

WEALTH AND THE DISTRIBUTION OF INCOME, CANADA 1969-70

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This paper explores the sensitivity of the size distribution of family income in Canada to alternative definitions of income. These alternative definitions examine both wealth generally in the form of an annuity equivalent, and home ownership in the form of imputed rent. An adjustment for family size differences is also made. The impact of these adjustments is assessed for average incomes, inequality, and the incidence of low income for different age groups. The adjustments do have significant effects that vary by age; in particular, the economic position of the elderly seems understated by the usual data. Also, methodological considerations, such as the direct use of micro data and the choice of inequality indicator are shown to be significant.

INTRODUCTION

The basic objective of this paper is to explore the sensitivity of the size distribution of family income to alternative definitions of income. The general premise is that nominal income, as conventionally measured, may not be a good indicator of "economic position" or "economic well-being". Based on this premise, a number of authors have suggested a range of adjustments in order to make the income measure more comprehensive.¹ The major focus here is on the joint distribution of income and wealth. Specifically, three main adjustments to the income distribution will be examined: adjustments for family size, the inclusion of imputed rent from owner-occupied housing, and the inclusion of the annuity equivalent of net worth. There are, of course, many other types of adjustments that would be relevant to the construction of a broader indicator of economic position but that will not be considered here.

The distribution of income, by its nature, is a very complex object. One approach that will be used to understand and discuss its features is disaggregation by age group. There is a substantial literature and body of evidence that suggests that age is an important factor.² A central issue is whether or not alternative definitions of income have differential impacts by age group. Another approach to the complexity of income distributions is to focus on a few of their basic characteristics, as indicated by selected statistics. The choice of such statistics is always arbitrary. In this paper, there are three main foci: average levels of income, the incidence of poverty, and the extent of inequality.

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¹See, for example, Taussig (1973) and the September 1973 issue of the *Annals of the American Academy of Social and Political Science*.

²See, for example, Atkinson (1971), Morgan (1965), and Taussig (1973). An earlier version of this paper, presented to the Canadian Economics Association meetings in June 1977, also provided disaggregations by geographic region.

DATA AND METHODOLOGY

The basic source of data is the 1970 Survey of Consumer Finance, the most recent survey to include questions on assets and indebtedness as well as demographic characteristics and income.³ The survey was conducted in May, 1970 so the income data apply to calendar 1969 while the wealth data are for May, 1970. The survey obtained completed questionnaires from 9,800 families and unattached individuals, with an overall response rate of 74.9 percent.⁴ A family unit in the survey is defined as an unattached individual or a group of individuals related by blood, marriage or adoption who share the same dwelling unit. Family units living in institutions, military bases, Indian Reservations, and the Northern Territories were excluded from the sample. Nominal income includes wages and salaries, net income from self-employment (for example, cash receipts less operating expenses and depreciation in the case of farmers), bond interest, dividends, transfer payments, and pensions in pay. Income in kind and employer contributions to pension plans were not included in nominal income. The definition of net worth includes houses and other real estate, shares, bonds, cash on hand, checking and savings accounts, equity in business and professional interests, mortgages outstanding, and consumer debt. However, durables other than cars, equities in the form of pension and/or insurance rights, and "human capital" are not included. There are multi-millionaires in the sample.

The sample design was quite complex, but it did not stratify by any proxy for wealth. As a result, there are significant problems of sampling variability especially in the upper tail of the wealth distribution.⁵ There also appears to be under-reporting.⁶ No attempts at compensating for these problems have been made.

The basic methodology that has been employed is micro-analytic. The raw micro-data constitute the starting point for the analysis. Computer programs were written to manipulate the income definition at the level of the individual family unit. The results were then aggregated by special purpose tabulation and statistical routines. These programs were developed by the author. It should be noted that because of the confidentiality requirements of the Statistics Act, the programs were run at Statistics Canada by their own personnel. At no time were the contents of individual records released.

