A METHOD OF ESTIMATING THE DISTRIBUTION OF WEALTH AMONG AMERICAN FAMILIES IN 1973

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The distribution of wealth in America has received relatively little study compared to the attention given the distribution of income. This is due, in part, to the difficulties of collecting empirical data on wealth.

Estimates of the distribution of wealth have been based in the past on (1) estate tax returns, (2) sample surveys of wealth, or (3) income capitalization.[1] The method of wealth estimation which is outlined here combines income capitalization with information from estate tax returns and survey data in order to arrive at a more complete distribution of wealth. By using a sample of income tax returns merged with observations from the Current Population Survey, it covers virtually the entire population.

The Nature of the Original Data

The data base for the wealth estimates is the 1973 microdata file produced by the Office of Tax Analysis (OTA) in the Department of Treasury from a sample of 50,160 observations from the Current Population Survey (CPS) and 45,030 tax records from the 1973 Individual Income Tax Model. Although most of the information used in this estimate is from the income tax record, the use of the merged OTA file extends the sample to households not required to file a tax return, makes possible the estimation of a distribution in family units rather than tax-filing units, and provides information on head of household age where the income tax record would not. In addition, imputations of state and local bond interest received by a family unit were added by OTA, along with estimates of property taxes paid by non-itemizers.

Dividends reported for each family unit were capitalized into the value of corporate stock owned, and interest into the value of debt instruments owned. Survey data were analyzed to test the hypothesis that rates of return vary with income level. Property tax paid, divided by the effective property tax rate, yielded estimates of the value of real estate owned. These three components of wealth were thus directly estimated by capitalization.

In order to estimate net wealth, its relationship to the above three components of wealth was calculated by regression methods from a sample of estate tax returns.[2] Combining the parameters estimated from the estate tax returns with the components estimated from each individual family record yielded an estimated value of net wealth for each family. A frequency distribution of wealth by wealth classes was then constructed.

The strengths of this new method of estimation lie in its reliance upon a broad data base and its combination of income capitalization with data available from other sources. A simple capitalization approach cannot include wealth which does not produce income and has difficulty dealing with debt and certain types of wealth which are hard to estimate by capitalization. This approach overcomes these problems, and is well-suited to replication at reasonably low cost.

Definition of the Wealth Concept

Net wealth, as defined in this estimate, includes all items of durability and realizable cash value, less all debts held by the economic unit. It is equivalent to the estate tax measure of wealth, and broader than most survey concepts because it includes all debt, as well as personal possessions and the value of equity in life insurance, annuities, and retirement funds (where contributions have been paid by the beneficiary).

Capitalization of Dividends and Interest

Corporate stock values were estimated by capitalizing total reported dividends of the jth family at the average rate of return on common stock for 1973 (which was 3.4% according to Moody's Investors Service) as in equation (1), below. An anal-

$$(1)\quad CSTK_j = DIV_j * \frac{1}{r}$$

ysis of r, the rates of return or dividend/price ratios received by families in the 1962 Federal Reserve sponsored survey (SFCC) showed no consistent differences between income classes, indicating that the average rate is the best predictor of any family's rate of return, regardless of family income level.[3] Earlier studies by Crockett and Friend found dividend-price ratios to be relatively constant across income class until very high incomes ($50,000+ in 1960) were analyzed.[4] To the extent that this is true, corporate stock ownership is underestimated for high income groups by applying equation (1).

The value of all debt instruments, or interest paying assets of the jth family, was estimated by capitalizing total reported interest receipts by the average rate paid on savings accounts for 1973, or 4.5%, as in equation (2), below. The mi-

$$(2)\quad DINST_j = INT_j * \frac{1}{i}$$

crodata from the SFCC provide evidence that interest rates do not vary systematically with income class, so that an average rate of interest is the best predictor of any family's rate of interest. This rate would be comprised of the rates of credit union deposits, savings and loan deposits, commercial bank deposits as well as privately held mortgages, municipal bonds, corporate bonds, and U.S. government bonds. While very large denomination corporate and U.S. government bonds paid higher rates of interest than savings accounts, these represent a small enough percentage of interest-bearing assets that they do not have a noticeable effect on the total. Interest on municipal bonds (held almost completely by top wealthholders according to estate tax estimates) is much lower—close to the rate paid on bank savings—due to the tax-free status of this income. Since the average rate of interest received by SFCC families in 1962 was close to the rate paid on savings accounts, the 1973 rate on savings accounts was used to capitalize all interest in this estimate.

