Revision II
PRELIMINARY: COMMENTS WELCOME

Consistent Weight Design for the 1989, 1992 and 1995 SCFs, and the Distribution of Wealth

Arthur B. Kennickell
Board of Governors of the Federal Reserve System

R. Louise Woodburn
Ernst and Young

Revised, August 1997

The authors are grateful to Gerhard Fries, Barry Johnson, Myron Kwast, Fritz Scheuren, and Joyce Zickler for comments and support, and to Kevin Moore and Amy Stubbendick for outstanding research assistance. The authors would also like to thank Steven Heeringa both for providing essential data used in the calculations reported here and for his earlier work in this area. The opinions presented here are the responsibility of the authors alone and do not necessarily reflect the views of the Board of Governors of the Federal Reserve System or Ernst and Young. All remaining errors are the responsibility of the authors.

This paper outlines the construction of a consistent series of weights for the 1989, 1992, and 1995 Surveys of Consumer Finances (SCF), and addresses the implications of these weights for the distribution of wealth in the U.S. Survey estimates of the distribution of wealth are determined primarily by two things: the data and the weights. The data provide the representation of individual units, and the weights determine the correct "size" of each unit. Although most economic analysts are drawn naturally into discussions of the nuances of data, few appear to connect as directly to the great importance of weights.[1]

I. Introduction

To provide reliable data for financial research, the SCF employs a questionnaire that carefully frames a detailed sequence of questions on the components of households' balance sheets. To provide sufficient representation of wealthy households, which hold a disproportionately large share of many assets and liabilities, the SCF sample includes a disproportionate representation of wealthy households. Both the questionnaire and the sample design have been changed only marginally since the 1989 survey. However, the weights originally released to the public with the final versions of the 1989 and 1992 surveys differ in some ways—even though they are derived from a "family" of similar calculations.

In processing the 1989 SCF, detailed information from the sample design was available for the first time, and this information was used to create two weights, one based largely on relatively simple post-stratification adjustments (see Heeringa, Conner and Woodburn [1994]—hereafter HCW), and one that used formal modeling of nonresponse in addition to post-stratification (Kennickell and Woodburn [1992]—hereafter KW). In terms of the general outlines of the implied wealth distributions, these weights did not differ greatly. For the 1992 survey, the experience of the 1989 survey together with still greater access to the sample frame data allowed the development of a set of weights that incorporated those advances (Kennickell, McManus and Woodburn [1996]—hereafter KMW).

One may question any particular weighting strategy, but it is obvious that differences in weight construction across otherwise comparable surveys can induce statistical discontinuities in

---

[1]One notable exception is Weicher [1996].

estimates. For this reason, we decided to apply the same weighting methodology to as many of the SCFs as possible. Because identical information was available for the 1992 and 1995 surveys, it was straightforward to apply the same technique updated for changes in the population and other minor differences. Recently, through the generosity of Steven Heeringa at the Survey Research Center at the University of Michigan, we have been given access to information that allows us to construct a revised 1989 weight that is consistent with those for the 1992 and 1995 surveys.[2]

The original and revised 1989 weights have some different implications for estimates of the wealth distribution. Using the original 1989 weights, together with the data from the survey, overall distributional measures such as the Gini coefficient, showed no significant change from the level estimated for the 1983 survey. However, point estimates of the proportion of total net worth held by the wealthiest ½ percent of households showed a dramatic increase from 1983 to 1989 under the original weights. This difference was estimated to be significant at a little better than the 95 percent level of confidence. Most of this apparent shift was attributable to shifts within the 10 percent wealthiest households over this period.

Under the revised consistent weighting design for 1989, the point estimate of the share of the top ½ percent in 1989 is *lower* than that in 1983, but the confidence interval for the figure actually encompasses the original 1989 figure. However, in light of the sensitivity of this calculation to fairly subtle changes in the weight construction, one should be very wary of comparing such estimates based on the 1983 and 1989 surveys.[3]

Estimates using consistently estimated weights for the three surveys from 1989 to 1995 suggest that the overall distribution of net worth as characterized by the Gini coefficient has not moved significantly. Largely reflecting shifts within the 10 percent wealthiest households, the point estimate of the wealth share of the top ½ percent has drifted up from 1989 to 1995; however, the change over the six-year period is not significant at the 95 percent level of confidence. Looking only

---

[2]Unfortunately, sufficient information no longer exists to extend this approach (necessarily modified for the differences in the sample design) back to the 1983 SCF. However, differences in the data between 1989 and 1983 are probably just as important as weighting differences.

[3]The same argument applies even more strongly to comparisons of independent surveys within a country or surveys done in different countries (e.g., Wolff [1996]).

over the 1992-1995 period, the share of the top ½ percent rose significantly, though the share of the bottom 90 percent was largely unchanged.

The next section of this paper provides an overview of the SCF. The third section reviews the current weighting methodology. The next section presents a variety of estimates of the wealth distribution using the SCF data and the consistently estimated weights. A final section summarizes the findings of the paper and points toward future research. To facilitate comments from scholars who are interested in technical weighting issues, we include two appendices to this paper, one with the key numerical adjustments to the weights and some related material, and the other with some descriptive figures and tables contrasting the original and revised 1989 SCF weights.

II. Background on the SCF

The current generation of SCFs has been conducted since 1983. Beginning with the 1989 survey, the survey questionnaire, sample design, imputation technique, and many other important technical factors have been held constant. The survey is sponsored by the Board of Governors of the Federal Reserve System in cooperation with the Statistics of Income Division (SOI) of the Internal Revenue Service. Data for the 1983 and 1989 SCFs were collected by the Survey Research Center at the University of Michigan (SRC). Since that time, data have been collected by the National Opinion Research Center at the University of Chicago (NORC).

The SCF is intended to provide reliable information on the financial characteristics of U.S. households. Detailed information is collected on all types of assets and liabilities, income, employment history, pensions, demographic characteristics, and the use of financial services. An overview of the data in the 1989, 1992, and 1995 surveys may be found in Kennickell, Starr-McCluer and Sundén [1997]. In 1995, the survey took an average of about 90 minutes to administer.

To give good coverage of broadly-distributed variables, such as credit card debt, and of narrowly-held variables such as corporate stock, the survey uses a dual-frame sample design. A multi-stage national area-probability (AP) sample provides good representation of broadly-distributed

characteristics.[4] A list sample, which has been designed to oversample relatively wealthy households, provides good coverage of many variables that are traditionally highly concentrated.

Although the list sample is discussed in other papers, it is useful to provide a summary here as background to the weight adjustments discussed later in this paper.[5] Under an agreement with SOI, the list sample is selected from an annual sample of tax data, the individual tax file (ITF), that has been developed by SOI for other research purposes—principally for use in modeling behavioral responses to the tax code and related analysis.[6] A set of agreements between the Federal Reserve, SOI, and the survey contractor is designed to protect the privacy of individuals. The arrangements place strong restrictions on both the use of the ITF, and the types of information that can be released from the survey to the public.

The ITF is a probability sample from the complete set of returns filed in a given year. It oversamples taxpayers who have high incomes and those with other unusual characteristics, and it is highly stratified. Among the stratifiers are business, farm, and other types of income. The SCF samples are selected from a version of the ITF for the calendar year preceding the survey. Although this file contains mainly data on returns filed for the tax year two years before the survey, it also contains amended returns for the same year and amended and late returns from earlier years. The subsample of the ITF from which the list sample is drawn includes only the latest return filed by a given taxpayer and it excludes returns filed from places outside the 50 states. Although the ITF is a sample—rather than the universe of returns—the sampling rates are high enough in critical parts of the sample that the variability associated with sampling from that file for the SCF is not a pressing concern.

---

[4] See Tourangeau, Johnson, Qian, Shin and Frankel [1993] for a discussion of the area-probability sample used for the 1995 SCF. The 1989 area sample was an overlapping-panel-cross-section design based in part on the area sample for the 1983 SCF and an independent sample selected in 1989. The independent area-probability sample for 1989 and the 1992 area-probability sample were based on the same frame, which was drawn jointly by NORC and SRC. For details on the 1989 sample, see HCW.

[5] See HCW, KMW, and KW for more information.

[6] For more detail on the construction of the ITF see Internal Revenue Service [1992]. The 1993 ITF, from which the 1995 list sample was drawn, contained 222,000 records.

Table 1: Definition of List Strata, 1992 SCF

Stratum number	*Units of index*
1	Less than 100,000
2	100,001 to 500,000
3	500,001 to 1,000,000
4	1,000,001 to 2,500,000
5	2,500,001 to 10,000,000
6	10,000,001 to 100,000,000
7	100,000,001 to 250,000,00
8	More than 250,000,000

In the 1989 and 1992 SCFs, data in the ITF were used in a straightforward way to construct a "wealth index," which is essentially a capitalization of the observed income flows using average rates of return. Thus, the units of the index correspond roughly to dollars of expected wealth. In the 1995 SCF, a slightly different approach was taken. The 1995 wealth index was defined as a combination of the earlier index and an index estimated from a direct regression of gross assets on the income and other tax variables (see Frankel and Kennickell [1995]). In all three years, the list sample was selected in two stages. First, to control costs, only cases living in one of the primary sampling units (PSUs) selected for AP sample were included. Second, these eligible cases were separated into strata defined in terms of the wealth index, and higher strata were sampled at a higher rates. This final stage selection was performed using systematic random sampling, where the size measure incorporated the probability of selection into the ITF, the PSU selection probability, and the selection rate within wealth index strata. The 1992 SCF stratum definitions are given in table 1.[7] The highest stratum is not sampled at all.[8] Beginning with the 1989 SCF, list sample respondents have been sent descriptive material about the SCF along with a postcard to be returned if they did not wish to be interviewed.[9]

[7]The exact sampling rates cannot be revealed. In 1989, seven strata were created, and six were sampled. The boundaries of the strata were changed in the 1992 and 1995 surveys to yield eight strata, of which seven were sampled.

