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AN INCOME-NET WORTH APPROACH TO MEASURING ECONOMIC WELFARE

By BURTON A. WEISBROD AND W. LEE HANSEN*

Economists and public policy-makers alike have long been concerned with the relative and absolute economic welfare of various segments of the population. This interest reflects an underlying concern both about the equity of the existing distribution and about our ability to explain and forecast more effectively the behavior of producers and consumers.[1] But given the many possible dimensions of a comprehensive measure of economic welfare, the single-dimensional, money-income measure so commonly used leaves much to be desired.

The concern of this paper is with the development of an approach for measuring current economic welfare which is operationally feasible and broader in scope than the traditional money-income measure. The measure proposed is based on a combination of current income and current net worth (assets minus liabilities). These are made commensurable by converting net worth into an annuity value, which is added to current income. While this proposed measure stops well short of an "ideal" measure, we show that even this change leads to policy prescriptions rather different from those generated by the current income measure of economic welfare.

I. The Measure

The proposed measure rests on the assumption that current income and current net worth are both important determinants—although not the sole determinants—of the "economic position" of a consumer unit. A unit's economic well-being or economic position should be thought of as a function of the flow of services over which it has command. This flow depends importantly on the consumer unit's current income and also on the services it receives from its assets, net of liabilities.[2]

It is well known that the distribution of income and the distribution

[1] There is a considerable literature on the measurement and extent of inequality in the size distribution of income. For a review of some of this work as well as for useful bibliographic references, see Irving B. Kravis [5]; and T. Paul Schultz [12].

[2] Of course, expected future income or "permanent" income is also relevant, particularly insofar as it may influence current access to capital markets. Although in our empirical work below we disregard expected future income, this variable certainly deserves further attention.

of net worth differ significantly.[3] Were it not for these differences—if the relative position of the various consumer units were more nearly identical in the two distributions—then it would be less important to attempt to integrate the two distributions. Such an integration would still be useful, however, if we wished to apply an absolute standard for determining the level of economic position, e.g., "affluence" or "poverty."

Although data on income and net worth are frequently available, the two types of information have not been combined, presumably because income is a flow while net worth is a stock. The procedure we set forth involves converting net worth into an income flow by recognizing that it is translatable mathematically into an annuity.[4]

For any given consumer unit—individual, family or household—we propose measuring its "economic position," Y^*, in time period t, as the sum of (1) its current annual income (the precise measure of income, which is net of yield on net worth, will be specified later), Y_t, and (2) the annual lifetime annuity value of its current net worth, expressed as $NW_t \cdot A_n$, where A_n is the value of an n year annuity whose present value is \$1.[5]

$$(1) \qquad\qquad Y_t^* \equiv Y_t + NW_t \cdot A_n.$$

Y^*_t is, thus, the income obtainable in period t if the unit's net worth were converted so as to yield a lifetime flow.

The annuity value, $NW_t \cdot A_n$, is a function of the amount of net worth, NW_t, the life expectancy of the consumer unit, as denoted by n, and the rate of interest, r. Thus, for any given interest rate, the greater the net worth of the unit, and the shorter its life expectancy, the greater will be the annual annuity, and therefore the greater will be the difference between Y^*_t and Y_t. This suggests that the distribution of economic position by age will differ significantly depending on whether the combined income-net worth measure or the current income measure is used. In particular, since older people have higher ratios of net worth to current money income, as well as shorter life expectancies, their economic position will be most affected by the consideration of net worth.

In proposing our measure we are not implying either that people generally *do* purchase annuities with any or all of their net worth, that

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[3] See Dorothy S. Projector and Gertrude S. Weiss [11]; and Harold F. Lydall and J. B. Lansing [7].

[4] The authors used this approach in examining the relevance of assets to the definition of "poverty," in an unpublished memo (August, 1964) while staff members for the Council of Economic Advisers. The approach has also been used by Janet Murray [9]. Also see Projector and Weiss [11] for a somewhat similar approach.