The use of micro-analytic methodology in economics is not as widespread as it could be. However, reliance on published tables is not only unnecessary; it also yields potentially misleading results. This analysis illustrates one such case. The problem generally is that within the partially disaggregated groups that are frequently published, there is often at least as much variability in particular

³Statistics Canada, *Incomes, Assets and Indebtedness of Families in Canada 1969*, #13-547 Occasional.

⁴This sample includes 212 family units who did not complete the question on net equity in business and professional interests. A zero value has been assumed in these cases; and the item has been included in the definition of net worth, unlike most tables in #13-547. Also 179 farm families had their houses (market value and mortgage outstanding—see page 14 in #13-547) included only as part of their net equity in business and professional interests. Most of the published tables in #13-547 exclude these family units. The term family unit applies to both families and unattached individuals. Statistics Canada's economic family is the definition of the family being used.

⁵See Wolfson (1977), Appendix A to Chapter VI.

⁶See Podoluk and Emmerson (1974).

attributes as for the entire population. For example, the dispersion in income or wealth ownership within age groups (or tax liability within income groups) may be greater than that for all age groups combined, so that an analysis confined to average income or wealth levels by age would overlook much that is of interest.

INCOME DEFINITIONS EMPLOYED

Two main kinds of adjustments to nominal income have been examined.⁷ Usually, income distributions are based on family incomes by family. However, it is generally agreed that two family units with the same income but of different size are not equally well off. An obvious alternative would be to examine per-capita incomes. But no account would then be taken of the “economies of scale” that accrue to family as opposed to individual living. An intermediate approach is to use some sort of “adult equivalent” units in constructing the distribution. One rough but easy way in which this can be done is to use the welfare ratio, the first type of adjustment that will be examined.

The welfare ratio is simply the ratio of a family’s income to its “poverty line”. Poverty is, of course, a broader concept than that captured by income alone. But Statistics Canada has published a series of “low income cut-offs” that serve as a rough proxy. They vary by family size and the size of the area of residence.⁸ In this paper, only the family size factor has been used. Thus, a family’s poverty line is the low income cut-off corresponding to its family size. The cut-offs for 1969 that have been used are displayed below.

Family Size	Cut-off	Family Size	Cut-off
	\$		\$
1	2,363	5	5,812
2	3,426	6	6,380
3	4,372	7 plus	6,995
4	5,199		

A family of size four with an income of \$10,398 would have a welfare ratio of 2.00. Alternatively, a family of four has the equivalent of 2.20 unattached individuals or “adult equivalents”. Distributions of this welfare ratio are tabulated in exactly the same way as distributions of dollar income.⁹

The welfare ratio, while it takes account of family size, leaves open the question of the income concept—the numerator of the ratio. Three alternatives for the numerator are considered in this paper. The first is the starting point, nominal income. The second definition adds to this a rough measure of imputed rent. Imputed rent is the net value of the services in kind provided by home

⁷Using the terminology of Love and Wolfson (1976), one kind of adjustment is to the income concept while the other is to the ordering principle. Examples of different ordering principles include family income per family, individuals by per capita family income, and families by per adult equivalent income.

⁸Statistics Canada, Research and Analysis Section, Consumer Income and Expenditure Division; *Revision of Low Income Cut-Offs*; December 17, 1973. Note that these cut-offs were estimated using nominal income. Therefore their use with other definitions of income is not strictly in accord with their intended use.

⁹Note that the welfare ratio by equivalent adult or per capita could have been used instead of the welfare ratio by family as the ordering principle.

ownership. Since the purpose of this paper is not an in depth analysis of the distribution of imputed rent, a simple measure has been employed—8 percent of net equity in owned houses.