[8]The total number of cases in the highest stratum is very small, the probability of obtaining an interview is very small, and it is likely that the data would be so unusual as to be unreleasable without severe "blurring" (see Strudler, Oh, and Scheuren [1987]). Even though the top group probably controls a large amount of assets, the fraction of net wealth held by the group is relatively small and might be better approximated using data from other sources, such as *Forbes*. As noted later in the paper, for purposes of the weighting design, taxpayers in the top stratum are treated formally as nonrespondents in the next-to-highest stratum.

[9]In the 1983 survey, an interview was attempted only for respondents who returned a postcard expressing active interest in participating.

There are three noteworthy compromises in using the ITF for the SCF design.[10] First, the unit of observation in the ITF is the taxpayer, while the unit desired in the SCF is the household. Some taxpayers in multiple-person households file separate tax returns. Without adjustments applied at the sample selection stage, such households would be selected too often into the SCF sample. However, the apparent effect of this unit definition problem is minor. Second, the same probabilities of selection are applied for the primary sampling units in the list sample as in the area-probability sample, even though the distribution of wealthy households is quite different from that of the general population (Frankel and Kennickell [1995]). There is no evidence that this difference induces serious problems, and adjustments at the post-stratification stage appear to be satisfactory. Third, because some types of income and the total incomes of wealthy people are often highly variable over time, and because some types of assets do not yield a flow of income that must be reported on a tax return at the time of receipt (e.g., personal residences, some insurance contracts, 401(k) accounts, etc.), the wealth index may be a noisy indicator of true wealth. The small number of cases with large differences between their wealth and that of others in the same stratum are dealt with in the weight construction stage as instances of misclassification. Despite these problems, it appears from the survey evidence that sampling from the ITF using the wealth index as a stratifier dramatically increases the efficiency of the SCF sample for wealth measurement (see KMW).

As in most other surveys, missing data are a problem in the SCF (see Kennickell [1997b]). Because of the seriousness of this problem, a great deal of attention has been directed to it. Missing data are multiply imputed in the SCF using an iterative estimation algorithm (see Kennickell [1991]). To accommodate the analysis of the data with standard software, each original data record is replicated five times, and each of these "implicates" is imputed independently.

III. Computation of Weights

To analyze the data collected, the sample design must be translated into analysis weights that specify the number of households in the population that are similar to each survey household. The weight for each case corresponds to the inverse of its probability of observation, which is usually

[10]See Kennickell and McManus [1993] for an extensive overview of these problems.

expressed as the probability of selection multiplied by the probability of response. This section outlines the design of the current SCF weight series, which is discussed in detail in KMW.[11] Earlier versions of SCF weights computed for the 1989 survey are discussed in HCW and KW.

Given the limited information observed about SCF respondents, it is not possible to compute a joint probability of observation under the area-probability (AP) and list sample frames. Although it is possible, in principle, to compute population estimates by using the two frames separately, critical issues connected with nonrandom nonresponse and legal constraints that require the separate identity of the list sample to be disguised in the public release of the data, make it pressing to develop a single analysis weight for the two samples.

The general strategy is as follows: First, separate frame weights are computed using some of the information observed about participants to adjust the initial selection probabilities. Second, a post-stratification scheme is used to combine the samples. The two samples are given different emphasis at this step. The list sample is assumed to provide the most reliable estimate available for the top end of the wealth distribution. Because some households file no tax returns and because the incidence of multiple filers increases at lower wealth levels, the area sample is assumed to provide the best estimate of the other end of the distribution. For observations with wealth in between these levels, both samples are assumed to provide reliable estimates of the population. Finally, some additional post-stratification is performed on the merged weights to align some important population totals. Weights are constructed for each of the five implicates separately.

IIIa. Separate Weights for Area-Probability Sample

For AP sample cases, the only frame information available for weighting adjustments is the location of the PSU from which the case was selected.[12] In general, response rates for comparable areas have not moved appreciably between the 1989 and 1995 surveys, reflecting a continuing

---

[11]To ensure exact comparability in the weighting schemes for 1989, 1992, and 1995, the weights for the 1992 survey were also recomputed. The associated bootstrap samples have also been reselected. The figures from the 1992 survey differ from the corresponding figures reported in the KMW paper because there have been minor revisions to the data since the paper was written and because of random variation in the boostrap samples selected.

[12]Some additional information was collected on an experimental basis during the adminstration of the 1995 SCF. This information is currently being analyzed.

comittment to maintaining these rates in the face of increasing respondent resistance.[13]

The initial AP weights, which are based on the probability of selection, are adjusted in two steps. First, assuming a uniform nonresponse propensity within PSUs, the weights are ratio adjusted by PSU to the original frame population totals. Second, these adjusted weights are raked to population figures for the geographic distribution of households, fine age categories, and age-homeownership groups; all of the control totals are computed using the March Current Population Survey for the survey year using SCF unit definitions (see appendix A, table A2).[14] The regional controls allow for broad population shifts since the frame was created; age and housing tenure are included to capture some economic factors in the patterns of nonresponse.[15]

IIIb. Separate Weights for List Sample

Nonresponse in the list sample varies widely over wealth index strata (see appendix A, table A3). Because the list frame contains a great deal of auxiliary information on respondents and nonrespondents, we are able to make a variety of adjustments for nonresponse.[16] As noted in the discussion of the sample design, the wealth index used to stratify the list sample was based on tax data from units in existence two years earlier. By the time of the survey, some selected units had divorced. In the event that a pair of selected joint filers divorced during this time, a decision was made to follow both parties, and each member of the original couple was assigned the original ITF base weight.[17]

---

[13]See appendix A, tables A1a and A1b for response rates by PSU for the AP sample in 1992 and 1995, respectively. Comparable rates for 1989 are not available. One important change since the 1989 survey has been a more concerted attempt to equalize response rates across comparable areas.

[14]See Oh and Scheuren [1987] for a discussion of raking and Little [1993] for a discussion of general post-stratification issues.

[15]Note that the regional adjustments in the first raking iteration are approximately equal to one, but substantially larger than one in 1992 and 1995. In 1989, the only available AP input weights were pre-adjusted to approximate the same regional totals as those we selected. In contrast, the inputs for the 1992 and 1995 AP weights were the unadjusted selection weights.

[16]Use of SOI data for purposes of nonresponse adjustment is governed by contract agreements between the Federal Reserve, the Statistics of Income Division of the IRS, and NORC. Under the terms of these agreements, there are strict limits imposed on the use of tax information, and all information produced as a result of using tax data is subjected to a thorough review to protect the privacy of survey respondents and nonrespondents.

[17]The base input for the list weight is the inverse of the probability of selection, which is the product of the probability of selection into the SOI sample (where the probability for couples

The list sample weights are adjusted in four steps. First, a small number of cases have net worth much greater or smaller than other cases in their original sampling strata—that is, misclassification appears to be a problem. Some such cases may have had a change in household composition since the time of the tax returns on which the sample is based, some may have had unusual income in that year, and for some the wealth index may be inadequate for other reasons. A number of adjustments are possible. For simplicity, we reassign the initial weights of cases that had unusually high or low values of gross assets within each stratum.[18] Cases with a level of gross assets exceeding the 90th percentile of the next highest wealth index stratum, or lying below the 10th percentile of the next lowest stratum, are assigned the median weight for that neighboring cell (see appendix A, table A4 for a list of reassignments).[19]

Second, we ratio adjust the list weights to two sets of control totals estimated from the entire unadjusted ITF. An adjustment to estimates of the population by stratum functions as a first-stage nonresponse adjustment.[20] An adjustment to regional population totals mitigates the distortions in the list sample induced by the use of the PSU selection probabilities from the AP sample. The adjustment factors are shown in appendix A, table A5.

---

filing separately is taken to be twice the ITF probability), the probability of selection of the areas in the AP sample, and the sampling rate within the list sample strata.

[18]The wealth variable was defined using the imputed survey data. Thus, weights of different implicates of the same observation may not be the same.

[19]Mulrow and Woodburn [1991] for an example of dealing with misclassification in the SOI Corporate Study.

[20]The relatively large adjustments in wealth-index strata 1 and 6 are due to a smaller sample in 1989, use of a modified version of the SRC half sample of PSUs, and the fact that the advanced tax file based on filings up to October 1988—rather than the complete file for 1988—was used to select the list sample.

Table 2: Definitions of Financial Income Post-Strata

Post-stratum	*Income range*
1	under $100
2	$100 to $999
3	$1,000 to $4,999
4	$5,000 to $9,999
5	$10,000 to $24,999
6	$25,000 to $49,999
7	$50,000 to $99,999
8	$100,000 to $499,999
9	$500,000 or more

Third, we apply three iterations of a three-level raking procedure, where the rake margins are totals for the original sampling strata, for post-strata defined in terms of a measure of financial income constructed with components of income reported in the ITF (table 2), and for geographic areas defined as the four major Census regions crossed with self-representing PSU status (see appendix A, table A6 for the adjustments).[21] Earlier research on nonresponse in the SCF list sample (see Kennickell and McManus [1993]) suggests that the measure of financial income accounts for most of the explanatory power of a detailed model of nonresponse. The motivation at this stage is to introduce this important variable while preserving the allocation of the original design and the geographic alignment of the sample, without the additional complications of more complex model-based adjustments, such as those explored by KW.[22]

Finally, because the list sample is based on returns filed in the preceding year (largely for the year two years before the survey), there is a difference in the size of the frame population and the size of the population that would be measured by a hypothetical ITF created at the time of the survey, we need to adjust the sum of the list sample weights. Guided by evidence in Kennickell and McManus [1993], we adjust the size of all strata higher than the second one at the rate of overall population growth.[23] The sizes of the bottom two strata are adjusted proportionately to equal the total of the

[21]Financial income includes income reported on the tax return for taxable and nontaxable interest, and dividends. We chose to stop the raking at three iterations, rather than continuing until the distributions converged to the exact margins, in order to avoid creating excessive variation in the weights.

[22]Because there is relatively large difference on average between nonresponse in self-representing PSUs and that in non-self-representing PSUs, we impose the more detailed geographic alignment here. The use of these categories is also supported by the results of Kennickell and McManus [1993].