[5]
$$\left(A_n = \frac{r}{1 - (1 + r)^{-n}} \right).$$

they necessarily *should* do so, or that they *can* do so. The problem of making income and net worth commensurable is conceptually independent of the practical possibilities for converting net worth into an annuity. For the fact is that, if our method of combining income and net worth is regarded as unsatisfactory—on the grounds that actual conversion is either difficult or undesirable—some other method is needed for combining them. It is hardly satisfactory to disregard net worth, and any measure of economic position which considers both necessarily implies some tradeoff between them.[6]

Before we turn to several applications of the income-net worth measure, it is useful to consider alternative periods over which net worth might be annuitized. At one extreme, net worth could be annuitized over an infinite period. Economic position would then be measured solely by current money income, since the annuity would consist entirely of interest, and that would be included in current money income. Thus, in effect,

$$(2) \qquad\qquad Y_t^* \equiv Y_t.$$

At the other extreme, economic position might be measured under the assumption that net worth is to be annuitized entirely during the current period;[7] this implies a measure of economic position:

$$(3) \qquad\qquad Y_t^* \equiv Y_t + NW_t,$$

where Y_t should be interpreted as net of the yield from net worth, since this yield would be lost if net worth were depleted in the current period. The alternative which we have used involves the assumption that net worth is to be annuitized over the expected lifetime of the consumer unit.[8] This decision, while arbitrary, is consistent with the spirit of much recent empirical research that suggests that saving (net worth accumulation) is in large part motivated by a desire to smooth out patterns of

[6] With regard to the practical aspects of conversion, there are some interesting issues which, however, are outside the bounds of this paper. For example, consider the net worth of older people, in the form of housing. They frequently prefer to continue occupying homes rather than relocating in smaller quarters more appropriate to their reduced family size; and although they may not be opposed to the idea of converting their homes into annuities by selling them and leasing them back, the market for such transactions seems quite undeveloped. We can only speculate as to why this sort of arrangement is so unusual. This market may have been simply overlooked by financial institutions. Alternatively, there may be no real demand for conversversion of home equity into an annuity. In addition, it does seem that commercial annuities have paid very conservative rates of interest, and thus have been rather unattractive. Clearly, additional research into the operation of annuity markets is in order.

[7] This case is discussed by Martin David [3].

[8] There are still other alternatives. One is to assume that net worth is annuitized over some arbitrarily specified time period, such as the maximum time period consistent with raising Y^*_t by some specified level. For an example of this approach, see Projector and Weiss [11].

normal lifetime consumption and to build up reserves to take care of unanticipated needs arising from, for example, medical expenditures [4] [6].

A decision to annuitize all of a unit's net worth over its lifetime, or indeed over any shorter period, implies that no net worth will remain at the time of death of the unit. But if a portion of net worth should be regarded as being held in trust as an estate for the survivors or for others, then only the remaining portion of net worth should properly be annuitized.[9] In any case, a decision regarding the treatment of estates should be recognized as involving both a factual question of the extent to which people *do* save for estate purposes,[10] and a social value judgment regarding the desirability of intergenerational wealth transfers (at death and at other times)—that is, whether people *ought* to save for estate purposes, and how much they ought to save [4]. These issues clearly deserve more attention.

In the empirical work that follows we shall arbitrarily base our calculations on the assumption of lifetime annuitization of net worth with no estate exclusion. The approach presented is general enough, however, to embrace alternative assumptions regarding the period of annuitization and size of estate, and, indeed, whether all components of net worth should be included. When the phrase "income-net worth" is used in the remainder of this paper it refers to Y^*_t in expression 1 above, with net worth being annuitized over the consumer unit's expected lifetime.

II. Applications and Implications

Uses for the income-net worth measure of economic position are numerous, ranging from reassessment of the extent of economic inequality to use in predicting consumer behavior. In this section we focus, first, on the extent of economic inequality as indicated by the combined income-net worth measure of economic position for families, then touch upon the implications of the findings for government antipoverty policy and for the definition of tax progressivity and regressivity, and, finally, venture a comment on the usefulness of the measure for the prediction of consumer expenditure behavior.