The third definition of income attempts to capture the benefits of wealth ownership generally. Since wealth and income are incommensurable (a stock and a flow), any such attempt is necessarily heroic. The approach that will be employed is that of the annuity equivalent, used by Weisbrod and Hansen (1968) and Taussig (1973). At any point in time, a family could in principle liquidate all its net worth and purchase an annuity for the remaining lifetime of the family's head and spouse.¹⁰ The value of the annuity income (dollars per year) can then be used as a commensurable indicator of the value of the family's wealth. In order to avoid double counting, investment income must first be subtracted from nominal income before the annuity income equivalent of net worth is added. This income equivalent annuity will be abbreviated ANNEQ.

The value of the annuity that can be purchased with a given amount of net worth is determined by the interest rate and the purchaser's life expectancy. The higher the interest rate or the shorter one's life expectancy, the higher the value of the annuity. The formula that has been used is

$$f(n, r) = r / (1 - (1 + r)^{-n})$$

where

n = life expectancy

r = interest rate

$f(n, r)$ = income stream that can be purchased for \$1

Following Weisbrod and Hansen (1968), two interest rates have been used, 4 percent and 10 percent.¹¹

The obvious implication of this formula is that older families will be able to purchase larger annuities than younger families owning the same wealth. This characteristic of the ANNEQ measure has given rise to the criticism (Projector and Weiss (1969)) that it ignores the prospective earnings of younger families. It also takes no account of the fact that some elderly families may have had to make sacrifices in order to accumulate the wealth that they currently own. These points should be born in mind when interpreting any of the results presented below.¹²

¹⁰Actually, the assumption is that for families with two or more members, the full value of the annuity is paid until one spouse dies. Then the surviving spouse receives two thirds of the original value of the annuity. This assumption is the one used by Weisbrod and Hansen (1968) and Taussig (1973).

¹¹Life expectancy data are from *Life Tables for Canada 1970-1972*, Statistics Canada # 84-532. Note that using mean life expectancy by age and sex is not equivalent to employing the distribution of life expectancies within age and sex groups. Insurance companies use this more sophisticated approach, though it is not expected that the results of the two methods would differ significantly. Also, mortality rates are known to vary significantly with socio-economic status (see Shorrocks (1975)). If rich people live longer, then the use of undifferentiated mortality rates overstates the ANNEQ income of the rich—though of course it also takes no account of the benefits of increased longevity.

¹²In principle, it might be better to resolve the problem of the incommensurability of wealth and income by considering instead the distribution of the present discounted value of lifetime income. However, this approach is not practical with available data; and it would still beg a number of questions, including the variability of income streams over individuals' lifetimes, the problem of

GENERAL CHARACTERISTICS OF THE SAMPLE

Table 1 presents some of the basic features of the distribution of income and wealth as estimated from the Survey of Consumer Finance for 1969–70, disaggregated by age group. It should be noted for the discussion that follows that life-cycle conclusions cannot be drawn from cross-section data alone. Thus, any age related patterns that emerge are only suggestive of the patterns of particular economic variates over individuals' and families' lifetimes.

TABLE 1
SELECTED ITEMS BY AGE, 1969–70
(all dollar items in \$000's)

Age Group		<25	25–34	35–44	45–54	55–64	65–74	≥75	All
Sample size		795	2005	2023	1786	1485	1083	623	9800
Population (000's)		599	1330	1309	1154	944	714	402	6450
Mean family size		1.72	3.26	4.50	3.87	2.64	1.88	1.65	3.13
Nominal income:	medium	4.28	7.79	8.55	8.36	6.56	3.17	2.54	6.76
	mean	4.81	8.21	9.55	9.62	7.95	4.67	3.37	7.69
Welfare ratio:	median	1.47	1.76	1.65	1.80	1.74	1.00	0.80	1.58
	mean	1.53	1.99	1.96	2.07	2.05	1.40	1.07	1.84
House equity:	median	0.0	0.0	7.1	8.2	7.5	6.1	5.0	2.2
	mean	0.5	3.9	9.5	10.6	10.4	9.3	8.2	7.7
Net worth:	median	0.2	2.0	10.2	13.1	14.7	13.0	10.3	7.1
	mean:	1.3	8.6	17.9	26.5	26.6	22.3	18.3	17.7
Mean ANNEQ at 4%		0.1	0.4	0.9	1.6	1.9	2.2	3.0	1.3
Mean ANNEQ at 10%		0.1	0.9	1.8	2.8	3.1	3.1	3.7	2.1

Source: Statistics Canada, 1970 SCF, special tabulations by the author.