[23]Because over time rates of return, tax rules, and other factors change, the income series observed in the ITF do not necessarily contain the same information about wealth at different points of time. Thus, it is not possible to compute appropriate control totals using the data for the tax year corresponding to the survey.

weights of the AP sample that reported filing a tax return for the preceding year less the total of the adjusted weights of the list sample cases in the higher strata.[24]

III.c. Combined Area-Probability Sample and List Sample Weights

Up to this stage in the weight construction, we have computed our best adjusted estimates of the analysis weights for each of the two samples separately. As noted earlier, we do not have sufficient information to merge the samples by computing a joint probability of observation under the two frames. We proceed by using a post-stratification technique based on the measure of gross assets used as a basis of reassigning the stratum for some list sample cases.

Table 3: Definition of Gross-Asset Post-Strata

Post-stratum number	*Amount of gross assets*
1	Under $50,000
2	$50,000 to 249,999
3	$250,000 to $749,999
4	$750,000 to $1,499,999
5	$1,500,000 to $9,999,999
6	$10,000,000 to $24,999,999
7	$25,000,000 or more

First, AP cases that did not file a return are given their nonresponse-adjusted weight as computed above, and these cases are not further adjusted. Second, we divide the remaining cases into seven post-strata defined in terms of gross assets (see table 3), and we adjust the AP and list weights within each of these post-strata by rescaling the weights of each sample by a function of the contribution of the sample to the number of cases in each post-stratum (see appendix A, table A7 for adjustments).[25] The totals of these combined weights for post-strata

[24]Some adjustments to the survey data were made to determine tax filing status for respondents. The survey requested this information directly. In cases where a respondent had not yet filed a return but expected to do so later, the survey also requested this information. However, for purposes of the weight calculations, AP cases with more than $50,000 in financial assets or $100,000 in gross assets, and all list cases were assumed to have filed a tax return regardless of what they reported to the direct question. Cases that reported that they expected to file a return were also treated as filers.

[25]Formally, the merging is as follows: In post-stratum I, let N_{ia} = weighted number of AP cases, N_{il} = weighted number of list cases, n_{ia} = the unweighted number of AP cases, n_{il} = the unweighted number of list cases, and let $R_{is} = (n_{is}/N_{is})/[(n_{ia}/N_{ia}) + (n_{il}/N_{il})]$ for s={a,l}. Then for case j from sample s in post-stratum I, $COMBINED_WGT_j = R_{ia} * AP_WGT_j + R_{il} * LIST_WGT_j$, where AP_WGT_j is the nonresponse-adjusted AP weight (equal to zero for list cases), and $LIST_WGT_j$ is the nonresponse-adjusted list weight (equal to zero for AP cases). If the weighted number of AP and list cases were the same in each post-stratum (i.e., $N_{ia}=N_{il}$), then the rescaling would reduce to a simple proportional adjustment based on the relative sample counts.

three and above are adjusted to control totals estimated from the list sample alone. Totals for the bottom two post-strata are adjusted to a figure computed as a residual of the CPS estimate of households less the totals for the higher post-strata and the number of nonfilers (see appendix A, table A8 for adjustments). Other dimensions besides gross assets could also be used to combine the samples; this construct is chosen as the closest to the core use of the survey. The use of control totals from the list sample alone for the higher-strata cases implicitly reflects a belief that serious nonresponse biases correlated with wealth are addressed adequately only for the list sample.

To reduce excessive variation of the weights in some gross-asset post-strata, the weights for cases in the gross asset post-strata two and above are truncated at the 95th percentile of their range within each post-stratum, and cases in the first post-stratum are truncated at the 99th percentile of their range. The mass removed by truncation is spread uniformly over all cases within that post-stratum (see appendix A, table A9 for adjustments).[26]

To avoid distortion of the weights of the wealthiest households, observations in gross-asset strata three and above are not further adjusted. The remaining merged sample analysis weights of cases that filed a tax return are subjected to three final adjustments. First, we post-stratify the weights of these observations to a set of fine age categories estimated from the CPS (see appendix A, table A10 for adjustments).[27] Second, we rake the weights of these observations to totals for homeownership crossed with coarse age categories, and totals for the four Census regions (see appendix A, table A11 for adjustments). Finally, these weights are post-stratified again to the fine age categories used in the first of these final adjustments (appendix A, table A12).

IIId. Comparison of Revised 1989 Weights with Earlier 1989 SCF Weights

For 1989, it is possible to compare the weights yielded by the process described here, with the weights developed by HCW and by KW. Figures B1 and B2 in appendix B show a scatter plot of the revised weights against the HCW weights and the KW weights, respectively. There is a

---

[26]The trim points for 1989 were necessarily higher than in 1992 and 1995 due to the smaller sample in 1989.

[27]In all of the final post-stratification and raking control totals, the CPS figures are adjusted to remove the estimated number of nonfiler households and households in post-strata three and above in the various cells, where the estimates are made using the final merged sample weights for those post-strata, and final AP sample weights for the households that did not file a tax return.

noticeable central tendency in both of these figures— particularly in comparing the revised weight with the HCW weight—but there is also considerable difference for some observations. Some of the differences appear systematic. A detailed investigation suggests that there is not one particular aspect of the weight construction that accounts for the differences. The most notable methodological differences in the weight construction are: adjustments using MSA status (HCW, KW), rather than self-representing PSU status (KMW); combining the frames using estimated selection probabilities under each frame (HCW, KW), rather than a post-stratification approach; and different approaches to trimming weights at different stages in the weight construction. The principal differences in weights appear in the list sample cases in the lower wealth index strata. Our detailed decomposition of the revised weights yields no evidence of an obviously faulty or unreasonable assumption in their construction.

IIIe. Replicate Weights

Although we believe it is very important to consider the variance due to sampling for many statistics derived from the SCF, we are constrained by legal and ethical confidentiality issues from releasing the types of information that users would need to implement any of the classical resampling approaches to variance estimation (e.g., balanced repeated replication). Indeed, even with the full sample information, application of such techniques to the SCF would require strong simplifying assumptions about the relationship between the two frames and the nature of nonresponse. Most non-resampling classical approaches, such as linearlization, are not applicable to the SCF due to the complex sample design and weighting methodology.

Bootstrap methods can offer an acceptable approximation to the results of the classical approaches.[28] For the SCF, we select 999 bootstrap sample replicates in a way that captures what we believe are the important dimensions of variation in the selection of the actual AP and list samples. For the first implicate of each of these bootstrap replicates, we compute a set of weights using the same procedures described for the main analysis weights.[29]

---

[28]See Sitter [1992] for a discussion of variance estimation using bootstrap techniques.

[29]Users who do not have access to the internal SCF data will not be able either to create alternative replicate samples that take appropriate account of the original design, or to compute the implied variation in the weights for alternative samples.

In the AP sample, we group the non-self-representing PSUs into pseudo-strata which were created along with the original design of the frame, and we subdivide the self-representing areas into groups of segments.[30] To select each bootstrap replicate for this part of the sample, we take each group one at a time and randomly select with replacement a number of areas equal to the number of areas in the group.[31] All AP observations in the selected areas are included in the given bootstrap sample.

Reflecting the common geographic basis of the AP and list sample cases, list sample observations in the non-self-representing PSUs are selected into the bootstrap samples as many times as the PSU was chosen for the AP bootstrap sample. For list sample observations in self-representing PSUs, no comparable geographic selection can be made. To select the bootstrap samples of these cases, we first divide the observations into those that were selected with certainty in the original sample and those that were not. Then these two groups are sampled independently by wealth index strata. The randomization over the certainty cases is performed as a proxy for the effects of unit nonresponse.[32]

There is substantial variation in the size of the bootstrap samples within each survey (see appendix A, table A13). For the 1989 SCF, the coefficient of variation of the sample size is 3.8 percent. The comparable figure for 1992 is 1.5 percent and that for 1992 is 1.2 percent. The much larger coefficient of variation in 1989 is mainly attributable to larger variation in the number of participants in the PSUs within in the pseudo-strata. There is a larger relative variation in the number of times a given observation is selected into the list sample than is the case for the AP sample (see appendix A, table A14). Two factors largely explain this difference. All of the AP bootstrap samples

---

[30] These are the groupings one would use in computing an estimate of sampling variance for the AP sample alone by such a technique as balanced repeated replication.

[31] Most of the groups of non-self-representing PSUs contain only two areas. In 1995, a small number of such areas are in pseudo-strata comprising three PSUs. Self-representing PSUs were divided into segments that were designed to be balanced in the same sense as the groups of non-self-representing PSUs.

[32] We have also investigated a number of other approaches, such as selecting the list sample cases by simple random sampling by wealth index strata without regard to geography. Although there are some differences under the alternative selection schemes we have explored, they are relatively minor.

and list bootstrap samples in non-self-representing PSUs are selected by randomizing over the pseudo-strata, with the result that these cases are selected in groups. In contrast, the replicates of the list cases in self-representing PSUs are selected by simple random sampling, stratified by certainty status, and wealth index strata.

IV. Wealth Distribution

Of all surveys conducted in the U.S., the SCF offers the best vehicle for making an assessment of changes over time in the distribution of household net worth. In this section we provide several indicators of this distribution estimated from the 1989, 1992 and 1995 surveys.[33]

Before proceeding, it is useful to comment on the treatment of the version of the data used in the wealth estimates reported here. As a part of the normal processing of the SCF, the data are intensively reviewed in order to minimize reporting and processing errors. Nonetheless, some apparently legitimate outliers remain. For certain specialized analyses, these outliers may be highly influential, though we see no particular reason to think that such observations will induce statistical bias in estimates from the survey. In the past, some users of the SCF data have identified selected survey outliers and used their existence to question the validity of the survey. A survey like the SCF that covers variables with highly skewed distributions in the population will likely always have some important "granularity." In most of our own analytical exercises where we need to examine distributions of balance sheet details, we systematically trim the weights of cases that are highly influential in the statistical sense (or perform other robust adjustments), in order to reduce the variance of our estimates. We also make estimates of the sampling variability of our estimates using the bootstrap sample weights, a procedure that automatically highlights estimates that are overly sensitive to a small number of observations. We encourage other analysts who use the SCF (or other datasets) to consider such practices.