The basic sources of data for our income-net worth estimates of eco-

[9] If an estate of size E is desired at the time of "expected" death n years hence, then with an interest rate r, the amount of net worth available for conversion to an annuity at time t will be

$$NW_t - \frac{E}{(1+r)^n}.$$

If, alternatively, it is desired to guarantee an estate no smaller than size E regardless of when death occurs, then the amount of net worth available for conversion to an annuity will be smaller, namely, $NW_t - E$.

[10] The fact that intergenerational transfers are so frequently made via the estate route rather than by transfers before death may be less an indication of people's desires to pass on their wealth than it is a reflection of their inability to anticipate the time of their death.

nomic position are the *Survey of Financial Characteristics of Consumers* (SFCC) and the *Current Population Survey* (CPS), for 1962. The SFCC provides data on families by age of head, income, and net worth[11]; the CPS provides data on family income by age of head, broken down into finer income classes. In view of the greater detail on income provided by the CPS data, and its larger sample size at the lower income levels, we chose to combine the SFCC data on net worth with the CPS data on income. Full details regarding the method of calculation are described in the Appendix to this paper obtainable from the authors upon request.

Briefly, the nature of the calculations employed to create the income-net worth measure of economic position are as follows. From the SFCC the median value of total net worth for families by income size class was determined.[12] It was then assumed that the net worth for this income class in the SFCC data was equivalent to the net worth for the same income class from the CPS data. However, since the income data already include a return from income-yielding assets, this return had to be deducted from income before the annuity value of net worth was added; otherwise there would have been double-counting of net worth.

We then determined the size of the lifetime annuity that total net worth could produce. In calculating the value of the annuity we used a 4 per cent and a 10 per cent interest rate, alternatively, to give a notion of the sensitivity of the results. In estimating joint life-expectancy values—the other component of the annuity calculation—we assumed that family heads (males) were five years older than their wives, and that the full annuity would be received while both husband and wife were alive but that the surviving spouse would receive two-thirds of the annuity during the remainder of his or her life.[13]

It is clear that a number of simplifying assumptions have been made in our empirical work. Consequently, our estimates should be regarded as somewhat rough, their principal objective being to illustrate our approach.[14]

[11] Net worth refers to all assets less all debts covered in the *SFCC*; the only important assets excluded were life insurance investments and equities in annuities and in retirement plans. Assets or wealth include the following: own home, automobile, business or profession (farm and nonfarm), liquid assets, investment assets, and miscellaneous assets. Debts include debt secured by own home, debt secured by investment assets, personal debt, and debt on life insurance policies. See [11].

[12] Median rather than mean net worth was used, in view of the highly skewed distribution of net worth holdings within income size classes. For further elaboration, see Appendix. The net worth data in the SFCC—unlike the CPS income data—did not distinguish between families and unrelated individuals as we would have preferred, except for the under $3,000 income class. See Appendix for further discussion.

[13] Here we follow the approach used by Janet Murray [9].

[14] After this study was completed, the basic SFCC data tapes became available. We plan to use these data for additional applications of the income-net worth measure. Use of the basic data will eliminate the need for many of the assumptions made above and thus will provide a check of the adequacy of these estimates.

TABLE 1—PERCENTAGE DISTRIBUTION OF FAMILIES BY TWO MEASURES
OF ECONOMIC POSITION, BY INCOME, 1962

Income Size Class	Percentage Distribution of Families		
	Current Money Income	Income-Net Worth	
		4 Per Cent	10 Per Cent
	(1)	(2)	(3)
Under $3,000	20	18	17
3,000– 4,999	19	17	16
5,000– 7,499	27	25	24
7,500– 9,999	17	17	16
10,000–14,999	13	15	17
15,000–24,999	4	6	7
25,000 and over	1	2	3
Total	100	100	100
Median	$5,960	$6,480	$6,750

Source: Column 1—See [14, Table 3, p. 26]. Columns 2, 3—Based upon data from [14, Table 3, p. 26] and [11]; see Appendix to this paper for method of calculation.