However, given this caveat, a clear age related pattern is evident in average family size, income, house equity, and net worth. Average income rises (in cross-section) until pre-retirement ages, drops somewhat in the 55–64 age group, and then drops more sharply in the retirement years. (In longitudinal or life-cycle terms, income probably does not drop as much after age 54. The incomes of the 55–64 cohort in 1970 should be compared with the incomes of the 45–54 cohort in 1960 to obtain the life-cycle perspective.) The mean welfare ratio displays the same age profile as income, but the “hump” is not as pronounced. This is to be expected since average family size follows a similar pattern with age as does income.

Average house equity rises with age but does not drop off as much as income or even net worth after retirement. The implication is that while the elderly *may* defining lifetime *family* income, and the problem of comparisons across cohorts in an unsteadily growing economy. Another alternative would be that of not bothering about the problem of incommensurability. Instead, judgements would be made based directly on bivariate (income and wealth) or multivariate (income, wealth, age, region, . . .) distributions. This approach is explored in a recent article by Kolm (1977). Unfortunately, the particular theoretical results obtained by Kolm rely on a very strong assumption of independence that would effectively obscure the results regarding the joint distribution of income and wealth presented here.

dis-save somewhat in retirement, this dis-saving does not take the form of liquidating the equity in their owned houses. Houses account for approximately 40 percent of Canadian families' net worth, and this proportion is fairly stable across all age groups.

As one would expect from the formula used to compute the annuity equivalent of net worth (ANNEQ), its average value rises with age even though average net worth begins to drop off. The factor of reduced life expectancy for the elderly outweighs any dis-saving they may have done.¹³

Table 1 also presents median values for income, the welfare ratio, house equity, and net worth. The median is statistically a much more robust indicator of central tendency than the mean, particularly for highly skew (or "long and fat tailed") distributions. The extent of skewness is also roughly indicated by the difference between the median and the mean. If this difference is large, the distribution likely has a long upper tail and the possibilities for sampling error in estimates of the mean (and any statistics based upon it) are likely to be large. As Table 1 indicates, the difference between the median and the mean is particularly large for net worth, as compared to the differences for income and the welfare ratio. Ownership of houses is not as skew as the ownership of net worth using this rough indicator. The general conclusion is that wealth is probably significantly more unequally distributed than income, and hence that mean wealth is probably subject to greater sampling variability.

EFFECTS ON AVERAGE INCOME OF THE INCLUSION OF WEALTH

Tables 2 and 3 illustrate the impact on average income by age of broadening the definition of income to take some account of the ownership of wealth. Both mean and median income are examined, both in nominal terms and in terms of the welfare ratio. The inclusion of imputed rent, thereby taking account of the income generating capacity of 40 percent of a typical family's wealth, raises average family income in Canada by almost eight percent. As one might expect, however, this effect is more pronounced in the older age groups, and almost negligible under age 35. For those 65 or over, the effect is to raise mean income by over 15 percent.

