roughly 14%, from .4708 to .4051.
4. Our estimates show a strong equalizing effect for in-kind transfers. The recipient benefit reduces measured inequality by 6%, while Smolensky et al. estimate that the donor benefit exerts a less strong disequalizing effect on income distribution (Smolensky et al. 1974).
5. Fringe benefits have a very slight disequalizing effect on the distribution of income, raising the Gini for WAGI from .4708 to .4731.
6. The distribution of the broad-based income measure displayed a Gini coefficient of .4155; the share of the bottom 20% was larger than for any of the other measures; the share of the top 10% was also relatively large.

THE INCOME-RECEIVING UNIT

In the last section, several income distributions were displayed for Wisconsin families. Using the family as the economic unit without

correcting for family size may not be ideal. It is argued that the measure of economic well-being for larger families should be reduced because more people are sharing the available resources.

The simplest way to correct for family size is to use a per-capita income measure. According to this method, a family of two would need $20,000 to attain the same per-capita measure of income as that of a single individual with a $10,000 income. The implicit assumption is that the two households then have a comparable level of economic well-being. But two people living together can share in the consumption of many goods and activities--a television or a kitchen, for example--with no additional cost, so most people would judge the couple to be better off. Ideally, therefore, relative states of economic well-being should be weighted by economies of scale. Other factors affecting the well-being of families at all income levels need to be considered as well, such as ages of family members, special individual physical needs, and number of wage earners.

Correction for family size may be criticized on the grounds that size is a choice variable: a family may elect to consume its limited resources by increasing its size rather than by acquiring available material commodities and still experience an increase in its overall level of well-being. If this is true, then great reductions in taxes for larger families at higher incomes may not be desirable.

Such a position, however, does not negate the argument that economic well-being--which is one subset of the overall level of well-being--is lessened by large family size. Thus, in spite of its drawbacks, the per-capita adjustment is a useful indicator of the level of economic well-being, and represents an important supplement to the family income measure.

In a per-capita distribution, measured inequality will be greater if poorer families are, on the average, larger than wealthier families. In an equivalent income distribution, the age of the family members also affects the family's well-being, with older members assumed to require greater resources. A detailed distribution of per-capita incomes using the Tax Model is displayed in this section. A less in-depth analysis of equivalent income is also provided.

The per-capita relative shares distribution displayed in Table 4 was derived by ranking income according to per-capita money income and then breaking out the distribution statistics. Thus, a family of two with $10,000 ranked higher in the family ordering than did an individual with $8,000, while on a per-capita basis the single person had a higher ranking than did the family of two, each of whom has $5,000 in per-capita income.

Per-capita money income inequality is 4% lower than that for families, when measured by the Gini. The lower Gini is consistent with the matrix displayed in Table 1. According to the Tax Model display in that table, the average size of families and unrelated individuals with below $3,665 in money income in 1974 was 1.54, while for families with between $18,325 and $22,910 it was 4.06. The corresponding numbers from the S.I.E. are 1.43 and 3.63, respectively, (S.I.E. Spring 1976).

Correcting for family size on a per-person basis increased the relative share of total money income of the bottom 20% of the population by roughly 30%--from 4.6% to 6.09%. The share of the next 20% increased by 10%, while that of the middle 20% decreased by 8%. The per-capita

Table 4

Per-Capita Money Income Distribution and Equivalent Income Distribution (Wisconsin, 1974)

Ranking on 1974 per-capita money income	Share of total 1974 Wisconsin money income	Share of Equivalent income
bottom 20%	6.0%±.3	7.0±0.7
second 20%	10.8%±.4	13.1±0.4
middle 20%	15.0%±.4	17.1±0.6
fourth 20%	21.7%±.5	22.1±0.7
ninth 10%	15.3%±.5	14.5±0.7
top 10%	31.2%±.8	26.3±1.1
Gini Coefficient	.4016	.3339

SOURCE: Wisconsin Tax Model

distribution is not unambiguously less unequal than the family distribution; the share of the top 10% is 3% higher in the per-capita breakout. In other words, money income is more concentrated in the top 10% in a per-person measure than on a family measure. The higher relative shares for the top 10% is the only exception to the greater equality displayed by the per-capita display. The generally smaller family sizes among the poor, especially among the young and old families, suggests that, for all but the top 10%, measured inequality in economic well-being is not as large in Wisconsin as is suggested by the family income distributions.