Extent of economic inequality. One important application of the in-come-net worth concept is to the measurement of economic position or of the extent of economic inequality. In this subsection we compare re-sults obtained through use of the income-net worth measure with those obtained through use of the more conventional, current money income measure.

If economic position is measured by current money income, then the distribution of economic position of United States families in 1962 is as indicated in Table 1, column 1. It shows, for example, that 20 per cent of all families—9.3 million—were below $3,000, and 18 per cent—8.3 million—were above $10,000.

If, however, economic position is measured by the more compre-hensive income-net worth measure, the entire distribution is shifted up-ward and its shape is altered, as is shown in Table 1, columns 2 and 3. By this measure, the fraction of all families whose economic position is below $3,000 per year *falls* to 18 per cent at a 4 per cent rate of interest—a drop of nearly one million families—and to 17 per cent at a 10 per cent rate of interest—a drop of 1.4 million families. The fraction above $10,000 *rises* to 23 and 27 per cent, respectively—increases of 2.2 to 4.2 million families. The median economic position, $5,960 per year by the current income measure, also rises—to $6,480 at a 4 per cent rate and $6,750 at 10 per cent.

The shift in the entire distribution is portrayed by the Lorenz curves in Figure 1.[15] They indicate that the degree of inequality is greater by

[15] The Gini coefficients are as follows: for the income measure, 0.37; for the income-net worth measure at a 4 per cent interest rate, 0.42; and at a 10 per cent interest rate, 0.47.
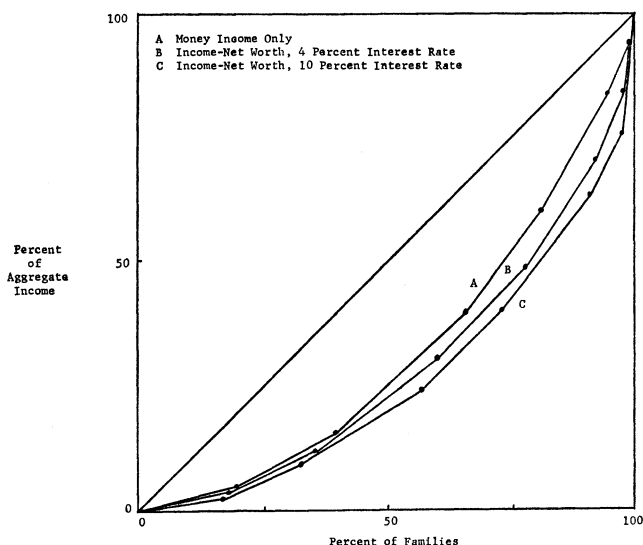
Note: None of the Lorenz curves cross.

FIGURE 1. LORENZ CURVES: PERCENTAGE SHARE OF INCOME AND INCOME-NET WORTH
RECEIVED BY FAMILIES, 1962

the income-net worth measure than by the income measure alone. The greater inequality reflects the fact not only that net worth holdings are, on average, positive in all income classes specified, but also that, except for the lowest income class, the ratio of net worth to income rises with income, as shown in Table 2.[16]

TABLE 2—MEDIAN INCOME AND MEDIAN NET WORTH OF FAMILIES, BY INCOME, 1962

Income Size Class	Median Income	Median Net Worth	Ratio (2)/(1)
	(1)	(2)	(3)
Under $3,000	$ 1,780	$ 2,250	1.3
3,000– 4,999	4,040	2,330	0.6
5,000– 7,499	6,170	5,560	0.9
7,500– 9,999	8,650	11,290	1.3
10,000–14,999	12,500ᵃ	18,320	1.5
15,000–24,999	20,000ᵃ	37,020	1.8
25,000 and over	N.A.	455,900	N.A.

N.A.—Not available.
ᵃ Estimated to be equal to the midpoints of the income class.
Sources: Column 1—See [14, Table 3, p. 26]. Column 2—See [11, Table A, pp. 96–97]; also see Appendix to this paper.