Estimation of Real Estate Value

The amount of property taxes paid on real estate was used to estimate real estate by equation (3), below:

$$(3)\quad RE_j = PT_j \cdot \frac{1}{eptr}$$

where RE = gross real estate wealth
PT = property taxes paid on real estate by jth family

eptr = average effective property tax rate in family's state of residence

Property taxes are reported by itemizers on their income tax returns, and have been imputed to non-itemizers by the Office of Tax Analysis. Effective property tax rates were calculated for each state from weighted averages of Census of Governments' figures on median effective rates by county.[5] Although there were variations from county to county within states, they were much less than the variations between states.

Constructing a Sub-sample of Estate Tax Returns

In order to utilize the estate tax return data for estimating the relationship between net wealth and asset ownership, a sub-sample of returns was drawn from the available data. Due to the great variability of net wealth relationships within this group, a large stratified sample was deemed appropriate, with optimal allocation employed in determining which observations would be sampled. A total sample size of 300 was selected on the judgment that this was large enough to allow sufficient sampling within the various strata, but of a reasonable size for computation purposes.

It has been demonstrated that the method of optimum allocation minimizes the portion of error due to sampling variability where there are substantial differences in the sizes of the strata and the variances within each stratum.[6] For a given sample size, n, equation (4) below, indicates the appropriate apportionment of the sample.

$$(4) \quad n_h = n \cdot \frac{N_h s_h}{\sum_{i=1}^{L} N_h s_h}$$

where n_h = number to be chosen from a given stratum
N_h = population of a given stratum
s_h = standard deviation within the stratum
L = number of strata employed

Since the primary purpose of this model is to estimate wealth across all wealth levels (rather than focusing on the very rich) observations with net wealth of more that $300,000 were deleted from the large sample before sub-sampling was performed. Persons with negative net wealth were also deleted before sampling although their inclusion did not materially affect results.

Estimation of a Regression of Net Wealth on Gross Assets

In the early 1970's, when the gross estate of a decedent exceeded $60,000 the executor of the estate was required to file a return with the Internal Revenue Service. Where net wealth (after deduction of debts and mortgages) exceeded $60,000, estates were taxed under a progressive system. The minimum filing requirement has been increased substantially during the last few years, and is currently $175,000. At the time of this estimate (1973), about 7% of the population were filing Federal estate tax returns.[7]

By utilizing a stratified sample of individual estate tax returns, a linear relationship between net wealth (gross wealth less all debts) and components of gross wealth may be estimated. Since the income tax information available on the OTA file is sufficient to generate estimates of corporate stock, debt instruments, and real estate wealth, net wealth of each family was estimated as a function of these variables.

Although this relationship was estimated using a variety of functional forms, including log-linear, a simple linear multiple regression with no intercept (equation (5), below) yielded the best fit.

$$(5) \quad NW_j = 1.041\ CSTK_j + 1.484\ DINST_j + .808\ RE_j$$
$$\qquad\qquad (17.27) \qquad (19.76) \qquad (18.98)$$
$$\qquad\qquad (\ .06) \qquad (\ .08) \qquad (\ .04)$$

This equation yielded an R^2 of .86, indicating that only 14% of net wealth is not explained by these three assets. Residuals were randomly distributed, showing no correlation of either underprediction or overprediction with the size of net wealth. All the explanatory variables were significant at the .001 level, and the overall F-statistic of 665 indicated strong explanatory power. T-statistics and standard errors are listed in the parentheses.

The coefficients are sensible in terms of what one would expect. While corporate stock has an estimated coefficient of roughly one, real estate typically carries substantial mortgage debt which reduces its effect on net wealth.[8] Indirectly measured wealth (all kinds other than corporate stock, real estate, and debt instruments) is most strongly correlated with debt instruments, which have a coefficient of 1.48. These assets, by their nature, have no debt associated with them. Prior studies have indicated that savings rates are higher among the self-employed (farmers, small businessmen) who would have large amounts of wealth measured only indirectly here.