The equivalent income measure in the Tax Model is based on the equivalent income ratios provided by Seneca and Taussig (1971) for children, and Mollie Orshansky (1974) for adults. The base family in the Tax Model is a family unit of one adult.[3]

Equivalent income scales consider the needs of families based on observed data for other families and allow comparisons of the true purchasing ability of these families. This is very useful in the area of tax policy analysis, where equity may call for the explicit inclusion of family size in the ability to pay measure. The Gini coefficient for family equivalent income--based on five-year average income--is .3339.

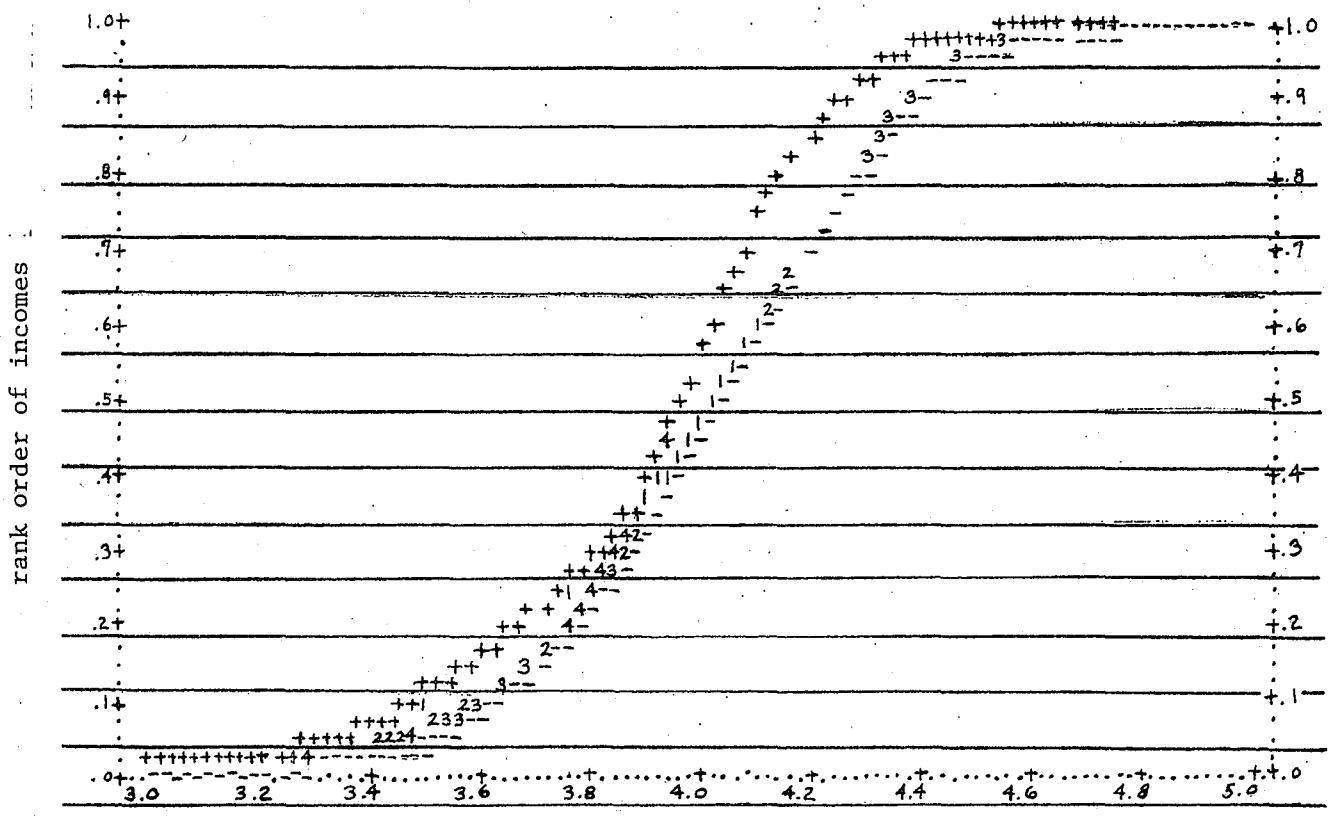
The cumulative distribution displayed in Figure 2 shows that the income cutoffs at each percentile are not widely different for the equivalent income measure than for the family money income measure. Equivalent income amounts are indicated by the figure "4." Because of the order of printing regulating the printout, fours actually appear only for a very small range. Below the $6,000 level the fours are coincident with the hyphen signs, and above $10,000 the fours are coincident with the plus signs. Throughout most of the range, therefore, the equivalent income associated with each percentile is lower than the corresponding money income. This diagram also shows that nearly 80% of all families have incomes between $5,000 and $25,000, regardless of the income measure used.