[16] The lowest-income class violates this generalization largely because it contains a higher proportion of aged—roughly one-third—than does the next-higher income class—for which the fraction is about one-fifth (calculated from Current Population Report [14]). This fact is significant because the aged (65 years and older) have a higher average ratio of net worth to income than do younger families; see Table 4, infra.

TABLE 3—MEDIAN INCOME, MEDIAN NET WORTH, AND LIFE EXPECTANCY
OF FAMILIES, BY AGE OF FAMILY HEAD, 1962

Age of Family Head	Median Income	Median Net Worth	Ratio (2)/(1)	Family Life Expectancy (Years)[a]
	(1)	(2)	(3)	(4)
Under 35	$5,585	$ 759	.14	49
35–54	6,918	7,664	1.11	34
55–64	6,219	13,210	2.12	21
65 and over	3,204	9,719	3.03	11
All	$5,956	$ 8,329	1.40	

[a] "Family life expectancy" is a weighted average of the life expectancies of husbands and wives at the mean age of the family head and on the assumption that wives are five years younger than their husbands. A weight of two-thirds is given to the additional years of life expectancy of the wife; this results from the assumption that widows will receive an annuity of two-thirds of the amount of the annuity previously received by the combined husband and wife unit.

Sources: Column 1—See [14, Table 3, p. 26]. Column 2—See [11, Table A 1, pp. 96–97]; also see Appendix to this paper. Column 4—Based upon data from [15]; see Appendix to this paper for method of calculation. (Appendix is available from authors.)

The effect of considering net worth in addition to income varies considerably with the age of the group, as noted earlier. This is illustrated in Table 3 which shows that the ratio of net worth to income rises dramatically with age, while life expectancy obviously decreases with age. Lorenz curves in Figure 2 for the four major age groups reveal clearly how the distributions of money income and of income-net worth diverge with age.[17]

This section establishes that the distribution of economic position by the proposed measure differs from that shown by current money income because of differences among age groups in life expectancies and in the relationship between income and net worth.[18] To further illustrate the

[17] The Gini coefficients for the income measure and the income-net worth measure based on a 10 per cent interest rate, are as follows:

Age of Family Head	Income	Income-Net Worth
Under age 35	0.31	0.34
35–54	0.34	0.43
55–64	0.39	0.50
65 and over	0.45	0.61

[18] Were we to use a more comprehensive measure of economic position that included *expected* income as well as current income—as we have said earlier would be desirable—the picture of the age distribution of economic position would be altered further. In particular, since the incomes of younger people can be expected to rise, their economic position will be improved in the future. For older persons, however, the opposite will more likely be the case since, if anything, their expected income path is declining rather than rising. We are planning to examine the possibilities of incorporating expected income into our measure.
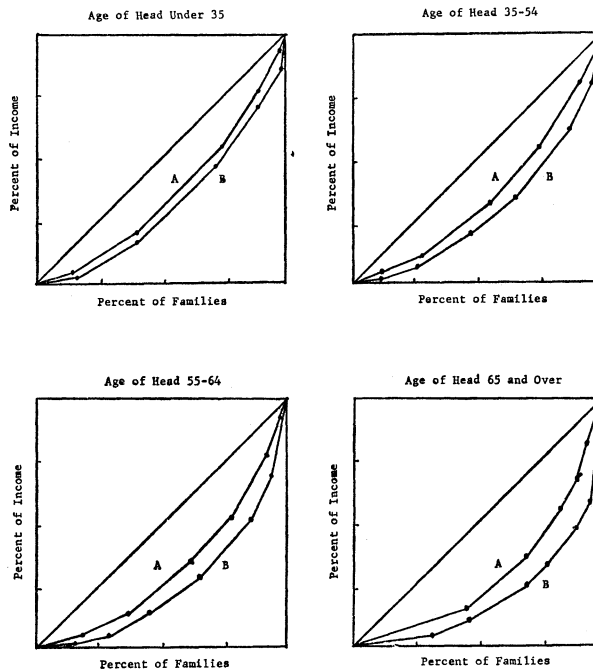
FIGURE 2. LORENZ CURVES: PERCENTAGE SHARES OF MONEY INCOME (A) AND INCOME NET-
WORTH, AT A 10 PER CENT INTEREST RATE (B), RECEIVED BY FAMILIES,
BY AGE OF HEAD, 1962

usefulness of the new measure we now examine the extreme low and high
ends of the distribution of economic position.