---

[33]Note that the net worth measure considered here does not include the present value of Social Security benefits, future benefits from defined-benefit pension plans, or measures of human capital. For information on the changes induced by including such measures as a part of net worth, see Kennickell and Sundén [1997]. Inclusion of such wealth makes for a more equal distribution.

Table 4: Mean and Median Net Worth, 1989, 1992 and 1995 SCFs, Thousands of 1995 Dollars

	Mean	Median
1989 (revised)[a]	229.3	57.0
	48.3	*5.0*
1992[b]	202.7	52.8
	13.1	*3.0*
1995	207.2	55.1
	13.6	*2.6*
Memo items:		
1983[c]	190.5	54.5
1989 (HCW)[a]	221.4	55.2
1989 (KW)[a]	198.4	52.4
	13.3	*2.6*

Standard errors due to imputation and sampling are given in italics.

a. The nominal figures were increased by 22.7 percent for inflation.
b. The nominal figures were increased by 8.5 percent for inflation.
c. The nominal figures were increased by 40.0 percent for inflation.

The final SCF data and revised analysis weights yield a very smooth distribution in the dimensions of such highly-aggregated variables as net worth, gross assets, and total debt.[34] Because the main point of the analysis reported in this section is to examine the overall net worth distribution, we have not made further outlier adjustments to the weights described earlier in this paper. The data used are from the final internal version of the surveys. Nonetheless, because the data in the public versions of the surveys are altered to protect the privacy of individuals, some differences in the results computed from those data may arise (see Fries, Johnson and Woodburn [1997] and Kennickell [1997a]).

Table 4 provides information on mean and median household net worth (in 1995 dollars) from the 1989, 1992 and 1995 SCFs.[35] According to the consistently estimated weights, point estimates of mean net worth fall in real terms from 1989 to 1995, with most of the decrease occurring between 1989 and 1992. However, given the size of the standard errors with respect to imputation and sampling, none of these changes are statistically significant at the 95 percent level of confidence.[36] The standard error for the 1989 mean

[34]See appendix A, figures A1-A3 for plots of the weighted sample cumulative percent distribution of net worth.

[35]For details on an earlier version of these estimates, see Kennickell, Starr-McCluer and Sundén [1997].

[36]The standard error for statistic X is estimated as $SX_{tot} = \{ (6/5) * SX^2_{imp} + SX^2_{samp} \}^{1/2}$, where the imputation variance SX^2_{imp} is given by $SX^2_{imp} = (1/4) * \Sigma_{I=1 \text{ to } 5} (X_i - \text{mean}(X))^2$ and the sampling variance SX^2_{samp} is given by $SX^2_{samp} = (1/999) * \Sigma_{r=1 \text{ to } 999} (X_r - \text{mean}(X))^2$. For the imputation variance, the mean function is taken with respect to all five implicates. Because we have computed bootstrap weights only for the first implicate, for the sampling variance

is considerably larger than those for the 1992 and 1995 means. This result is not surprising, and primarily reflects two factors: First, the 1989 list sample, which is the most important determinant of the upper tail of this skewed distribution—and, thus, the mean— is about half the size of those for 1992 and 1995. Second, the overlapping-panel cross-section structure of the 1989 AP sample is inherently more variable. More surprising is the fact that the standard error under the revised weight is so much larger than the estimate under the KW weight.[37] However, the 1989 variance estimates were based on a set of eleven experimental replicates. Most likely, the difference in the size of the standard error is attributable to the instability of the bootstrap variances in small samples.[38]

As is the case for the mean, the point estimate of the median declines in real terms over the 1989-1995 period, but by not so large a fraction of its 1989 value. The decline is not significant at the 95 percent level of confidence.

Often, relative changes in mean and median net worth are taken to indicate changes in inequality. By such arguments, the fact that the median declines less than the mean would be taken as an indicator of decreased inequality. However, even if the statistical significance of the difference were not questionable, other characterizations of the wealth distribution may give different impressions.

---

calculations, the mean function is taken with respect to the 999 bootstrap replicates of the first implicate.

[37]It is not feasible to compute sampling error for the HCW weights.

[38]For example, if we take the 999 means computed for the standard error of the 1989 mean in table 4, and separate them into 90 groups of 11 (with a discarded remainder of 9), the smallest standard error in such a group is 12,810, and the largest is 75,740; with larger groups, the range decreases.

Table 5: Gini Coefficients for Net Worth, 1989, 1992, and 1995 SCFs

	Gini coefficient
1989 (revised)	0.788
	0.016
1992	0.782
	0.011
1995	0.788
	0.010
Memo items:	
1983	0.777
1989 (HCW)	0.795
1989 (KW)	0.789
	0.017

Standard errors due to imputation and sampling are given in italics.

Another commonly cited statistical characterization of the distribution of net worth is the Gini coefficient.[39] This figure is one of a large number of possible summary statistics. Table 5 shows the Gini coefficients for 1989, 1992 and 1995 using the consistently estimated weights. Also shown are estimates from the 1989 survey using the HCW weights and the KW weights, and from the 1983 SCF using using the final FRB weights .[40] The estimates for 1989-1995 with the consistent weight series differ by at most 0.006, which is not a statistically significant difference. These estimates differ only slightly from the KW estimate for 1989 and the 1983 estimate. The Gini coefficient computed with the HCW weight appears to be a relative outlier. However, even that value is higher by only slightly less than one standard error than the 1995 figure, and by and about one and a quarter standard errors than the 1992 figure.

Although the Gini coefficient shows no significant trend over the period considered, offsetting movements within the distribution could be masked at this level of summary. To gauge the shifts across the entire distribution of net worth, figure 1 plots the net worth value corresponding to a given percentile in 1989 against the net worth value of that percentile in the 1992. Figures 2 and 3 show

[39]The Gini coefficient is usually defined in terms of the Lorenz curve. The Lorenz curve is a graph of the percent of the population that has net worth less than or equal to a given value, plotted against the percentile of the wealth distribution corresponding to that amount of wealth. If every household held the same amount of net worth, the graph would lie along a 45 degree line; otherwise, the graph would lie below that locus. The Gini coefficient is equal to the area between the Lorenz curve and a 45 degree line (a measure of the deviation from equality) divided by the total area below the 45 degree line, which is identically one-half. Thus, in the case of exactly equal distribution, the Gini coefficient is equal to zero, and in the case where all wealth is held by one person, the coefficient is equal to one.

[40]Projector and Weiss [1966] report an estimate of 0.76 from the 1963 SFCC.

corresponding quantile-quantile (Q-Q) plots of the distributions in 1989 and 1995, and in 1992 and 1995, respectively.[41] To highlight the interesting differences in the distributions, the (nominal) values have been subjected to a transformation which is intended to compress the large spread in the tails of the distribution.[42] In the figures, the solid vertical line marks the 90th percentile of the distribution of net worth (by construction, the point of intersection with the plot corresponds to the 90th percentile for both axes), the dashed line corresponds to the 99th percentile, and the dotted line corresponds to the 99.5th percentile. If the plot lies on the 45 degree line, the distributions are identical.

There are two noticeable, but not statistically or economically important, distortions in these figures at the extremes of the distributions. At the very top end, the deviations simply marks a difference in the maximum values in the two series plotted. The choppy pattern in the negative values reflects the very small number of observations with substantial negative net worth.

---

[41]Because of computational limitations, it is not feasible to show the 95 percent confidence band (or similar measures) in these plots.

[42]Because of the enormous spread in the values of net worth, a simple level scale would be dominated by the most extreme values, and most intermediate relationships would be obscured. Thus, is it desirable to rescale the data in some way. In a Q-Q plot, any monotonic function of the data will not affect the basic relationships shown. For the Q-Q plots in this paper, we have applied the inverse hyperbolic sine transformation ($\log\{\theta y + [\theta^2 y^2 + 1]^{1/2}\}/\theta$) with a scale parameter (θ) of 0.0001 (see Burbidge, Magee, and Robb [1988]). In addition to being defined for zero and negative values, this transformation has the convenient property of stretching the range of the top 10 percent of the wealth distribution in a way that makes clearer the shifts within that part of the distribution, while not overly compressing the remainder of the distribution. The more usual transformation sign(x)*log(abs(x)) also has this property, but it induces distracting exaggerations in the range below about $100.

Fig. 1: Q-Q Plot of 1992 NW vs. 1989 NW, Revised Weights

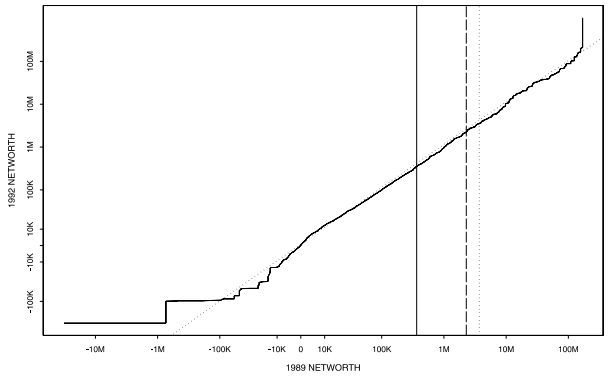


Fig. 2: Q-Q Plot of 1995 NW vs. 1989 NW, Revised Weights

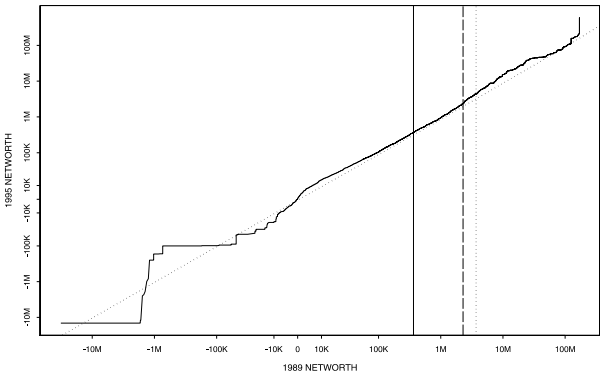
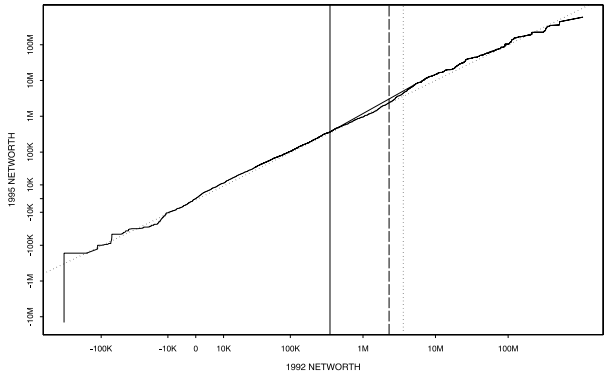


Fig. 3: Q-Q Plot of 1995 NW vs. 1992 NW, Revised Weights



With the exception of a group of households within the top percent of the distribution, the positive values in 1995 appear to lie largely above the positive values for 1989, reflecting mainly inflation over the period. The plot that compares the 1989 data and the 1992 data is similar, but the differences appear less strong. The graph of the 1992 and 1995 distributions suggests that the important relative shifts were largely within the top 1 percent of the distributions.[43] Because there

[43]Appendix B, figures B3-B5 show Q-Q plots for 1989 wealth using the revised weight with the HCW weight, the revised weight with the KW weight, and the KW weight with the HCW weight. For a comparison of the 1989 wealth distribution under the HCW and KW weights with the 1992 and 1995 distributions under the revised weight, see appendix B, figures B6-B9.

are relatively few negative values in any of the years analyzed, drawing strong conclusions about the changes at that end of the distribution is difficult.