INTERGROUP DIFFERENCES

Several differences among groups of the population contribute to the overall inequality in the economy. For example, inequality within age groups might be less than total inequality throughout the economy. If this were true, then overall inequality would be reduced if income differences between age groups were lessened. Inequality among racial and ethnic groups, occupational groups, and geographic regions could be approached in a similar fashion.

Figure 2

Cumulative Distribution of Equivalent and Money Incomes
(Wisconsin, 1974)



SOURCE: Wisconsin Tax Model

1 money income

4 equivalent income

\+ upperbound

\- lowerbound

LIFE-CYCLE DIFFERENCES

One intergroup difference which has received much attention is that among age groups. It is generally argued that a 22-year-old entering the labor market should not be expected to earn as much as someone with identical education but several years of job experience. However, the 22-year-old's income could be expected to be about the same as that of someone of comparable age and/training. One economist has defined perfect equality at any point in time as "equal incomes for all families at the same stage of their life cycle, but not necessarily equal incomes between different age groups" (Paglin 1975, p. 602).

Ideally, lifetime incomes or consumption should be compared to adjust for income differences at different stages of the life cycle. While such comparison is desirable, a method for measuring the distribution of lifetime earnings and then drawing quantitative inferences has not yet been agreed upon. Changes in the composition within families and in the age composition of the population interact with a multitude of other factors, rendering the construction of lifetime earnings distributions infeasible (see Atkinson 1975, p. 68). Thus, it may be unreasonable to compare the lifetime incomes of different age groups.

Indirect evidence regarding lifetime income distribution is provided by intra-age group distributions. If income is more equally distributed within age groups than for the population as a whole, then life-cycle differences do contribute to observed overall inequality. Furthermore,

to the extent that age-earnings profiles that are not flat are accepted, less inequality within age cohorts implies less undesirable inequality than is suggested by the overall distribution.

The Tax Model was used to display money income distributions for five age categories according to the age of the head of the household. In a majority of cases, age data for head-of-household were entered directly from three sources: driver's licenses provided by the Motor Vehicle Department, the 1974 Screen Sheet, and the Medicaid tape. The remaining ages were inferred from available information (Bob Eleff Tech Note #125). For example, if an individual took the $25 personal exemption allowed for those over 65, he or she was assigned a random age between 63 and 80.

As shown in Table 5, there is less concentration of money income within age groups up to age 65. Among families headed by someone age 65 or over, incomes are more unequally distributed than for the overall population. This decreased dispersion is not very great and corresponds roughly with Taussig's findings for the U.S. (Atkinson 1975, p. 68). The Ginis imply that the expected difference in family money income for two familieschosen at random from the 25-to-34 age group is roughly 72% of the expected difference for two families chosen at random from the total population (calculated as 2(.3027)/2(.4182)). As we would expect, life-cycle income peaks, on the average, in the 35-to-54 age class, and the lowest average incomes are found among families whose head is under 25, followed very closely by families in the 65-and-over group. Dispersion is highest in the oldest age group, as might be expected; many of these households are living on pensions or income supports, while others in this class have income from wages and/or property.