  Implications for measurement of "poverty" and "affluence." What im-
pact does our measure of economic position have on the magnitude and
age distribution of "poverty" in the United States? In answering this
question we shall define the poverty line for families as $3,000 of current
income, or, alternatively, as $3,000 of income-net worth per family.
(Many an ideal measure of welfare would include many other variables.)
One especially important limitation to either of these measures is that
they fail to distinguish among families of diverse size. Family size is
important in looking at the amount and composition of poverty among
age groups, since there is considerable variation in size by age of family
head. As Orshansky has shown [10], the family size adjustment reduces
the total number of poor *families*, though it leaves the total number of
poor *people* unchanged. The reduction in the number of poor families is
particularly great among those headed by persons over 65, since the
average size of these families is relatively small. For simplicity, we have
used the now-antiquated $3,000 poverty line. Our objective, in any case,

TABLE 4—NUMBERS AND PERCENTAGES OF FAMILIES WITH INCOMES AND INCOME-NET
WORTH OF LESS THAN $3,000 PER YEAR, AND OF MORE THAN $10,000
PER YEAR, BY AGE OF HEAD, 1962

	Less Than $3,000 Per Year					
	Families With Current Money Income Below $3,000		Families With Current Income—Net Worth Below $3,000, at			
Age of Family Head			4 Per Cent Interest Rate		10 Per Cent Interest Rate	
	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)
	(1)	(2)	(3)	(4)	(5)	(6)
Under 35	17	2.0	17	2.0	17	2.0
35–54	13	2.7	12	2.7	12	2.6
55–64	19	1.4	17	1.2	15	1.1
65 and over	47	3.2	36	2.4	32	2.2
All	20	9.3	18	8.4	17	8.0
	More Than $10,000 Per Year					
	Families With Current Money Income Over $10,000		Families With Current Income—Net Worth Above $10,000			
Age of Family Head			4 Per Cent Interest Rate		10 Per Cent Interest Rate	
	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)
	(1)	(2)	(3)	(4)	(5)	(6)
Under 35	9	1.1	10	1.2	11	1.3
35–54	24	5.1	29	6.1	34	7.2
55–64	22	1.6	30	2.2	36	2.6
65 and over	9	0.6	16	1.0	21	1.4
All	18	8.3	23	10.5	27	12.5

Source: Same as Table 1.

is to emphasize not the absolute number of poor families but rather
changes in that number and in the age composition when net worth is
considered in addition to income.

The effect of using income-net worth rather than current income is
shown in the top panel of Table 4. If current income is used alone to
measure the extent of poverty, then—recognizing that no adjustment

has been made for family size—the table shows that 47 per cent of the aged are "poor." When net worth is annuitized at a 4 per cent rate the percentage falls to 36, and to 32 at a 10 per cent rate.[19] A glance up the columns shows, again, the decreasing effect of net worth as successively younger families are considered. Thus, the "poverty problem" appears to be much less a problem of the aged when net worth is taken into account than is the case when current income alone is the criterion. Moreover, apart from the distribution of the "poor," the total number of "poor" families falls, from 20 per cent—9.3 million families—to 17 per cent—8.0 million families—when net worth is considered (at a 10 per cent interest rate).

   If we now look at the age distribution of poor families, we find that whereas the aged poor constituted 34 per cent of all poor families by the current income measure, they comprise only 28 per cent of all poor families according to the income-net worth measure. In absolute numbers, their total drops from 3.2 million to 2.2 million families. Consequently, the relative as well as the absolute number of the "aged poor" is substantially reduced. Again, the rising ratio of net worth to income with age, shown in the top panel of Table 5, coupled with the falling life expectancy, is of critical importance.