TABLE 2
MEAN INCOME BY AGE AND INCOME DEFINITION 1969-70
(all dollar items in \$000's)

Age group	<25	25-34	35-44	45-54	55-64	65-74	≥75	All
Nominal income	4.81	8.21	9.55	9.62	7.95	4.67	3.37	7.69
+Imputed rent	4.85	8.52	10.31	10.46	8.77	5.42	4.02	8.30
+ANNEQ at 4%	4.84	8.54	10.23	10.81	9.31	6.26	5.82	8.64
+ANNEQ at 10%	4.91	9.00	11.15	12.08	10.50	7.18	6.54	9.47
Welfare ratio	1.53	1.99	1.96	2.07	2.05	1.40	1.07	1.84
+Imputed rent	1.54	2.06	2.10	2.25	2.27	1.63	1.29	1.99
+ANNEQ at 4%	1.54	2.07	2.09	2.34	2.40	1.88	1.88	2.09
+ANNEQ at 10%	1.56	2.17	2.28	2.62	2.71	2.16	2.12	2.29

Source: Statistics Canada, 1970 SCF, special tabulations by the author.

¹³Note that the elderly on average are not dis-savers. See Wolfson (1977), Section VI.C.

TABLE 3
 MEDIAN INCOME BY AGE AND INCOME DEFINITION 1969-70
 (all dollar items in \$000's)

Age group	<25	25-34	35-44	45-54	55-64	65-74	≥75	All
Nominal income	4.28	7.79	8.55	8.36	6.56	3.17	2.54	6.76
+Imputed rent	4.32	8.04	9.28	9.23	7.32	4.00	3.05	7.26
+ANNEQ at 4%	4.34	7.97	9.12	9.31	7.49	4.45	4.13	7.45
+ANNEQ at 10%	4.41	8.30	9.72	10.20	8.44	5.08	4.60	8.00
Welfare ratio	1.47	1.76	1.65	1.80	1.74	1.00	0.80	1.58
+Imputed rent	1.47	1.84	1.81	1.98	1.97	1.26	1.02	1.71
+ANNEQ at 4%	1.49	1.82	1.77	2.10	2.02	1.42	1.43	1.76
+ANNEQ at 10%	1.51	1.90	1.89	2.19	2.24	1.62	1.58	1.89

Source: Statistics Canada, 1970 SCF, special tabulations by the author.

But the incomes of the elderly would on average still be less than half those of the prime age groups (25-54).

Turning to ANNEQ as a more general adjustment for wealth ownership, its inclusion in income would raise average income by ten to twenty-five percent. Again, the effect is much more pronounced among the elderly, amounting to about a sixty percent increase in average income.

All the numeric values just cited are for mean nominal income. These effects are generally more pronounced when the welfare ratio and/or the median are examined. The general conclusion must be that taking some account of wealth significantly affects the economic position of the elderly.

INCIDENCE OF LOW INCOME

Table 4 presents the effects of the alternative income definitions on the incidence of low income. This incidence measure is the proportion of all family units whose incomes are below the Statistics Canada low income cut-offs cited above. It should be noted that this exercise is *not* one of the intended uses of these low income cut-offs.¹⁴ However, it should suffice for a general indication of the extent of the differential reduction of measured "low income" that would result from a broader definition of income.

TABLE 4
 INCIDENCE OF LOW INCOME (%) BY AGE AND INCOME DEFINITION 1969-70

Age group	<25	25-34	35-44	45-54	55-64	65-74	≥75	All
Income definition:								
Nominal	33.5	17.1	19.6	21.7	25.5	50.2	66.9	28.0
+Imputed rent	32.9	16.1	16.9	18.7	21.6	37.0	48.6	23.4
+ANNEQ at 4%	32.9	16.4	16.9	17.4	19.8	30.7	33.5	21.3
+ANNEQ at 10%	32.9	15.1	14.0	15.2	17.2	26.3	30.2	19.0

Source: Statistics Canada, 1970 SCF, special tabulations by the author.

¹⁴Recall footnote 8.

In terms of nominal income, the incidence of low income is concentrated among the elderly and the young. Overall, the inclusion of imputed rent would reduce measured low income by about 16 percent while the inclusion of wealth generally in the form of ANNEQ would reduce it by 24 to 32 percent. These effects are strongest for older age groups. In general, the picture of the distribution of the poor in Canada would change significantly if wealth in some form were included in the determination of the incidence of low income, particularly for the elderly.

