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ABSTRACT

Any summary measure of the degree of inequality in the size distribution of income is sensitive to the choice of both the demographic unit of analysis and the income concept. Thus, intertemporal variation in a summary statistic will be affected not only by economic factors, but also by changes in either unit composition or sources of income. Recently, the post-World War II stability of the aggregate distribution of income has been attributed to this type of phenomenon--economic forces promoting greater equality, some have alleged, have been offset by demographic changes that produce greater inequality.

This paper uses microeconomic data to account for the distributional impact of changes in demographic composition and of increases in government transfer payments between 1965 and 1972. We have decomposed the population into twelve demographic subgroups and used the Gini coefficient to measure income inequality. The pretransfer and posttransfer distributions of income for each of these groups are analyzed.

Three major findings emerge. First, in this period the pretransfer and posttransfer distributions became more unequal for the entire population and for most of the demographic subgroups. Second, about one-half of the increase in the aggregate index of inequality cannot be accounted for by demographic change. Hence, hypotheses that suggest that demographic change has offset a trend toward greater income equality are not supported by the data, at least within the 1965-1972 time period. Third, the government cash transfer system dramatically decreases inequality within certain subgroups, but it has only a modest effect on the aggregate degree of inequality.

DEMOGRAPHIC CHANGE, GOVERNMENT TRANSFERS, AND THE DISTRIBUTION OF INCOME

I. Introduction

Any summary measure of the degree of inequality in the size distribution of income is sensitive to the choice of both the demographic unit of analysis and the income concept.[1] Thus, intertemporal variation in a summary statistic will be affected not only by economic factors, but also by changes in either unit composition or sources of income. Recently, the post-World War II stability of the aggregate distribution of income has been attributed to this type of phenomenon--economic forces promoting greater equality, some have alleged, have been offset by demographic changes that produce greater inequality. Kuznets (1972) states that a shift in the demographic composition of the population away from "standard" male-headed families[2] to younger, older, and female-headed units increased inequality and offset the equalization of incomes that occurred among standard families. Rivlin (1975) suggests that rising incomes, including public transfer payments, have "enabled Americans to increase their consumption of a luxury good--the luxury of living apart from relatives (p. 5)." Hence, the equalizing effect of increased transfers has been counteracted by demographic changes that increased the number of low-income units.

This paper uses microeconomic data to account for the distributional impact of changes in demographic composition and of increases in government transfer payments between 1965 and 1972. Section II describes the data and the decomposition of the population into twelve demographic subgroups. The pretransfer and posttransfer distributions of income for each of these groups are analyzed in Section III. Section IV reviews and qualifies the results.

Three major findings emerge from this study. First, in this period the pretransfer and posttransfer distributions became more unequal for the entire population and for most of the demographic subgroups. Second, about one-half of the increase in the aggregate index of inequality can not be accounted for by demographic change. Hence, hypotheses that suggest that demographic change has offset a trend toward greater income equality are not supported by the data, at least within the 1965-1972 time period. Third, the government cash transfer system dramatically decreases inequality within certain subgroups, but has only a modest effect on the aggregate degree of inequality .

II. Data and Methods

Most intertemporal studies of the size distribution of income have relied upon data published by the Bureau of the Census (Budd, 1970; Kuznets, 1972; Schultz, 1972).[3] The use of published data has three principal disadvantages. First, in computing indices of inequality it is generally assumed that all members of an income class have incomes equal to the class midpoint. This assumption "often leads to estimates which are outside the mathematically possible bounds (Gastwirth, 1972, p. 306)."[4] Second, published census data utilize the concept of money income that includes government transfers. The distribution of pre-transfer income cannot be directly derived from such data. Finally, the data cannot be disaggregated into the desired set of demographic groups.

This study uses micro data from the 1966 Survey of Economic Opportunity (SEO) and the March 1973 Current Population Survey (CPS).[5] The

availability of micro data allows estimation of inequality indices based on class means rather than midpoints.[6] Inequality is measured by the Gini coefficient, computed from thirty-one income classes.[7] Two income concepts are studied--pre(government)transfer income, defined as earnings, property income, and private transfers; and posttransfer income, defined as pretransfer income plus all government cash transfers.[8] The population is divided into twelve exhaustive and mutually exclusive groups, distinguished by type of household unit (family or unrelated individual), sex of head, and age of head.[9] The age categories are young (less than 25 years of age), prime-age (25-64), and aged (over 65).