Separate regressions were run on persons with wealth of between $60-80,000 and over $300,000,[9] but the results were not substantially different, indicating that wealth levels do not affect applicability of the regression outside the estate tax group. Therefore, we assume that one can apply the relationship to the entire population, with relative confidence that it is applicable to wealth levels below $60,000.

When applied to the OTA file, it yields an estimated population total net wealth of $2.6 trillion compared to the national balance sheet household sector total of $3.5 trillion for 1972. This was significantly closer than any of the other functional forms tested. Total corporate stock was estimated at $669.2 billion versus a national balance sheet estimate of $761.5 billion, and total interest-bearing assets were estimated here as $892.6 billion compared to $632.4 billion in time deposits and other savings plus $247.7 in credit market instruments.[10] The real estate total of $774.2 billion is difficult to compare to national balance sheet figures, which include real property in trust and holdings of non-profit institutions.

Results of the Wealth Estimation

In order to develop population estimates of the wealth distribution, families were arrayed in ascending order by level of wealth, and the upper boundaries of each percentile were determined using a computerized routine designed for this purpose. The highest percentile of the distribution included all families with wealth over $502,066 in 1973. The upper 10% included all those with net wealth over $75,797.

Within each wealth class, values were first weighted by their respective sample weights and summed both within the class and cumulatively. Net wealth (and other variables analyzed here) were first multiplied by the unique weight at-

tached to that family, and then summed across the class. Cumulative percentages represent the summing across the distribution divided by the sum of weights up to that point.

Figure 1

LORENZ CURVES OF WEALTH AND INCOME BY WEALTHCLASS, 1973

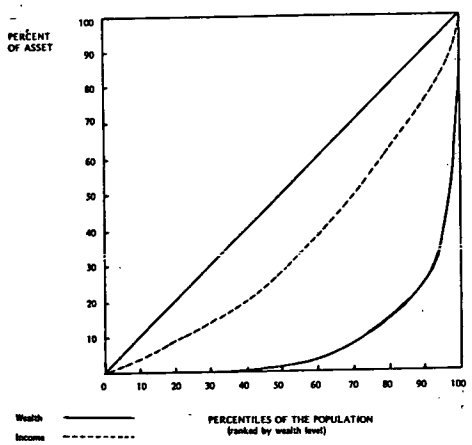
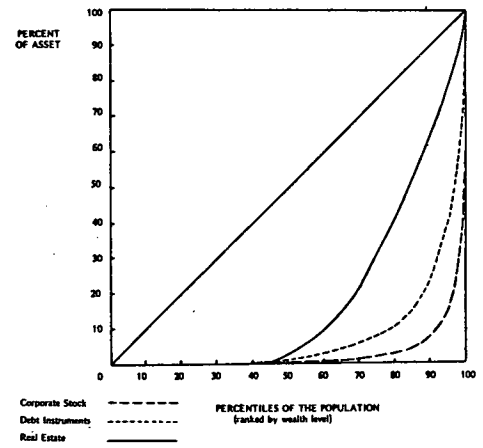


Figure 2

LORENZ CURVES OF CORPORATE STOCK, DEBT INSTRUMENTS, AND REAL ESTATE BY WEALTHCLASS, 1973



The cumulative distribution of wealth and income by wealth classes is portrayed in the Lorenz diagram in Figure 1. Figure 2 shows the set of Lorenz curves representing the cumulative distribution of corporate stock, debt instruments, and real estate by wealth class. While real estate is significantly less concentrated than is total net wealth, corporate stock is clearly considerably more concentrated. In Table 1, the cumulative percentages used to construct Figures 1 and 2 are listed. The percentage of real estate held rises with wealth more rapidly than that of debt instruments, and particularly than corporate stock, with a reversal of this trend in the upper decile. The first 35 percentiles of the wealth distribution, representing approximately 24.6 million families, hold no measureable wealth, contrasted with 16.8% of Census money income. The lower half of the distribution holds 1% of net wealth, 0.2% of corporate stock, 1% of debt instruments, and 1.8% of real estate but 28.5% of income. The upper 10% of wealthholding families hold almost 70% of net wealth and 93% of corporate stock, but only 36% of real estate. The highest 1% of the wealth distribution holds an estimated 32.6% of net wealth, although receiving only 8.7% of income. They own 60.3% of corporate stock, 29.4% of debt instruments, and 8.4% of real estate.