One of the main caveats to these results is the fact that the original determination of the low income cut-offs by Statistics Canada took no account of variations in expenditure patterns by age. Had they done so, the picture could be different.¹⁵

INEQUALITY

The measurement of economic inequality is the subject of considerable debate. The basic problem is that the choice of any particular statistical measure is to some extent arbitrary. While there are a few conditions or axioms that are generally agreed to be necessary for a "good" inequality measure (see Love and Wolfson (1976)), these conditions are generally insufficient to reduce the number of acceptable inequality measures to only one. One of the fundamental ways in which various "acceptable" inequality measures differ is in their sensitivity to inequality at different points in the income spectrum. Some measures tend to be more sensitive near the modal income, others in the tails of the distribution. Other inequality indicators¹⁶ are sensitive only to a specific range of the income spectrum. In this paper, four inequality indicators have been employed. Their choice is admittedly arbitrary. But it has been motivated by the desire to capture, in a handful of statistics, the main features of the changes in the distribution of income brought about by changes in the definition of income.

The four indicators that have been used are the well known Gini coefficient, the (squared) coefficient of variation (CV), and the shares of total income accruing to the top 5 percent and bottom 20 percent of all family units. The Gini is generally not very sensitive to (i.e. its numeric value does not change very much with) changes in the distribution, but it is relatively more sensitive to changes around the modal income. The CV tends to be most sensitive in the tails of the distribution; and since income and wealth distributions are characteristically positively skewed, it is most sensitive to changes in the upper tail. The shares of the top 5 percent and bottom 20 percent are clearly most sensitive to changes in the upper and lower tails of the distribution, respectively. An increase in inequality corresponds to an increase in the value of the first three indicators, and a decrease in the fourth.

¹⁵See Table 21, page 84 in Statistics Canada #62-535. Also note that elderly persons living with their children may not be shown as elderly in the tables because of the "economic family" definition.

¹⁶The term inequality measure is used here to refer to those statistics that are sensitive to changes in all parts of a distribution, though their relative sensitivity may vary. Equivalently, any inequality indicator that satisfies strictly the Pigou-Dalton Condition of Transfers is an inequality measure. Quantile shares do not satisfy this condition strictly so they are referred to by the more general category of inequality indicators. They do not violate it. Statistics based on quantile cut-offs, however, are not even inequality indicators according to this definition because they may violate the Pigou-Dalton condition.

TABLE 5
INEQUALITY INDICATORS BY AGE AND INCOME DEFINITION 1969-70

Age group	<25	25-34	35-44	45-54	55-64	65-74	≥75	All ages
Gini coefficient:								
Nominal income	0.38	0.28	0.31	0.37	0.42	0.44	0.38	0.39
Welfare ratio	0.35	0.31	0.34	0.36	0.39	0.40	0.32	0.37
+Imputed rent	0.35	0.31	0.33	0.35	0.37	0.37	0.32	0.36
+ANNEQ at 4%	0.35	0.32	0.34	0.36	0.38	0.40	0.39	0.36
+ANNEQ at 10%	0.35	0.32	0.34	0.38	0.39	0.41	0.41	0.37
Coefficient of variation:								
Nominal income	0.48	0.28	0.44	0.68	0.76	0.95	0.66	0.65
Welfare ratio	0.39	0.35	0.49	0.58	0.63	0.83	0.52	0.56
+Imputed rent	0.40	0.35	0.47	0.54	0.58	0.67	0.45	0.52
+ANNEQ at 4%	0.39	0.39	0.48	0.73	1.00	0.80	0.62	0.64
+ANNEQ at 10%	0.40	0.51	0.57	0.99	0.94	0.90	0.67	0.79
Share of top 5%:								
Nominal income	13.5	11.9	14.6	16.5	18.0	20.8	18.1	16.3
Welfare ratio	12.3	13.2	16.1	16.5	17.4	18.9	16.7	16.1
+Imputed rent	12.3	13.2	15.8	16.1	16.7	17.7	15.2	15.8
+ANNEQ at 4%	12.3	13.8	16.1	17.4	17.8	19.8	17.5	16.8
+ANNEQ at 10%	12.4	14.7	16.9	19.1	19.1	20.7	18.1	18.0
Share of bottom 20%:								
Nominal income	3.5	7.3	7.0	5.0	3.7	5.2	7.2	4.3
Welfare ratio	4.3	6.8	6.5	5.5	4.6	6.6	9.4	5.5
+Imputed rent	4.1	6.9	6.1	5.7	5.0	6.6	8.5	5.8
+ANNEQ at 4%	4.2	6.9	6.9	5.7	5.0	6.2	6.6	5.9
+ANNEQ at 10%	4.2	6.8	6.8	5.6	4.9	5.7	6.0	5.6