The micro data offer a rich detail not found in published data, but restrict the analysis to the period between 1965 and 1972, the earliest and latest years for which comparable micro data sets existed when we began our work. Conclusions derived from the data must be tempered by the recognition that cyclical conditions differed in these two years. Both 1965 and 1972 were years of substantial economic growth and falling unemployment. However, the unemployment rate averaged 4.5 percent in 1965 and 5.6 percent in 1972. While the rate of inflation was modest in both periods, 1.7 and 3.3 percent, wage and price controls were in effect in 1972.

III. Empirical Results

~~This section first~~ examines the relationship between demographic change and the distribution of income. The effect of transfers on the degree of income inequality is examined in the second part of this section.

Demographic Changes and the Income Distribution

Table 1 (columns 3 and 6) reveals that substantial demographic change occurred between 1965 and 1972. According to the Census Bureau, the total number of units increased by over 17 percent from 60.4 million to 70.9 million, while the total population of the U.S. grew by only about 7.5 percent. The largest group, families with prime-age male heads, fell from 57.9 to 53.1 percent of total units. Nine of the other eleven groups became more prevalent in the population. Female-headed families increased from 8.2 to 9.3 percent of all units, and female unrelated individuals from 12.5 to 14.2 percent. There was also a large increase in the proportion of living units that consisted of unrelated young males.

The prime-age male group had the highest mean income on both a pre-transfer and a posttransfer basis. Thus, one would expect that the demographic shift toward lower-income units would result in greater aggregate inequality. Tables 2 and 3 confirm this expectation and reveal that inequality was increasing within most of the demographic groups as well.

Table 2 presents Gini coefficients across subgroups for the pre-transfer distribution of income in 1965 and 1972. The coefficients range from .2832 to .7736. The aggregate index rose by 6.3 percent (last row of table).[10] Inequality among families headed by prime-age males rose by about one-half this amount. The largest change in inequality occurred among female-headed families (15.1 percent), followed by families with prime-age and aged female heads (8.2 percent each). The Gini coefficient increased for all but two groups, families with aged male heads and young unrelated women.

TABLE 1: Mean Income and Relative Size of Each Demographic Group

Demographic Group	1965			1972		
	1 Pretransfer Income	2 Posttransfer Income	3 Size of Group[1]	4 Pretransfer Income	5 Posttransfer Income	6 Size of Group[1]
Families headed by:						
Young males	$5790	$5862	4.4%	$8475	$8710	5.1%
Prime-age males	8756	9004	57.9	14283	14829	53.1
Aged males	3596	5320	9.5	5337	8372	9.0
Young females	2045	2559	0.5	1986	3210	0.9
Prime-age females	3802	4661	6.0	5664	7022	6.8
Aged females	3788	5029	1.7	5790	8244	1.6
Individuals who are:						
Young males	2573	2627	0.7	4312	4535	1.9
Prime-age males	4571	4816	4.9	7858	8322	5.5
Aged males	1226	2397	2.0	1978	4030	2.0
Young females	1890	1897	1.4	3136	3217	1.7
Prime-age females	3445	3706	5.4	5003	5434	5.9
Aged females	977	1964	5.7	1533	3270	6.6
Total population	$6482	$6992	100.0%	$9989	$10916	100.0%

Note: Mean income is given in current dollars.

[1]There were 60.4 million units in 1965; 70.9 million in 1972.

TABLE 2: Inequality in the Distribution of Pretransfer Income

	1 1965 Gini Coefficient	2 1972 Gini Coefficient	3 Δ Gini* Coefficient
Families headed by:			
Young males	.2832	.2881	1.7%
Prime-age males	.3092	.3196	3.4
Aged males	.6460	.6325	-2.1
Young females	.5847	.6729	15.1
Prime-age females	.4835	.5229	8.2
Aged females	.5354	.5793	8.2
Individuals who are:			
Young males	.4544	.4678	3.0
Prime-age males	.4383	.4554	3.9
Aged males	.7158	.7567	5.7
Young Females	.5224	.4803	-8.1
Prime-age females	.4716	.4871	3.3
Aged females	.7439	.7736	4.0
Total population	.4400	.4679	6.3%

*Changes in Tables 2 and 3 are defined as

$$[(X1972 - X1965)/X1965] \cdot (100).$$

TABLE 3: Inequality in the Distribution of Posttransfer Income

	1 1965 Gini Coefficient	2 1972 Gini Coefficient	3 Δ Gini Coefficient
Families headed by:			
Young males	.2785	.2771	-0.5%
Prime-age males	.2997	.3063	2.2
Aged males	.4355	.4184	-3.9
Young females	.4420	.3958	-10.5
Prime-age females	.3755	.3980	6.0
Aged females	.4058	.4173	2.8
Individuals who are:			
Young males	.4463	.4505	0.9
Prime-age males	.4017	.4161	3.6
Aged males	.3786	.4139	9.3
Young females	.5176	.4640	-10.4
Prime-age females	.4213	.4917	-0.4
Aged females	.4153	.4260	2.6
Total population	.3917	.4116	5.1%