   The question of how poverty should be measured for purposes of governmental policy remains open; it is certainly not resolved by our brief foray into the issue.[20] Illuminating, nonetheless, is the fact that the proposed income-net worth measure of economic position—by accounting for net worth and life expectancy as well as income—portrays a smaller magnitude of poverty, and a rather different age composition of the poor.

   It might be argued that the more conventional measures of poverty, based on current income alone, have assumed *implicitly* some level of net worth holdings, or that they *ought* to have made such an assumption. If the income-net worth measure is viewed as useful, the question still re-

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[19] A comparison of our results with those of Janet Murray [9] can be made only for families aged 65 and over with annual money income less than $3,000—for only these aged families were examined in her study. By our income-net worth concept and at a 4 per cent interest rate, the number of aged poor is reduced by 23 per cent, i.e., from 47 to 36 per cent. The Social Security study also used a 4 per cent interest rate, but employed two income measures: income with prorated assets excluding home, and income with prorated assets including home. The first measure reduced the number of the aged poor by only 11 per cent; from 54 to 48 per cent. When homes were included among prorated assets, the number was reduced by over one-third, from 54 per cent to 35 per cent, i.e., a total reduction of 35 per cent. Differences in the underlying data as well as use of assets rather than net worth would appear to account for the difference in her results and those presented here.

[20] For example, there is the issue of how prospective social insurance benefits, or more broadly the full range of public services, should be treated. But this topic has barely been opened up. We owe this point to Robert J. Lampman.

TABLE 5—MEDIAN INCOME AND MEDIAN NET WORTH OF FAMILIES WITH INCOMES OF
LESS THAN $3,000 PER YEAR AND OF MORE THAN $10,000 PER YEAR,
BY AGE OF FAMILY HEAD, 1962

Age of Family Head	Less Than $3,000 Per Year		
	Median Net Worth (NW)	Median Income (Y)	Ratio NW/Y
Under 35	$ 0	$ 1,782	0
35–54	385	1,760	.22
55–64	5,625	1,646	3.42
65 and over	6,667	1,844	3.62
All	$ 2,250	$ 1,788	1.26

Age of Family Head	More Than $10,000 Per Year		
	Median Net Worth	Median Income	Ratio NW/Y
Under 35	$ 7,634	$12,969	.59
35–54	20,349	13,449	1.51
55–64	35,524	12,420	2.86
65 and over	45,800	14,084	3.25
All	$21,714	$13,454	1.61

Source: Same as Table 3.

mains as to what level of income-net worth should be regarded as a poverty line for purposes of measurement or eligibility for public programs.

It seems reasonable that the "official" measures of poverty adopted by the U.S. Office of Economic Opportunity, which consider current income and family size, could be extended to encompass net worth as well. Indeed, something very similar to this has already been implemented by the College Scholarship Service which, in determining the eligibility of college students for financial aid—from both private and public sources—relies upon family net-worth data in addition to current income and family size. The 1966 Survey of Economic Opportunity (SEO) makes this approach applicable to a more general class of decisions regarding "poor" or "needy" people, for it will provide extensive data on the net worth of low income families by family size.

Turning briefly from the poor to the "affluent," we see in the bottom panel of Table 5 what effect consideration of the annuity value of net worth has on the upper end of the distribution of economic position. Considering money income only, 18 per cent of U.S. families, or 8.3 million families, were over the $10,000 mark; but this rises to 27 per cent—12.5 million families—when net worth is annuitized at a 10 per

cent rate of interest. And, as with the low end of the distribution, the effect of considering net worth is markedly age-specific.

Implications for defining tax progressivity and regressivity. The income-net worth measure may be viewed as an alternative standard for viewing whether a given tax is "really" regressive, progressive, or proportional. We suggest that the ratio of taxes paid to current income may be a less useful standard for assessing vertical tax equity than is the ratio of taxes paid to income-net worth.