Table 5

Distribution of Money Income by Age Groups
(Wisconsin, 1974)

Age of Head Of Household	Gini Coefficient	Bottom 20%	Top 10%	Top 50%	Mean 1974 Money Income
Under 25	.3500	6.3%±.3	24.1%±.7	74.8%±1.1	$8,000
25 to 34	.3027	6.3%±.3	22.4%±.6	70.4%±1.0	13,300
35 to 54	.3934	4.9%±.2	29.8%±.6	75.9%±1.0	18,200
55 to 64	.4017	4.9%±.3	29.4%±.8	76.9%±1.2	16,000
65 and over	.4567	5.8%±.5	36.5%±.9	79.4%±1.4	9,200
All Households	.4182	4.6%±.2	30.4%±.9	78.3%±0.9	13,800

SOURCE: Wisconsin Tax Model

Because of the differences in distributions among the age groups, shifts in the age composition of the population may bring about a change in the overall index of inequality without any shift in the intragroup distributions. Wisconsin already has about 10% more than its relative share of households headed by persons over 65. If the state had fewer elderly families, its measured inequality would probably be smaller than at present (Allweiss Tech Note #162). The effect of this disproportionately large older population and its growth on measured income inequality should be quite small. The growth of cash transfers, public assistance, and favorable tax treatment for this group (see the forthcoming Tax Burden Study) lessens the differences in disposable income between older families and the younger population and serves to lessen the differences with the over 65 age class as well.

RURAL AND NONRURAL INCOMES

Two subgroups of interest are rural and nonrural families. One scholar estimated that the average money income of rural families in 1941 was roughly 50% of that of urban units (Reid 1951, p. 136). Since then, farm and nonfarm rural families have made significant relative gains. The display from the Wisconsin Tax Model shows that money incomes of rural families were, on the average, 84% of nonrural incomes in 1974 (Table 6). This is slightly larger than Lampman's report that the average income of all U.S. farm residents was 80% of the income of nonfarm residents in 1974 (Lampman 1977, p. 111). The average money income of nonrural Wisconsin families was $14,400 in 1974, compared with $12,000 for rural families. On the average, over 80% of the mean nonrural money income came from wages and salaries; the comparable figure for rural families was 70%.

Inequality within each of these two groups does not differ greatly from the overall measured inequality, and dispersion among rural families is only slightly less than overall inequality. The Gini for rural families is .4144, while for all families the Gini is .4182. The Gini for nonrural families is .4175 (Table 6).

HOMEOWNERS AND RENTERS

Like other subgroups considered in this section, renters' money incomes display a degree of dispersion roughly equal to that for the total population. The Gini coefficient of .3908 for renters is 1.3% lower than the Gini of .3959 for homeowners. This latter figure is, perhaps, even

Table 6

Money Income Distribution for Population Subgroups
(Wisconsin, 1974)