Source: Statistics Canada, 1970 SCF, special tabulations by the author.

Table 5 displays the values of these four inequality indicators for five income definitions by age group.¹⁷ The first income definition is the conventional one, nominal income. The second definition then incorporates the family size adjustment by using the welfare ratio of nominal income. The three subsequent income definitions continue to use the welfare ratio but then add imputed rent and finally ANNEQ for two interest rate assumptions.

The fact of there being substantial inequality in the distribution of nominal income is illustrated by the statistics showing that the top 5 percent of all family units receive almost four times as much income as the bottom 20 percent. However, when family size differences have been taken into account by using the welfare ratio for nominal income, the top 5 percent receive about three times as much income as the bottom 20 percent. The generally lower levels of sensitivity of the Gini coefficient are illustrated by the fact that it drops by about 5 percent while the CV drops by almost 15 percent with the shift to the welfare ratio.

Inequality, as measured by the Gini and CV, tends to increase with age with the exception of the family units whose heads are under 25 or 75 or over.

¹⁷Note that the four inequality indicators used, for all groups combined, are not simply some weighted average of the within group values. In particular, the Gini coefficient is not decomposable into within and between group inequality components. See Love and Wolfson (1976).

However, this increase is muted somewhat by the shift to the welfare ratio of nominal income. Presumably, one reason is that the dispersion of family sizes also tends to increase with age.

The inclusion of imputed rent in income (using the welfare ratio as well) reduces inequality in virtually all cases (age and inequality indicator). This result is somewhat striking because the inequality in the distribution of equity in owned house is significantly higher than that for income.¹⁸ The explanation must lie in the joint distribution of income and home ownership. For example, rural households are much more likely to own their own homes even though their incomes tend to be lower when compared to households residing in metropolitan areas.¹⁹ There are, as a result, some groups of households where home ownership tends to offset low nominal income, with the net effect that the inclusion of imputed rent in the income definition tends to be equalizing.

The effects on inequality as measured by the Gini coefficient of the inclusion of the annuity equivalent of net worth in income are not dramatic. Using the welfare ratio for all groups combined, the Gini falls by about two percent when a four percent interest rate is used while it increases by about two percent with a ten percent interest rate. These effects are also somewhat surprising when inequality in the distribution of net worth by itself is considered: the Gini is 0.72 and the CV is 4.2 for all family units.

These results are also in quite sharp contrast with those of Weisbrod and Hansen (1968) where the Gini increased by 13.5 percent and 27.0 percent for interest rates of 4 percent and 10 percent respectively. The obvious explanation for this discrepancy in results lies in the methodology employed.²⁰ Weisbrod and Hansen relied on published figures for a number of income classes. Median net worth by income range and age group was used to compute ANNEQ. As a result, all variability within age-income groups was lost. Taussig (1973), on the other hand, employing a micro-analytic methodology similar to the one used here obtained similar results for the Gini,²¹ namely very small changes.