To look more directly at groups within the wealth distribution, table 6 shows some concentration estimates for net worth in 1989, 1992, and 1995. For comparison, earlier calculations are also reported for 1989 using the KW and HCW weights, for 1983 using the final weights for that survey, and the 1963 Survey of Financial Characteristics of Consumers using the final weights for that survey. Estimates are shown for the percentage share of total net worth held by the top ½ percent wealthiest households, the next-wealthiest ½ percent of households, the next-wealthiest 9 percent of households, and the remaining 90 percent of households. According to the consistent weight series, the point estimate of the share of net worth held by the wealthiest ½ percent of households increased in 1995 from both 1989 and 1992. The change in this share from 1989 to 1995 is not statistically significant, but the increase from 1992 to 1995 is significant at above the 95 percent level of confidence. As expected from the quantile-quantile plots, however, the share of net worth held by the 90 percent least wealthy households is virtually unchanged over the whole six-year period. A decrease in the share of net worth held by households between the 90th and 99th percentiles of the distribution accounts almost entirely for the observed change for the wealthiest ½ percent from 1992 to 1995.[44]

[44]To allow readers to see changes in the wealth shares of other percentile groups, Lorenz curves for 1989, 1992 and 1995 net worth using the revised weights are given as appendix figures A4-A6. For a given percentile of the distribution of net worth on the vertical axis, the horizontal axis shows the wealth share held by all households at or below that percentile. The wealth level corresponding to each percentile point may be seen from the cumulative distributions of net worth for each of the three years, shown in appendix figures A7-9.

Table 6: Proportion of Total Net Worth Held by Different Percentile Groups: 1989, 1992, and 1995 SCFs

	Percentile of the net worth distribution			
Survey year	0 to 89.9	90 to 99	99 to 99.5	99.5 to 100
	CONSISTENTLY COMPUTED WEIGHTS			
1989	32.5	37.1	7.3	23.0
	3.1	*3.5*	*1.2*	*2.8*
1992	32.9	36.9	7.5	22.7
	1.7	*1.8*	*0.5*	*1.5*
1995	31.5	33.2	7.6	27.5
	1.8	*1.4*	*0.7*	*2.0*
Memo items:				
1963[a]	36.1	32.0	7.2	24.6
1983[a]	33.4	35.1	7.2	24.3
1989 (HCW)	31.5	33.3	7.2	28.0
1989 (KW)	32.5	32.5	7.6	27.4
	2.8	*1.9*	*1.4*	*3.1*

Standard errors due to imputation and sampling are given in italics.
[a] See Avery, Elliehausen, and Kennickell [1988].

Earlier estimates reported by KW and others (e.g., Wolff [1995]) using the original 1989 weights indicated a dramatic increase between 1983 and 1989 in the concentration of wealth among the wealthiest ½ percent of households. Moreover, this increase appeared regardless of whether either the HCW weight or the KW weight was used for the calculation. Given the close conceptual relationship of the revised 1989 weight to the original weights, the degree of change in the estimate is surprising. This result suggests that for making calculations of this sort, strongly consistent methods are even more important than previously believed. Scholars should be very wary of narrow estimates of wealth concentration from surveys that differ by more than minor details in their technical

basis. This argument may apply even more strongly in the case of comparisons of surveys that are done in different countries (e.g., Wolff [1996]), where technical methods, the definitions of relevant wealth items, and other types of nonsampling error may differ greatly.

To underscore the variability inherent in the concentration estimates, figures 4-6 show average shifted histogram (ASH) estimates of the distribution over the 999 bootstrap replicates, of the share of net worth held by the top ½ of one percent of the net worth distribution in 1989, 1992 and 1995 respectively, using the consistently estimated weights.[45] Figures 7-9 show the comparable distribution for the bottom 90 percent of the wealth distribution.[46] Although the mode of the distribution of the share of net worth held by the ½ percent wealthiest families is virtually the same using the consistently estimated weights for 1989 and 1992, the distribution is much more broadly spread in 1989. The greater spread is a direct result of the fact that the list sample (which strongly drives most estimates of the top of the distribution) in 1989 is about half the size as in 1992. The estimates for the share held by the bottom 90 percent wealthiest families also show a relatively large variablity in 1989, largely as a consequence of the complex structure of the overlapping panel/cross-section structure of the area-probability sample in 1989 (see HCW). The 1992 and 1995 surveys used a more straightforward AP design.

---

[45]Figure B12 in appendix B provides similar information for the KW weight and the 1989 data. The experimental variance estimates reported by KW were based on only eleven bootstrap replicates. The relatively small level of variability originally reported for those estimates appears to be due to the random chance of selecting bootstrap replicates that were relatively similar. Another way of stating the issue is that the variability of the bootstrap variance estimate appears to be large in small samples.

Because we did not construct weights for all implicates, we are unable to display the imputation and sampling variation on the same chart. However, results reported in KMW suggest sampling error is the dominant factor in the variability of the estimate.

[46]Appendix B, figure B13 shows similar information for the KW weight.

Figure 4: ASH Plot of the Distribution of the Percent of 1989 Net Worth Held by the ½ Percent Wealthiest Families, Consistently Estimated Weights

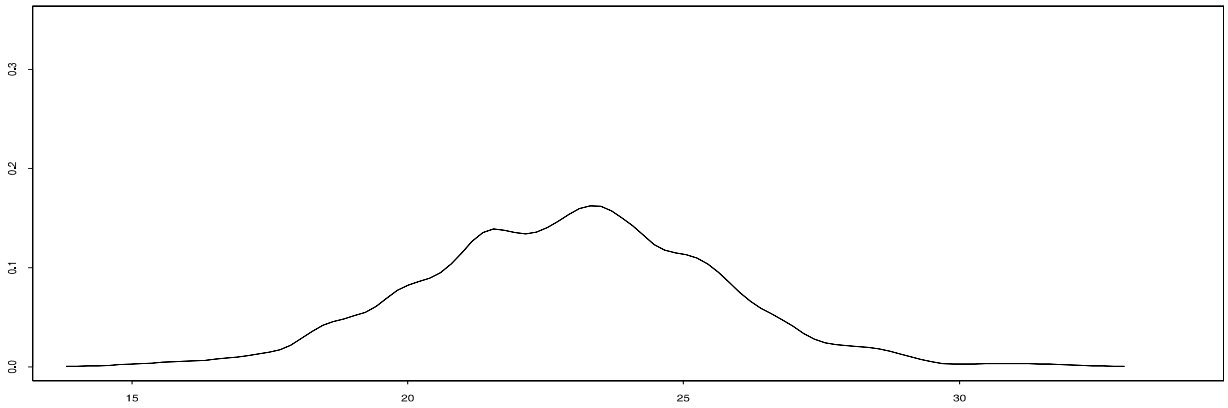


Figure 5: ASH Plot of the Distribution of the Percent of 1992 Net Worth Held by the ½ Percent Wealthiest Families, Consistently Estimated Weights

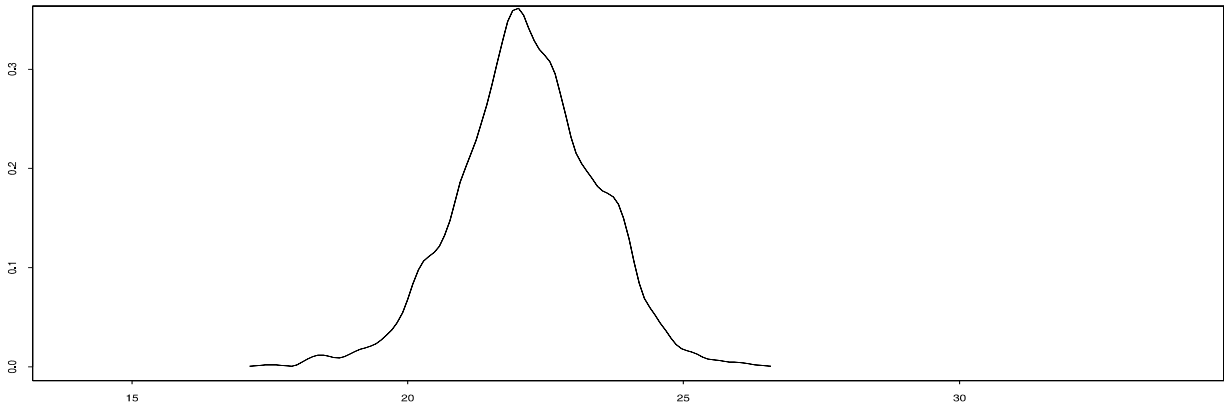


Figure 6: ASH Plot of the Distribution of the Percent of 1995 Net Worth Held by the ½ Percent Wealthiest Families, Consistently Estimated Weights