Ranking on 1974 Family Money Income	Renters	Home-owners	Rural Families	Nonrural Families	White Families	Nonwhite Families	Female-Headed Families
Bottom 10%	2.01%±.1	1.8%±.1	1.6%±.2	1.7%±.1	1.8%±.1	1.3%±.2	2.1%±.2
Second 10%	3.3%±.2	3.2%±.2	2.9%±.2	3.0%±.2	2.9%±.2	2.6%±.2	3.4%±.2
Second 20%	10.1%±.3	11.0%±.3	9.5%±.4	10.1%±.3	9.8%±.3	11.0%±.4	9.5%±.4
Middle 20%	16.7%±.5	16.9%±.5	16.4%±.6	16.2%±.5	16.2%±.5	19.4%±.7	14.3%±.6
Fourth 20%	24.5%±.6	22.7%±.6	24.4%±.7	23.0%±.6	23.3%±.6	23.9%±.8	21.6%±.7
Ninth 10%	16.3%±.5	15.1%±.5	16.3%±.6	15.5%±.5	15.7%±.5	17.9%±.6	15.6%±.6
Top 10%	27.2%±.8	29.4%±.9	28.9%±.9	30.7%±.8	30.3%±.9	23.9%±.8	33.4%±1.0
Gini	.3908	.3959	.4144	.4175	.4172	.3850	.4347
Mean	$8,900	$16,200	$12,100	$14,400	$13,800	$12,100	$8,200
Median	$7,500	$13,800	$10,000	$11,700	$11,200	$10,900	$5,700
# of Families	526,000	1,088,000	431,000	1,183,000	1,568,000	46,000	383,000

SOURCE: Wisconsin Tax Model

somewhat overstated: the inclusion of imputed net rent, while not an equalizing addition to the overall distribution, would probably reduce the dispersion among homeowners. While the average income of the top 10% of homeowners is nearly ten times that of the bottom 10%, their imputed net rental incomes are, on the average, probably less widely unequal.

The mean money income of all renters before Wisconsin taxes is only 55% of that of homeowners. If nonmoney income were included, then the relative average would fall below 55% because of the addition of imputed net rent for homeowners. Excluding income from sources other than wages and salaries would increase the average income of renters to 60% of that of homeowners. Homeowners appear to derive a larger proportion of their incomes from property and transfers.

A note of caution when treating the poorest group of renters: as shown in Table 1, the Tax Model estimates that there are significantly more poor households than is estimated by the S.I.E. Furthermore, the Tax Model predicts that there are more poor renters than the S.I.E. predicts.[4] These poorest 10% of renters, who have a 2% share of cumulative income for all renters, correspond to families with money incomes of less than $2,500. Finally, while the Tax Model estimates that the mean money income of renters was 55% of that of owners, the S.I.E. estimates that the mean survey money income of renters was two-thirds of that of owner-occupants in Wisconsin in 1975 (S.I.E. 1978, Table 22).

WHITE AND NONWHITE FAMILY INCOMES

The nonwhite population in Wisconsin accounts for a small proportion of all families. The Tax Model estimates that there were roughly 46,000

nonwhite families and individuals in Wisconsin in 1974. The S.I.E. predicts that two years later there were closer to 56,000 families and individuals in Wisconsin who were either black or of Spanish origin. Either figure represents fewer than 4% of all families and individuals in the state in 1974.

The concentration of money income within each of these two groups is not very different from that for the overall population. The Gini for nonwhites is 7.9% lower than the population Gini. According to the Tax Model the mean and median incomes for nonwhites is close to 85% of the average and median incomes of white families. The S.I.E. ratios of nonwhite to white for mean and median money incomes are closer to two-thirds and .72, respectively.

A closer look at the distribution for nonwhites displayed in Table 6 reveals that a large group of families and unrelated individuals remain among the poorest in Wisconsin. Over 20% of the nonwhite families and individuals had less than $4,000 money income in 1974; this is less than half the $11,200 median income for all households that year. Twenty percent of the nonwhite families had incomes in excess of $17,000. It appears that while some nonwhite families have attained relatively high incomes, most have not shared in this prosperity.

FEMALE-HEADED FAMILIES

The substantial increase in the number and proportion of households headed by females is a recognized phenomenon of the past decade. The Tax Model estimates that nearly one in four families was headed by a female

in 1974. The S.I.E. estimate of 360,000 female individuals or families headed by females roughly corresponds to the 383,000 predicted in the Tax Model.