However, as Table 5 shows, the effects of the inclusion of ANNEQ are more substantial for the CV and share of the top 5 percent. For the CV, the increase in inequality that results from the inclusion of ANNEQ in the income definition is 15 percent and 41 percent for the two interest rates. The corresponding (relative) increases in the share of the top 5 percent are 4 percent and 12 percent. Both of these pairs of changes are significantly greater than those observed for the Gini coefficient.

Turning finally to the share of the bottom 20 percent, the overall effect of the inclusion of ANNEQ is quite weak. In fact it is slightly equalizing insofar as it

¹⁸The Gini coefficient for equity in owned house is 0.672 compared to 0.385 for nominal income. The corresponding figures for the CV are 2.079 and 0.650.

¹⁹86.9 percent of rural households lived in owned dwellings in May 1968. Their average household incomes in 1967 were \$5,203. The corresponding figures for households residing in metropolitan areas were 53.6 percent and \$8,019. See Statistics Canada, *Household Facilities by Income and Other Characteristics 1968*, #15-540, Table 4A.

²⁰Weisbrod and Hansen (1968) note that their results might have been different had the micro-data tape been available at the time.

²¹The following table represents our results for the Gini coefficient and those of Taussig and Weisbrod and Hansen in as comparable a form as is possible.

results in an increase in the share of total income accruing to the poorest quintile. For all age groups except those 75 or over, the effect is negligible.

That the four measures presented in the tables respond differently to the change in income definition serves to emphasize the importance, in any discussion of inequality, of employing more than one measure. In particular, the use of the Gini by itself should be avoided. Furthermore, it is very important that the measures be chosen carefully. Taussig correctly makes this point. Unfortunately his particular choice of inequality indicators does not capture adequately changes in the upper tail of the distribution.²² As a result, none of Taussig's inequality indicators show relatively large increases. The general conclusion, then, is that the disequalizing effects of the inclusion of ANNEQ are most pronounced in the upper tail of the income distribution. Within age groups, there is no clear pattern to the relative changes in the inequality indicators.

CONCLUSIONS

The general conclusion that emerges from this statistical analysis is that the joint distribution of income and wealth in Canada is a complex object. It is not simply the case that high income families have large amounts of net worth, with the opposite for low income families. To some extent, and particularly for home ownership, there may be a negative correlation between income and wealth. The extent of any correlation also varies across age groups. Furthermore, the statistical picture that emerges depends critically on the methodology employed. It is clearly insufficient to do anything other than micro-unit analysis. Results based even on partially aggregated data are very likely to be misleading. The choice of specific inequality indicators is also of great importance. While any choice will to some extent be arbitrary, it can still be informed by the requirement that each of the main ranges of the income distribution (upper, middle, and lower) be covered by at least one "acceptable" indicator. To summarize, income concept,

Age	Weisbrod and Hansen			Taussig		Wolfson		
	Nominal Income	Plus ANNEQ at		Nominal After Tax	Plus ANNEQ at 6%	Nominal Income	Plus ANNEQ at	
		4%	10%				4%	10%
<25	0.31	0.34	0.34	{ 0.318	0.318	0.380	0.380	0.383
25-34				{ 0.261	0.269	0.279	0.284	0.296
35-44	0.34	0.43	0.43	{ 0.282	0.293	0.310	0.308	0.319
45-54				{ 0.322	0.324	0.368	0.366	0.381
55-64	0.39	0.50	0.50	0.389	0.392	0.415	0.412	0.422
65-74	0.45	0.61	0.61	0.451	0.454	{ 0.440	0.435	0.447
>75						{ 0.381	0.418	0.432
ALL	0.37	0.42	0.47	0.361	0.360	0.385	0.378	0.390

²²In fact using the definition of footnote 16 above, the Gini is the only statistic used by Taussig that is an inequality indicator. For example, neither the variance of logarithms, the "normalized interquartile range", or the "nonparametric measure of skewness" used by Taussig satisfy the Pigou-Dalton condition.

methodology, and measures all matter for the picture of the distribution of economic well-being that emerges from any statistical analysis.

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