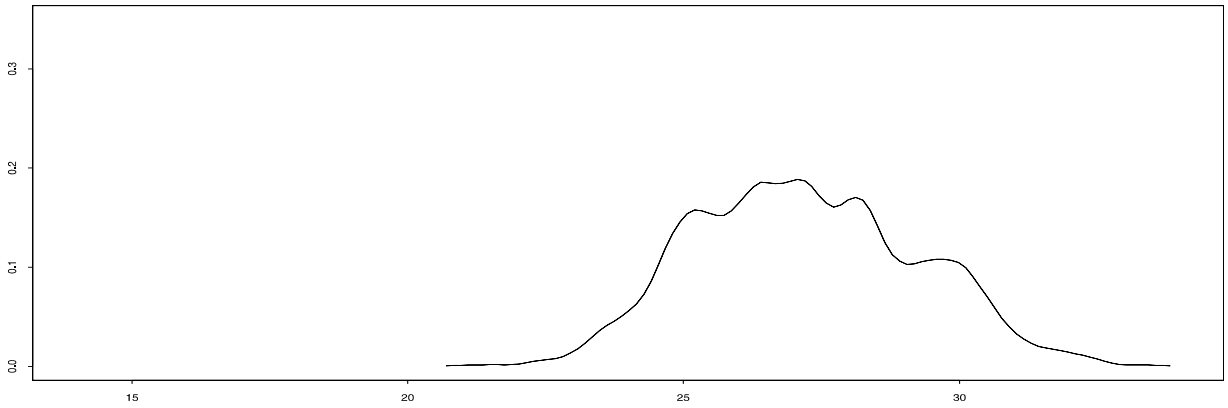


Figure 7: ASH Plot of the Distribution of the Percent of 1989 Net Worth Held by the Bottom 90 Percent Wealthiest Families, Consistently Estimated Weights

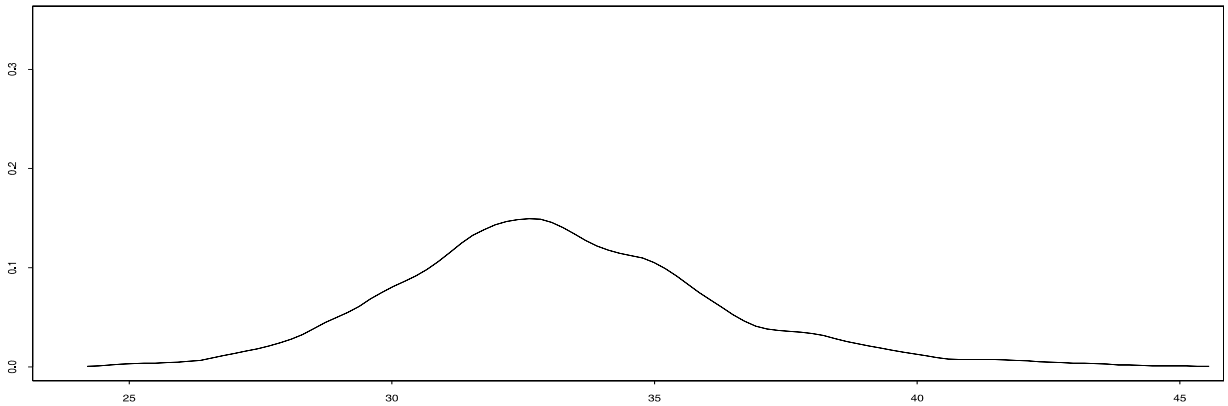


Figure 8: ASH Plot of the Distribution of the Percent of 1992 Net Worth Held by the Bottom 90 Percent Wealthiest Families, Consistently Estimated Weights

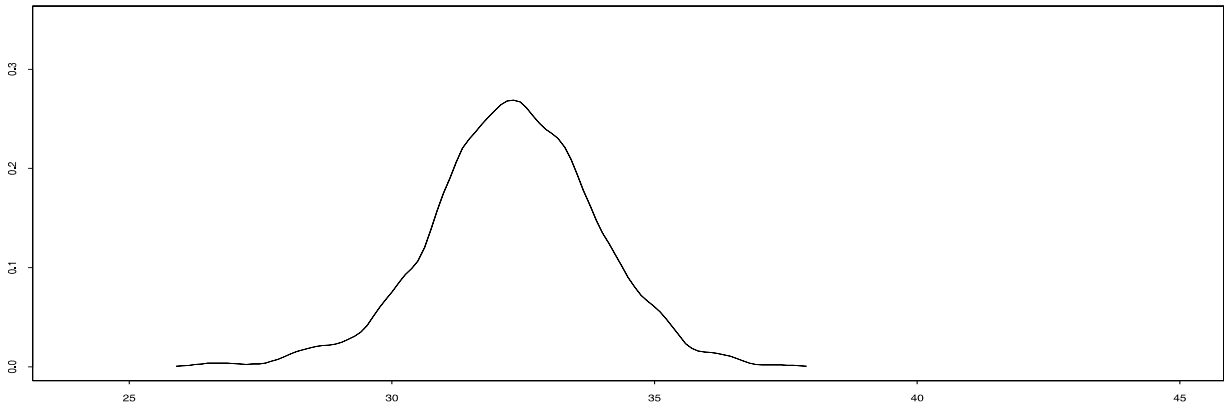
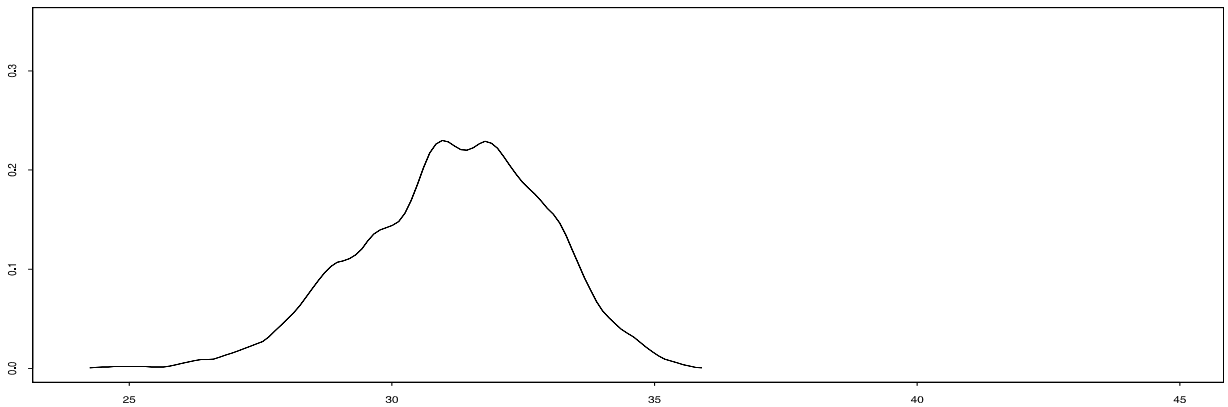


Figure 9: ASH Plot of the Distribution of the Percent of 1995 Net Worth Held by the Bottom 90 Percent Wealthiest Families, Consistently Estimated Weights



To better understand the underlying dynamics of wealth over the 1989-1995 period, tables 7-9 disaggregate the wealth distribution by the same percentile groups as in table 6 and by a set of component wealth and liability variables. Among the wealthiest ½ percent of households, business assets are particularly important in all the years shown: in 1995, for example, the group held about 60 percent (with a standard error of 3.6) of all such assets (table 9). Bonds, trust assets, and stocks are also important for the group. Behind the increased share of overall net worth of the wealthiest ½ percent in 1995, there was a notable increase from 1992 (table 8) in their share of businesses, almost entirely at the expense of the group between the 90th and 99th percentiles. At the same time, the top group also increased its share of bonds and the category "other accounts," and it decreased its share of debt.

At the other end of the wealth distribution, the bottom 90 percent hold about 66 percent (with a standard error of 1.1 percent) of owned principal residences in 1995. Cash value life insurance and vehicles are also relatively important for this group. From 1992 to 1995, changes are most apparent in the increased share of debt held by the bottom 90 percent.[47] Given the spread of stock ownership and the rise in stock prices between 1992 and 1995, it is somewhat surprising that the share of stock and mutual funds owned by the bottom 90 percent fell significantly between 1992 and 1995. However, the dollar holdings of the group rose strongly—by almost a third—but the holdings of the other groups rose even faster. Moreover, evidence presented by Kennickell, Starr-McCluer and Sundén [1997] suggests that much of the increase in ownership of equities took place through retirement accounts.

The correspondence of wealth shares and income shares is not strong: For example, in 1995, the top wealth group in table 9 were estimated to receive only 9.7 percent of total income in contrast to holding 27.5 of net worth..[48] A Q-Q plot of 1994 income against 1995 net worth shown in

---

[47]Appendix B, tables B1 and B2 contain similar figures for 1989 based on the HCW and KW weights respectively. The change in the point estimate of the wealth share of the wealthiest ½ percent that is attributable to the change in weighting the 1989 data appears to operate most strongly through a decline in share of bonds, trust assets, the category other accounts, businesses and the category other assets held by the group under the revised weight. Changes at the other end of the wealth distribution are more subtle.

[48]A Lorenz curve for 1995 income is provided as appendix A figure A11 to facilitate more detailed examination of the distribution.

appendix A figure A10 shows clearly that the distribution of income is less skewed than that of net worth — at least below a level of about a few hundred thousand dollars of income.[49] Above that point, the distributions are about equally skewed, as indicated by the fact that the plot is roughly parallel to the 45 degree line above that point. Not surprisingly, over time there is also more substantial variation — probably cyclical — in the distribution. One reason that has been offered to explain a part of the more equal distribution of income is that this figure is more variable over time than the fundamental level of "permanent income." Among the variables requested in the 1995 survey is an indication of whether the respondents considered their total income for the preceding year to be above or below "normal," and if the figure was unusual, they were asked what the normal level would be. Although there are clearly measurement problems with such a measure, one might reasonably expect that it would at least move in the direction of smoothing out fluctuations in income. However, as shown by a Q-Q plot of the two income measures from the 1995 survey (appendix A figure 12A), the only substantial differences in the distributions of the two measures are in the range where actual income is negative.