Table 3 reveals that posttransfer income inequality increased for seven of the groups. The aggregate degree of inequality also rose. The increase in the posttransfer Gini coefficients for each demographic group and the aggregate is smaller than the increase in the pretransfer coefficient. This suggests an improvement over time in the equalizing effect of transfers, an issue that is explored below in greater detail.

Table 4 decomposes the increased inequality of both pretransfer and posttransfer income into components due to changing demographic composition and to increased within-group inequality. For each type of income, the table presents the observed aggregate mean income and Gini coefficient for 1965 and 1972, and two estimates. One forces the 1965 demographic composition of the population into the 1972 distribution of income; the other forces the 1972 composition into the 1965 distribution.[11]

Lines 1 and 2 (for pretransfer incomes) show that if the 1965 demographic composition had not changed during the period, but if the 1972 pretransfer income distribution within each subgroup had still been generated, then, in 1972, the Gini coefficient would have been about 3 percent lower, and the mean pretransfer income about 5 percent higher than the actual 1972 magnitudes. Similarly, lines 3 and 4 show that, given the demographic changes that occurred, but holding constant the income distribution within each group, inequality would have increased by about 3 percent, and the level of income would have been about 4 percent lower compared to the actual 1965 figures. Both of these estimates suggest that about one-half of the observed 6.3 percent increase in the Gini coefficient from .4400 in 1965 to .4679 in 1972 cannot be accounted for by demographic change. The lower panel of Table 4 can be

TABLE 4: Decomposition of Changes in Inequality

		1 Gini Coefficient	2 Mean Income (Current $)
	Pretransfer income		
1.	1972 actual	.4679	$9989
2.	1972 income distribution, 1965 demographic composition	.4537	10453
3.	1965 income distribution, 1972 demographic composition	.4534	6226
4.	1965 actual	.4400	6503
	Posttransfer income		
5.	1972 actual	.4116	10916
6.	1972 income distribution, 1965 demographic composition	.4001	11383
7.	1965 income distribution, 1972 demographic composition	.4027	6716
8.	1965 actual	.3917	6992

interpreted in the same fashion. It yields parallel conclusions about the sources of increased posttransfer inequality during this period.

Effects of Transfers on the Income Distribution

Between 1965 and 1972, expenditures on public cash transfers rose from $37 billion to $80 billion.[12] Table 5 examines the impacts of the level and rapid growth of transfers in this period. In both years, transfers substantially reduced inequality and raised incomes for several demographic groups, but they had only a modest impact on the aggregate level and distribution of income.

In 1965 transfers reduced the Gini coefficient by 10.8 percent and raised average incomes by 7.9 percent.[13] However, these aggregate results obscure a wide variation in the effects among the twelve groups. Transfers slightly altered the level and distribution of income among families with young or prime-age male heads and among young unrelated individuals of either sex. They reduced inequality by about one-third and raised mean income by about 48 percent for families with aged male heads. For female-headed families of all ages, transfers decreased inequality by over 22 percent and raised incomes by 23 percent to 33 percent. For both male and female aged individuals, transfers doubled incomes while reducing inequality by about 45 percent. The large redistributive impacts for all categories of aged units are due to Social Security payments, which account for about one-half of all cash transfers.[14]

In 1972, the aggregate posttransfer Gini coefficient was 12.0 percent less than the pretransfer Gini, while the posttransfer mean income was 9.3 percent higher than the pretransfer level. Again the transfer system had a small impact on non-aged male-headed families and

TABLE 5: The Effect of Transfers in the Level and Distribution of Income

	1965		1972	
	1 Δ Gini* Coefficient	2 Δ Mean Income	3 Δ Gini Coefficient	4 Δ Mean Income
Families headed by:				
Young males	-1.7%	1.2%	-3.8%	2.8%
Prime-age males	-3.1	2.8	-4.2	3.8
Aged males	-32.6	47.9	-33.9	56.9
Young females	-24.4	25.1	-41.2	61.6
Prime-age females	-22.3	22.6	-23.9	24.0
Aged females	-24.2	32.8	-28.0	42.4
Individuals who are:				
Young males	-1.8	2.1	-3.7	5.2
Prime-age males	-8.4	5.4	-8.6	5.9
Aged males	-47.1	95.5	-45.3	103.7
Young females	-0.9	0.4	-3.4	2.6
Prime-age females	-10.7	7.6	-13.8	8.6
Aged females	-44.2	101.0	-44.9	113.3
Total population	-10.8%	7.9%	-12.0%	9.3%