TABLE 1
CUMULATIVE PERCENTAGE OF NET WEALTH, INCOME, AND ASSETS HELD BY WEALTH CLASSES, 1973

Net Wealth Percentile	Net Wealth	Corp. Stock	Debt Instmts.	Real Estate	Census Money Income
0-35	0.0	0.0	0.0	0.0	16.8
45	0.3	0.1	0.5	0.4	24.1
55	2.1	0.4	1.8	4.5	33.3
65	5.5	0.8	3.7	14.6	43.6
75	11.2	1.6	6.9	30.9	55.4
85	20.9	3.9	14.9	52.7	68.4
95	42.5	14.7	40.6	77.3	83.2
99	67.4	39.7	70.5	91.6	91.3
100	100.0	100.0	100.0	100.0	100.0
Top 1%	32.6	60.3	29.4	8.4	8.7
Top 5%	57.5	85.3	59.4	22.7	16.8
Top 10%	69.8	92.9	75.8	35.7	24.5

The Gini coefficient measures the ratio of the area between the Lorenz curve and 45° line to the total area below the 45° line. The closer this coefficient is to one, the higher the degree of concentration or inequality.[11] Coefficients computed from this data are summarized in Table 2, below, and reflect the high concentration found in wealth relative to income.

TABLE 2
GINI COEFFICIENTS OF CONCENTRATION, 1973

Net Wealth (by wealth class)	.81
Census Income (by income class)	.46

Review of the Strengths and Weaknesses of Major Estimating Techniques

The method of wealth estimation presented here represents a highly useful alternative to the survey method of collection of wealth data. Surveys are expensive and time-consuming, and are plagued by problems of lower response rates among the wealthy. Errors in reporting are common. Estate tax returns are on an individual rather than a family basis, are limited currently to persons with an estate of $175,000 or more(although the limit of $60,000 applied to the year of this study), and are biased by the incidence of transfers of wealth inter vivos, particularly through trusts. While detailed analysis of wealth by type among top wealthholders is highly useful in that it represents a large percentage of person-

al wealth, a knowledge of the entire wealth distribution is required when we wish to analyze wealth effects on the "middle class" of inflation, tax policy and changes in valuation in the stock market. Comparisons of distribution over time can be made using this method on a succession of cross-sectional data.

Notes and References

1. See particularly James D. Smith and Stephen D. Franklin, "The Concentration of Personal Wealth, 1922-1969," American Economic Review 64 (May 1974): 162-167 and Dorothy S. Projector and Gertrude S. Weiss, Survey of Financial Characteristics of Consumers, Federal Reserve Technical Paper, Washington, D.C.: Board of Governors of the Federal Reserve System, 1966.
2. See Internal Revenue Service, Department of the Treasury, Statistics of Income - 1972 Estate Tax Returns for a description of the sample.
3. Calculations were made from the original microdata now on magnetic tape, which Projector and Weiss used in the Survey of Financial Characteristics of Consumers.
4. Marshall E. Blume, Jean Crockett, and Irwin Friend, "Stock Ownership in the United States: Characteristics and Trends," Survey of Current Business 54:11 (November 1974): 16-40.
5. United States Department of Commerce, Bureau of the Census, Census of Governments, 1972, Vol. 2, pt. 2, Assessment - Sales Price Ratios and Tax Rates.
6. William G. Cochran, Sampling Techniques, 2nd ed. (New York: John Wiley & Sons, 1963), p. 97. Proportional sampling is a special case of this situation and is optimal if variances are equal in each of the stratum.
7. This 7% represents that part of the population which fell into the wealth group that would have had to file an estate tax return if they had died.
8. A coefficient as high as 0.8 is probably due to the high correlation of consumer durables with real estate value.
9. Persons with wealth of between $60-80,000 are considered "low filers," and persons with wealth of over $300,000 are regarded as "high filers."
10. Statistical Abstract 1973, Table 712, p. 446.
11. For a discussion of the Gini coefficient and its history, see Joseph L. Gastwirth, "The Estimation of the Lorenz Curve and the Gini Index," The Review of Economics and Statistics 54 (August 1972) 306-16.