[49]The SCF collects total income for the full calendar year preceding the survey.

Table 7: Holdings and Distribution of Assets, Debts, and Income, by Percentiles of Net Worth, 1989 (revised). All dollar figures are given in billions of 1989 dollars.

	Percentile of the net worth distribution									
	All households		*0 to 89.9*		*90 to 99*		*99 to 99.5*		*99.5 to 100*	
Item	Holdings	% of total	Holdings	% of total	Holdings	% of total	Holdings	% of total	Holdings	% of total
Assets	20,557.5	100.0	7,618.7	37.1	7,205.4	35.0	1,339.2	6.5	4,390.4	21.4
	3,948.2	*0.0*	*1,486.2*	*3.2*	*1,858.2*	*3.4*	*447.7*	*1.1*	*838.8*	*2.6*
Princ. residence	6,582.1	100.0	4,173.3	63.4	1,947.5	29.6	181.7	2.8	279.3	4.2
	752.3	*0.0*	*440.3*	*2.3*	*327.0*	*2.3*	*37.9*	*0.6*	*79.4*	*0.9*
Other real estate	3,186.5	100.0	600.5	18.9	1,227.8	38.5	232.0	7.3	1,125.3	35.3
	943.7	*0.0*	*250.6*	*4.3*	*348.5*	*5.3*	*216.4*	*3.2*	*425.0*	*6.7*
Stocks	1,239.1	100.0	228.4	18.4	536.1	43.2	108.9	8.8	365.6	29.5
	290.8	*0.0*	*81.3*	*4.0*	*154.0*	*5.8*	*62.9*	*3.3*	*89.0*	*5.6*
Bonds	858.7	100.0	107.3	12.5	360.1	41.9	75.8	8.8	315.1	36.8
	242.6	*0.0*	*66.5*	*4.1*	*109.2*	*7.0*	*63.8*	*4.7*	*114.7*	*8.1*
Trusts	456.8	100.0	62.5	13.7	184.7	40.8	80.2	17.4	129.3	28.1
	151.4	*0.0*	*49.1*	*6.0*	*106.4*	*13.9*	*53.9*	*10.4*	*64.4*	*9.3*
Life Insurance	367.5	100.0	188.7	51.4	119.7	32.6	24.1	6.5	35.0	9.4
	66.4	*0.0*	*32.3*	*5.3*	*30.8*	*5.2*	*13.2*	*3.3*	*28.0*	*5.3*
Checking accts	241.7	100.0	116.6	48.8	98.1	39.8	16.2	6.9	10.7	4.5
	48.3	*0.0*	*20.2*	*7.1*	*42.1*	*10.3*	*13.4*	*6.0*	*5.1*	*2.2*
Thrift accounts	440.6	100.0	218.6	49.8	171.1	38.7	21.0	4.7	29.8	6.8
	101.7	*0.0*	*60.6*	*7.5*	*58.1*	*7.2*	*16.3*	*2.9*	*10.9*	*2.5*
Other accounts	2,029.8	100.0	830.6	40.9	788.4	38.8	171.3	8.5	239.2	11.8
	359.3	*0.0*	*156.3*	*4.4*	*226.1*	*5.9*	*54.6*	*2.7*	*136.6*	*5.5*
Businesses	3,523.0	100.0	321.9	8.9	1,248.6	35.3	335.8	9.6	1,623.6	46.2
	1,148.5	*0.0*	*425.2*	*4.2*	*548.6*	*6.7*	*200.3*	*3.5*	*440.4*	*7.9*
Automobiles	767.2	100.0	570.7	74.4	152.0	19.8	14.6	1.9	29.9	3.9
	58.4	*0.0*	*29.6*	*2.8*	*34.7*	*2.7*	*9.8*	*1.2*	*13.1*	*1.3*
Other assets	864.5	100.0	208.0	24.2	371.2	42.8	77.6	8.9	207.5	24.1
	215.3	*0.0*	*80.5*	*5.0*	*141.8*	*6.8*	*41.5*	*3.5*	*51.2*	*6.6*
Liabilities	3,173.3	100.0	1,969.7	62.1	735.1	23.1	70.4	2.2	397.5	12.5
	350.2	*0.0*	*235.2*	*4.3*	*144.9*	*3.4*	*32.8*	*1.0*	*144.9*	*3.7*
Princ. res. debt	1,695.9	100.0	1,329.9	78.4	315.5	18.6	18.0	1.1	32.5	1.9
	130.5	*0.0*	*124.3*	*2.7*	*48.0*	*2.6*	*12.0*	*0.7*	*13.6*	*0.8*
Other r/e debt	824.3	100.0	139.7	17.0	329.8	39.9	44.4	5.4	310.1	37.7
	207.4	*0.0*	*87.2*	*7.2*	*91.3*	*8.2*	*23.8*	*2.2*	*133.1*	*9.1*
Other debt	653.1	100.0	500.2	76.6	89.8	13.7	8.1	1.2	55.0	8.4
	87.3	*0.0*	*75.0*	*5.9*	*43.8*	*5.0*	*13.3*	*2.0*	*25.3*	*3.6*
Net worth	17,384.3	100.0	5,648.9	32.5	6,470.3	37.1	1,268.8	7.3	3,992.8	23.0
	3,661.6	*0.0*	*1,291.3*	*3.1*	*1,745.5*	*3.5*	*439.7*	*1.2*	*774.3*	*2.8*
Total income	3,652.6	100.0	2,373.2	65.0	779.6	21.3	145.8	4.0	353.6	9.7
	255.1	*0.0*	*146.1*	*2.5*	*120.0*	*2.1*	*42.8*	*1.1*	*82.5*	*2.1*
Memo items:										
Min net worth (T $)	-2,825.2		-2,825.2		348.6		2,282.4		3,466.1	
Num. of obs.	3143.0		2161.0		565.0		89.0		328.0	
Wgtd num. units (M)	93.0		83.7		8.4		0.5		0.5	

Standard errors due to imputation and sampling are given in italics.

Table 8: Holdings and Distribution of Assets, Debts, and Income, by Percentiles of Net Worth, 1992. All dollar figures are given in billions of 1992 dollars.

	Percentile of the net worth distribution									
	All households		*0 to 89.9*		*90 to 99*		*99 to 99.5*		*99.5 to 100*	
Item	Holdings	% of total	Holdings	% of total	Holdings	% of total	Holdings	% of total	Holdings	% of total
Assets	21,120.6	100.0	8,074.6	38.1	7,383.7	34.8	1,421.4	6.7	4,316.5	20.4
	1,269.1	*0.0*	*413.6*	*1.8*	*767.5*	*1.8*	*167.7*	*0.5*	*332.9*	*1.3*
Princ. residence	6,874.2	100.0	4,418.5	64.3	1,949.7	28.4	201.9	2.9	303.6	4.4
	255.6	*0.0*	*176.9*	*1.6*	*135.7*	*1.4*	*41.3*	*0.6*	*32.9*	*0.5*
Other real estate	3,024.4	100.0	554.9	18.4	1,175.3	38.9	291.9	9.6	1,000.5	33.1
	340.0	*0.0*	*57.9*	*2.0*	*180.6*	*3.1*	*112.6*	*2.9*	*153.8*	*4.0*
Stocks	1746.8	100.0	328.8	18.9	743.8	42.5	188.7	10.8	484.6	27.7
	170.7	*0.0*	*36.0*	*2.2*	*128.2*	*4.0*	*50.0*	*2.9*	*66.5*	*3.2*
Bonds	897.9	100.0	108.0	12.0	420.1	46.8	137.7	15.3	231.5	25.8
	101.7	*0.0*	*19.0*	*1.9*	*73.1*	*4.3*	*44.4*	*4.3*	*35.3*	*4.1*
Trusts	358.2	100.0	56.1	15.7	161.2	45.0	22.1	6.1	118.3	33.0
	56.4	*0.0*	*13.2*	*2.9*	*32.6*	*5.8*	*15.7*	*3.6*	*29.1*	*5.0*
Life Insurance	404.7	100.0	227.3	56.2	147.4	36.4	9.5	2.3	20.5	5.1
	45.8	*0.0*	*18.6*	*5.6*	*38.8*	*5.9*	*2.4*	*0.6*	*3.7*	*1.0*
Checking accts	215.0	100.0	124.2	57.8	59.7	27.8	14.0	6.5	17.1	8.0
	13.9	*0.0*	*7.7*	*2.6*	*7.2*	*2.3*	*5.9*	*2.6*	*3.2*	*1.5*
Thrift accounts	624.0	100.0	267.4	42.9	294.1	47.1	30.2	4.8	32.2	5.2
	64.8	*0.0*	*28.0*	*4.5*	*51.4*	*5.0*	*17.2*	*2.7*	*12.2*	*1.9*
Other accounts	1,952.0	100.0	850.7	43.6	784.7	40.2	129.2	6.6	187.0	9.6
	114.2	*0.0*	*61.6*	*2.5*	*75.3*	*2.4*	*40.9*	*2.0*	*42.9*	*2.1*
Businesses	3,662.9	100.0	342.2	9.4	1,244.8	34.0	320.9	8.8	1,750.5	47.7
	420.9	*0.0*	*47.4*	*1.4*	*236.1*	*3.7*	*88.6*	*2.2*	*240.6*	*4.2*
Automobiles	815.0	100.0	610.6	74.9	167.5	20.6	11.9	1.5	24.8	3.0
	21.3	*0.0*	*13.5*	*1.1*	*11.0*	*1.0*	*2.0*	*0.2*	*3.4*	*0.4*
Other assets	630.7	100.0	185.9	29.5	235.4	37.3	63.4	10.1	145.7	23.1
	70.4	*0.0*	*24.2*	*3.1*	*46.7*	*4.5*	*15.2*	*2.4*	*30.4*	*3.6*
Liabilities	3,448.5	100.0	2,241.3	65.0	832.8	24.1	81.4	2.4	292.2	8.5
	158.7	*0.0*	*99.5*	*2.2*	*81.1*	*1.8*	*33.1*	*0.9*	*39.5*	*1.0*
Princ. res. debt	2,206.5	100.0	1,660.2	75.2	461.8	20.9	33.2	1.5	51.1	2.3
	88.1	*0.0*	*79.0*	*2.0*	*44.4*	*1.8*	*10.6*	*0.5*	*7.0*	*0.3*
Other r/e debt	670.7	100.0	139.6	20.8	299.4	44.6	39.7	5.9	191.6	28.6
	82.0	*0.0*	*23.0*	*2.9*	*47.5*	*3.8*	*24.2*	*3.0*	*33.2*	*4.0*
Other debt	571.4	100.0	441.6	77.3	71.6	12.5	8.6	1.5	49.4	8.6
	28.2	*0.0*	*23.3*	*2.3*	*10.6*	*1.7*	*4.0*	*0.7*	*11.7*	*1.9*
Net worth	17,775.7	100.0	5,833.3	32.9	6,550.9	36.9	1,339.9	7.5	4,024.3	22.7
	1,153.7	*0.0*	*339.0*	*1.6*	*711.1*	*1.8*	*142.5*	*0.5*	*314.7*	*1.5*
Total income	3,745.6	100.0	2,622.4	70.0	813.7	21.7	93.9	2.5	215.1	5.7
	91.9	*0.0*	*60.2*	*1.3*	*55.1*	*1.1*	*11.8*	*0.3*	*24.5*	*0.6*
Memo items:										
Min net worth (T $)	-325.0		-325.0		343.4		2,348.9		3,530.0	
Num. of obs.	3906.0		2570.0		687.0		104.0		543.0	
Wgtd num. HHs (M)	95.9		86.3		8.6		0.5		0.5	