*Changes are defined as [(Xpost - Xpre)/Xpre] · (100).

on young unrelated individuals, and larger impacts on the other demographic groups. Although transfers grew rapidly during this period, the 1972 reduction in aggregate inequality and increase in mean income were only slightly larger than these changes for 1965 (bottom line of Table 5).

Changes in the aggregate equalizing effect of transfers are partly determined by shifts in the demographic composition of households. This possibility is not treated in Table 5. However, Table 4 can be used to account for the impact of demographic change on the equalizing effect of the transfer system. Lines 2 and 6 of that table show that if the 1965 demographic composition had been constant during the period, but the 1972 pretransfer and posttransfer income distributions within each group had still been generated, then, in 1972, the aggregate posttransfer Gini coefficient (.4001) would have been 11.8 percent below the pretransfer Gini coefficient (.4537). The estimate resulting from this simple attempt to control for demographic variables does not differ appreciably from the observed 12.0 percent. Thus, most of the observed increase in the equalizing effect of transfers was due to changes in the level and distribution of transfer benefits. Only a small part of this change reflected shifts in the population toward household categories for which transfers have a greater than average impact.[15]

The equalizing effect of transfers in 1972 forms a pattern across the demographic groups that is very similar to the one observed in 1965.[16] The major exception occurs for families headed by young females, for whom transfers reduced inequality by 41 percent in 1972, compared to a reduction of 24 percent in the earlier year. Indeed, while the pretransfer Gini coefficient for this group rose 15 percent between 1965

and 1972 (Table 2), the posttransfer index declined by 11 percent (Table 3). The differential impact on young female heads is due to the sharp expansion in Aid to Families with Dependent Children.[17] Among ten of the eleven remaining household types, the reduction in inequality due to transfers is slightly greater in 1972 than in 1965 (columns 1 and 3 of Table 5). For aged male individuals, the equalizing effect of transfers diminished slightly, although transfers still reduced inequality by 45 percent. Given the absence of major structural changes in the transfer system, the rapid growth of transfers did not produce a significantly larger reduction in inequality in 1972 than in 1965.

IV. Summary

The three principal findings of this study are reviewed and qualified in this section.

1. The aggregate pretransfer and posttransfer degree of inequality increased between 1965 and 1972. While the Gini coefficient did increase during this period, it is inappropriate to extrapolate a secular trend from the experience of a seven-year period. There has been little change in the degree of inequality since the Census Bureau began publishing CPS data. The Gini coefficient of the posttransfer distribution for all families and unrelated individuals was .4150 in 1947 and .4163 in 1973.[18] There has been fluctuation around this fairly constant level. For example, the Gini coefficient was .4152 in 1960, reached a post-World War II high of .4241 in 1961, and attained a low of .3988 in 1968. An analysis of the 1947-1960 or the 1947-1973 period reveals no trend, while the 1961-1968 period shows a 6 percent decrease

in inequality, and the 1968-1973 period, a 4 percent increase. Obviously, attempts to extrapolate a trend on the basis of short time spans may yield inaccurate predictions.

2. About one-half of the rise in inequality can be accounted for by demographic change; the other half is due to economic forces that increased inequality for most of the demographic groups. Implicit in the decomposition of changes in inequality into a demographic and an economic component is the assumption that the two forces are independent. However, the structure of living units and the rate of family formation are affected by economic change. For example, a young male may move out of his parents' home because his real income has grown. However, the analysis in this paper will record an increase in the number of young male individuals, and label this demographic change. Economic forces, then, refer to changes in within-group inequality. In this example, the family's income will be lower after the son has moved out, changing the distribution of income among families. Such a change in inequality would be attributed to economic forces, whether the family's income had fallen due to unemployment, or, as in this case, because of a change in the structure of living units. The interrelationship of demographic and economic change blurs the distinction made in this paper. However, the measurement of this interrelationship remains an unresolved problem.