Money income inequality within this group of households is significantly larger than overall measured inequality. The Gini for female-headed households is .4347, which is 4% larger than the Gini for all families. The concentration of income in the top 10% is highest within this subgroup among those displayed in Table 6. The bottom and middle deciles within this group have relatively low income shares. As the number of households headed by females in Wisconsin continues to grow, it is anticipated that this trend will exert a disequalizing influence on overall income distribution. An additional display by family size would be a useful addition to this section of the analysis.

The average income of households headed by females is only 60% of the average for all households and is closer to 50% of that for husband-wife households and households headed by males. The ratio of median incomes for households headed by females to those of all households is nearly one-half. Average wage and salary income comprises 70% of the average money income of households headed by females.

THE WISCONSIN INCOME TAX AND THE DISTRIBUTION OF INCOME

The tax system is one tool available for altering the final distribution of resources. This alteration can be brought about either with or without direct transfers. Some economists believe that a progressive tax system is one of the best policy tools available for making a change in the final distribution of income (Okun 1975, p. 101). We have already shown that

government cash-transfers have a significant effect in favor of the poor on the final distribution of income. Here, we show that the Wisconsin income tax minus Homestead credit, or net income tax, exert substantially less influence on the equalization of incomes. In an ongoing study of the incidence of all state and local taxes in Wisconsin, the Tax Model Group has also found that the final burden of all taxes and credits range from mildly regressive to proportional. The net effect of all taxes on the final distribution will, therefore, slightly favor the rich.

The burden of the Wisconsin income tax and Homestead credit is strongly progressive (before the federal offset) across all income classes. In 1974, the income tax minus Homestead credits generated $750 million, which represented over 20% of all state and local taxes collected. Whereas assessing the final burden of many of the indirect taxes involves complicated arguments about shifting assumptions and the exporting of taxes to other states, the final burden of the net income tax is assumed to be identical to its impact. Thus, the net income tax burden is available for all families in the sample directly from Wisconsin's good records.

The Tax Model money-income measure was used for this analysis. As shown in Table 7, Wisconsin income taxes and Homestead credits reduced measured inequality by less than 2%. The after-tax Gini is .4099, compared with a before-tax Gini of .4182. The relative shares of the bottom six deciles increased slightly, while the shares for each of the top four deciles fell.

The display of the effect of the income tax on the distribution of income highlights an interesting point regarding the state tax system. While the Wisconsin income tax and Homestead credit program are the most

Table 7

Money Income Distribution After Wisconsin Income Tax
(Wisconsin, 1974)

Rank order of population	Share of money income
Bottom 10%	1.8%±.1
Second 10%	3.1%±.1
Second 20%	10.1%±.4
Middle 20%	16.4%±.5
Fourth 20%	23.2%±.5
Ninth 10%	15.5%±.5
Top 10%	29.9%±1.0
Gini coefficient = .4099	

SOURCE: Wisconsin Tax Model

progressive parts of the tax system, the total dollar amount of the net income tax was only 3% of money income in Wisconsin in 1974. Thus, while a plot of effective net-income tax rates against money income may give the impression that the income tax has a major equalizing influence on the final distribution of income, the smallness of the tax relative to all money income diminishes its contribution to equalization. This should be remembered when the merits of alternative redistribution schemes are examined.

THE ACCOUNTING PERIOD: INCOME AVERAGING

The annual incomes used up to this point are subject to transitory fluctuations. It is generally acknowledged that these short-run disturbances in family income average out over a long period of time. Without averaging, these random fluctuations would lead one to predict a 35% annual gross flow from below to above the poverty line (Mirer 1973, p. 12).

Suppose a family's sole wage-earner suffers a temporarily debilitating illness. In an extreme case, a family's income may fall to zero during the year of recuperation but return to its normal level the following year. Such occurrences can distort the picture of overall distribution of resources. A single-year snapshot of the income distribution does not compensate for these windfall gains and losses from the overall distribution.