When net worth is considered in addition to income—in the manner we propose—the progressivity or regressivity of the tax system with respect to particular groupings of people will change in a systematic way. The essential reason for this is, as discussed above, that the ratio of income to income-net worth is not the same, either among income classes within age groups, or among age groups. Within any age group the use of the income-net worth base will show any tax, or the tax system as a whole, to be less progressive or more regressive, as the case may be, than if the conventional income base is used. This results from the fact that the ratio of net worth to income rises with respect to income. Similarly, the use of the income-net worth base will show any given tax to fall less heavily upon aged people than upon younger people. This results from the rising ratio of net worth to income with respect to age, and from the decline of life expectancy with respect to age. Both of these factors are captured in the proposed income-net worth measure but not in the current income base.

These illustrations can be generalized as follows. The net effect of the (1) rising ratio of net worth to income over the life cycle, (2) decreasing life expectancy over the life cycle, and (3) rise and then decline of income over the life cycle, will determine the precise dimensions of shifts in progressivity or regressivity by the income-net worth measure relative to that indicated by the use of current income alone. It is clear, however, that the picture of how our tax burdens are related to "ability to pay" is very different when our more comprehensive measure of "ability" is used. This suggests the desirability of undertaking studies of effective tax rates based not on current income but on ability-to-pay—as measured by income-net worth—for various taxes and for the tax system as a whole.[21]

Consumption behavior estimation. The approach presented in this paper for measuring economic position may be applied fruitfully to the prediction of consumer behavior. Indeed, *any* measure of economic position would seem to imply a theory of behavior, and vice versa. Thus, if economic position can be viewed as a function of annuitized net worth as

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[21] The relevance of net assets to the "regressivity" of the sales tax has been discussed by Harold M. Somers in a statement prepared for the Joint Economic Committee [13].

well as current income, then we might expect consumer expenditure
levels also to depend on these factors.

Consider, for example, the relationship between the level of consumer
expenditures in a given time period, and the level of permanent income,
or alternatively, the level of windfall income in that period. Employing
our income-net worth approach we suggest that the MPC out of per-
manent income should be higher, in general, than the MPC out of wind-
fall income—and that the difference should narrow with age.

The reasoning is as follows: an increment of windfall income may be
viewed as, in effect, a lump sum transfer of net worth (simply assets in
this case). As such, its effect on current consumption expenditures would
tend to be determined not by the size of the capital transfer but by its
annual lifetime annuity value. Given the size of the capital transfer and
the interest rate, the annuity value will depend on the life expectancy
of the recipient, and, hence, will vary directly with the recipient's age.
In all but the limiting case in which life expectancy does not extend
beyond the current period, the annuity value will be less than the capital
value. Thus, even if the recipient's MPC with respect to *annuity* income
were unity, the observed MPC with respect to the *capital* value would be
less than unity, and would be smaller the younger is the recipient.

It is interesting to note that this testable prediction is similar to that
arrived at by Modigliani-Brumberg-Ando [8], [1]. While they started
with the objective of predicting consumption behavior, their work
implies a measure of economic position—namely, that economic
position at a point in time is the sum of net worth plus the present
value of expected income, divided by the length of expected life. We on
the other hand started with the objective of measuring economic posi-
tion, but some of the implications of the measure for consumption pat-
terns became apparent as our work progressed. It is to be hoped that in
the future closer rapport will develop between researchers concerned
with measures of economic welfare and those concerned with the theory
of economic behavior.

III. *Conclusions*

The income-net worth measure proposed here, while incomplete as a
measure of economic welfare and imperfectly measured in this paper,
has a number of useful attributes, the major one being that of merging
two disparate but obviously related measures of economic position into a
unified measure. The most striking result is its impact on the economic
position of the aged, who by this measure appear to be considerably
"better off" than is shown by the current income measure. This results
from the interaction of income, net worth holdings, and life expectancy.
In addition to questions about the distribution of economic position, the
income-net worth measure may be useful as a basis for redefining tax

progressivity and regressivity, and as an explanatory variable in consumption behavior studies. Finally, it seems apparent that the measurement of economic welfare and the prediction of economic behavior are really two sides of the same coin, and that more explicit recognition of this fact would enrich the work in both areas.

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