3. Government transfers significantly reduce inequality for several population subgroups, but have only a small impact on the aggregate degree of inequality. This impact increased slightly between 1965 and 1972. The effect of government transfers was derived by comparing the pretransfer and the posttransfer distributions of

income. Such a comparison assumes that both the level and distribution of transfer payments are unrelated to pretransfer incomes. However, unemployment compensation, public assistance, and other transfers are related to the pretransfer incomes of households. Conversely, the availability of transfers affects pretransfer income through its effect on labor supply (Cain and Watts, 1973) or on savings behavior.

The results of this study, although subject to several qualifications, do show that the use of aggregate data obscures the effect of both demographic change and government transfers on the level and distribution of income. As more micro data become available, it should be possible to investigate more completely both cyclical and secular aspects of inequality on a disaggregated basis.

NOTES

[1]An additional problem in the measurement of inequality is the time period over which income is measured. Longitudinal data on individual incomes are generally unavailable. However, Benus and Morgan (1975) were able to construct a Gini coefficient from data covering several years. They conclude "that for the population as a whole, the unit of analysis and the measure of income seem to have more effect on measures of inequality than the length of the accounting period" (p. 224).

[2]A "standard" family according to Kuznets contains a male head aged 25-64, a wife, and any dependent children.

[3]Benus and Morgan (1975) do use micro data.

[4]Because the frequency function of income generally rises to a mode and then declines, the true class mean is greater than the midpoint in the lower-income classes and lower than the midpoint in the higher classes. This results in an underestimate of the income for low-income classes, an overestimate for high-income classes, and an overestimate of the degree of inequality (Gastwirth, 1972, p. 312).

[5]The 1966 SEO contains information on 1965 incomes; the March 1973 CPS reports 1972 incomes. The definitions of income and reporting unit are identical in these two sources. Both sources neglect in-kind income and taxes and suffer from well-known underreporting problems (Budd, 1970).

[6]This yields the lower bound for estimates of the Gini coefficient (Gastwirth, 1972).

[7]Negative incomes were excluded. A Pareto tail was estimated to determine the mean income of the open-ended interval. The analysis was also carried out using Theil's index of inequality (Theil, 1972). Since the results obtained from both indices were similar, only the Gini coefficient is discussed in the text. The simple correlation between the pretransfer (posttransfer) Gini and Theil indices across the twelve demographic groups was .97 (.96) in both 1965 and 1972.

[8]Government cash transfers include Social Security, Railroad Retirement, all types of public assistance, unemployment insurance, workmen's compensation, government employee pensions, and veterans' benefits.

[9]The Census defines a family as "a group of two or more persons related by blood, marriage, or adoption and residing together"; and unrelated individuals as "persons 14 years old and over who are not living with any relatives." (U.S. Bureau of the Census, 1975, p. 166).

[10]The low-income population may receive a larger share of the aggregate income when inequality, as measured by the Gini coefficient, increases. This can occur when two Lorenz curves intersect. However, the Lorenz curves for 1965 and 1972 do not intersect. The share of the bottom 20 percent of the population fell from 1.4 percent to 1.0 percent of pretransfer income and from 4.0 percent to 3.8 percent of posttransfer income between 1965 and 1972. Conversely, the share of pretransfer (posttransfer) income obtained by the top fifth rose from 45.1 percent to 47.4 percent (42.9 percent to 44.7 percent) in this period.

[11]The two estimates represent the familiar index number problem. One estimate uses 1965 incomes as the base, the other, 1972 incomes. The two estimates, however, are very similar.

[12]Plotnick and Skidmore (1975), chapter 3.

[13]Posttransfer incomes in the census data are pretax incomes. If taxes had been netted out, the incomes of all groups could not have increased.

[14]Social Security and Railroad Retirement expenditures were $17.6 billion in 1965 and $40.4 billion in 1972 (Plotnick and Skidmore, 1975, chapter 3.

[15]Lines 3 and 7 of Table 4 reveal that, given the demographic changes that occurred, but holding constant the 1965 pretransfer and posttransfer income distributions within the twelve groups, transfers would have reduced the aggregate Gini index by 11.2 percent in 1972. This is comparable to the observed equalizing impact in 1965 of 10.8 percent.

[16]The simple correlation coefficient between the effects of the transfer system on inequality in the two years, columns 1 and 3 of Table 5, is .96; on income levels, columns 2 and 4, it is .97.

[17]Between 1965 and 1972 expenditures on AFDC increased from $1.7 billion to $6.6 billion (Plotnick and Skidmore, 1975).

[18]The Gini coefficients reported in this section were computed by the authors from data in the Current Population Reports (U.S. Bureau of the Census, 1975, Table 9). Since these Gini coefficients were computed from published data using the Census method, their magnitudes are not comparable to the other results presented in this paper.

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