As stated earlier, economists wish to measure lifetime incomes to offset differences due to stages in the life-cycle, or transitory differences resulting from short-term disturbances. Lifetime earnings for each individual are too difficult to measure, however. The required administrative records are not available, and all of the associated theoretical issues are not yet resolved. Average income over several years serves as a compromise measure, since it compensates for temporary fluctuations and draws from existing administrative records. This multi-year average income brings up some of the same theoretical problems associated with lifetime income measures. Ideally, it would be desirable to adjust for inter-family differences occurring over the duration of the experiment, but the Tax Model data set does not permit this adjustment. The 1974 family as it is constructed here, is static throughout the seven-year period, 1970-

76. Furthermore, the seven-year period of the Tax Model time-series exhibited wide changes in macroeconomic conditions (i.e., rising unemployment and inflation).

Average income in the Tax Model is calculated for each family only during those years for which the family's records are available. The findings reported here are for a seven-year average WAGI. Since WAGI excludes most transfer payments, the equalizing trend resulting from income-averaging is not as great as may be expected. Transfer payments raise the incomes of many families who are at the bottom of the distribution, whether for a single year or for several years.

Results displayed in Table 8 indicate that the share of the first five deciles increased in the average income measure; the share of the lowest 20% increased by 60%. Each remaining decile share, with the exception of the top decile, is larger for the single-year measure than in the multi-year average income measure. The share of the top decile is over 2% larger in the multi-year measure. The Gini coefficient is roughly 2% lower for this average income measure than for single-year WAGI.

These findings are roughly consistent with those found by Mirer in his study of three-year income from 1967 to 1969. Using Michigan panel data, Mirer reported that variability in permanent income decreased as the level of permanent income approached $15,000 or so (near the middle of the distribution), and above $15,000 the level of variability once again began to rise (Mirer 1973, p.5). This regression towards the mean has also been reported in other findings (Taubman 1978, p. 21). That is, relatively low- and high-income families experience proportionately

Table 8

Distribution of Multiple-Year Average WAGI vs Single-Year WAGI
(Wisconsin, 1970-1976)

Rank order of Population	Share of Multi-year WAGI (1970-76)	Share of Single-year WAGI(1974)
Bottom 20%	1.9%±.1	1.2%±.1
Second 20%	8.9%±.4	8.5%±.3
Middle 20%	16.5%±.4	16.9%±.4
Fourth 20%	24.9%±.6	25.6%±.5
Ninth 10%	16.7%±.6	17.4%±.6
Top 10%	31.0%±.5	30.3%±.4
Gini coefficient =	.4635	.4708

SOURCE: Wisconsin Tax Model

greater equalizing fluctuations than do families near the middle of the distribution. This same trend has been displayed using the Tax Model, with the exception of the relative gain in the income share of the top decile in the multi-year average.

FOOTNOTES

[1]For an excellent discussion of the Tax Model, from which parts of this section were taken, see Dave Burress' Research Memorandum #10, "The Wisconsin Tax Model System," which was presented at the 1978 Conference of the Association for Computing Machinery. The reader is also referred to the Tax Model Technical, Research, and Theory Note Series.

[2]For a more detailed description of the fringe benefit imputation employed in the Tax Model, see Bob Eleff, Tax Model Technical Note #150.1, "Fringe Benefits Excluding Pensions (IFREZ641)."

[3]For a description of the equivalency scale used in the Tax Model, see John Nyman, Tax Model Technical Note #120, "Cost of a Child (LKIDZ641)," and Allan Allweiss, Tax Model Technical Note #160, "Relative Costs of Adults by Age and Number of Adults."

[4]Based on the following table from the Tax Model and S.I.E.:

Tax Model 1974 and S.I.E. 1976 Distribution of Owner-Occupied and Renter-Occupied Dwelling, 1974 Money Income, Wisconsin

Total 1974 Survey Money Income	Tax Model		S.I.E.	
	% owner-occupied	Total Pop. (000)	% owner-occupied	Total (000)
All Households	67.4	1,614	70.5	1,513
Under $4580	47.7	377	55.7	229
4580 to 9159	59.8	340	61.1	315
9160 to 13774	61.7	290	70.1	326

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