Standard errors due to imputation and sampling are given in italics.

Table 9: Holdings and Distribution of Assets, Debts, and Income, by Percentiles of Net Worth, 1995. All dollar values are given in billions of 1995 dollars.

	Percentile of the net worth distribution									
	All households		*0 to 89.9*		*90 to 99*		*99 to 99.5*		*99.5 to 100*	
Item	Holdings	% of total	Holdings	% of total	Holdings	% of total	Holdings	% of total	Holdings	% of total
Assets	24,461.0	100.0	9,267.3	37.9	7,583.3	31.0	1,683.5	6.9	5,916.1	24.2
	1,477.1	*0.0*	*378.7*	*1.8*	*571.9*	*1.3*	*255.6*	*0.7*	*713.7*	*1.9*
Princ. residence	7,613.2	100.0	5,053.3	66.4	1,957.6	25.7	205.7	2.7	396.0	5.2
	193.2	*0.0*	*142.0*	*1.1*	*88.2*	*0.9*	*20.6*	*0.3*	*51.3*	*0.6*
Other real estate	2,690.2	100.0	544.1	20.2	1,180.1	45.9	235.8	8.8	728.4	27.1
	233.8	*0.0*	*62.1*	*2.0*	*121.7*	*2.8*	*44.4*	*1.4*	*125.2*	*3.3*
Stocks	2,747.2	100.0	428.0	15.6	1,159.3	42.2	293.2	10.7	865.2	31.5
	328.6	*0.0*	*46.8*	*1.8*	*137.9*	*4.1*	*68.7*	*1.8*	*208.8*	*4.6*
Bonds	1,142.3	100.0	110.4	9.7	394.5	34.5	105.5	9.3	530.9	46.5
	138.3	*0.0*	*16.6*	*1.5*	*50.6*	*3.7*	*45.3*	*3.2*	*95.9*	*4.5*
Trusts	529.7	100.0	69.4	13.1	225.4	42.5	55.3	10.5	179.3	33.8
	72.9	*0.0*	*12.6*	*2.6*	*39.4*	*5.5*	*36.0*	*5.7*	*52.7*	*7.7*
Life Insurance	651.1	100.0	357.8	55.0	181.3	27.8	40.0	6.2	71.9	11.0
	48.7	*0.0*	*27.5*	*3.6*	*29.7*	*3.6*	*19.2*	*2.9*	*20.9*	*2.9*
Checking accts	265.9	100.0	153.5	57.7	69.2	26.0	12.3	4.6	30.9	11.6
	12.4	*0.0*	*7.1*	*2.1*	*6.5*	*1.9*	*3.0*	*1.1*	*5.8*	*1.9*
Thrift accounts	893.5	100.0	385.0	43.1	365.8	40.9	72.9	8.2	69.7	7.8
	72.3	*0.0*	*25.4*	*3.1*	*64.7*	*5.1*	*34.5*	*3.9*	*34.0*	*3.5*
Other accounts	2,035.0	100.0	771.5	37.9	717.1	35.2	142.3	7.0	403.8	19.8
	172.4	*0.0*	*65.1*	*2.9*	*63.4*	*2.8*	*57.0*	*2.5*	*118.8*	*4.6*
Businesses	4,018.2	100.0	309.1	7.7	835.3	20.8	462.4	11.5	2,406.8	59.9
	535.8	*0.0*	*30.4*	*1.1*	*153.6*	*2.6*	*144.2*	*2.3*	*340.9*	*3.6*
Automobiles	1,108.2	100.0	860.4	77.6	197.2	17.8	21.4	1.9	29.2	2.6
	21.8	*0.0*	*17.5*	*0.8*	*8.3*	*0.7*	*4.3*	*0.4*	*4.7*	*0.4*
Other assets	766.7	100.0	224.8	29.3	300.5	39.2	36.9	4.8	204.1	26.6
	73.1	*0.0*	*19.4*	*2.8*	*49.5*	*4.2*	*13.2*	*1.6*	*38.2*	*4.0*
Liabilities	3,941.2	100.0	2,794.5	70.9	762.3	19.3	117.5	3.0	266.0	6.8
	114.9	*0.0*	*81.8*	*1.6*	*60.3*	*1.3*	*23.5*	*0.6*	*47.6*	*1.1*
Princ. res. debt	2,650.7	100.0	2,077.5	78.4	455.1	17.2	47.8	1.8	70.2	2.7
	70.5	*0.0*	*63.7*	*1.2*	*34.2*	*1.2*	*8.5*	*0.3*	*10.5*	*0.4*
Other r/e debt	582.3	100.0	146.6	25.2	239.0	41.0	59.3	10.2	136.9	23.5
	58.9	*0.0*	*24.6*	*3.4*	*36.0*	*4.3*	*17.7*	*2.8*	*30.9*	*4.3*
Other debt	708.1	100.0	570.5	80.6	68.2	9.6	10.4	1.5	58.9	8.3
	29.4	*0.0*	*15.5*	*2.8*	*8.8*	*1.2*	*8.0*	*1.1*	*19.3*	*2.4*
Net worth	20,519.8	100.0	6,472.8	31.5	6,821.0	33.2	1,566.0	7.6	5,650.0	27.5
	1,398.3	*0.0*	*317.9*	*1.8*	*529.5*	*1.4*	*250.7*	*0.7*	*688.6*	*2.0*
Total income	4,300.7	100.0	2,964.3	68.9	843.6	19.6	145.3	3.4	346.8	8.1
	99.5	*0.0*	*55.8*	*1.1*	*45.3*	*0.8*	*19.4*	*0.4*	*46.2*	*1.0*
Memo items:										
Min net worth ($Th)	-14,467.4		-14,467.4		368.3		2,544.5		4,762.0	
Num. of obs.	4,299.0		2829.0		804.0		172.0		494.0	
Wgtd num. units (M)	99.0		89.1		8.9		0.5		0.5	

Standard errors due to imputation and sampling are given in italics.

Variable Definitions for Tables 7-9

Assets: All types of assets.
- *Principal residence:* The residence that the survey respondent considered his or her principal residence.
- *Other real estate:* All other types of real estate except those owned through a business.
- *Stocks:* All types of stock and stock mutual funds (including "balanced" funds), including those held through an IRA or Keogh, but not those held through a thrift account.
- *Bonds:* All types of bonds except savings bonds, and bond mutual funds, including those held through an IRA or Keogh, but not those held through a thrift account.
- *Trusts:* All trusts with an equity interest, managed investment accounts, and private annuities.
- *Life Insurance:* Cash value of whole life and universal life insurance.
- *Checking accounts:* All types of standard checking accounts and share draft accounts.
- *Thrift accounts:* Pension and other retirement accounts from a current job from which withdrawals can be made or loans taken out.
- *Other accounts:* Money market and savings accounts, certificates of deposit, and savings bonds.
- *Businesses:* All types of businesses except corporations with publicly-traded stock.
- *Automobiles:* Automobiles, trucks, motorcycles, boats, air planes, and other vehicles not owned by a business.
- *Other assets:* Includes all other assets (antiques, paintings, jewelry, metals, futures contracts, oil leases, etc.).

Liabilities: All types of debt.
- *Principal residence debt:* All mortgages and home equity lines associated a principal residence.
- *Other real estate debt:* All other debt secured by real estate.
- *Other debt:* All other types of debt (installment credit, credit cards, etc.).

Net worth: Assets minus liabilities.

Total income: Total household income from all sources in the year preceding the survey.

VI. Summary and Future Research

This paper is a part of an ongoing research effort intended to ensure both the comparability of SCF data across years of the survey and the reliability of the data within years. Beginning with the 1989 SCF, the survey questions and all important methodologies have been largely fixed. The only substantial technical difference before the work in this paper was done was the change in weighting methodology from 1989 to 1992. At the time the new weighting was introduced, we expected that the construction of the two weights was sufficiently similar that the change would result in no structural distortion in the data. To test this hypothesis, we decided to recompute the 1989 weight using the same methodology as that applied to the 1992 and 1995 surveys. This paper summarizes the construction of a consistent series of weights for the 1989, 1992, and 1995 SCFs and uses those weights to make estimates of various characteristics of the distribution of wealth.

As expected from earlier work, wealth is highly concentrated, with the top ½ percent wealthiest households owning more than a quarter of household net worth in 1995. A surprising finding is the degree to which the level of such a narrow measure of wealth concentration is sensitive to fairly subtle differences in weight design. Earlier weights for the 1989 SCF indicated that there had been a dramatic increase in the concentration of wealth among the wealthiest ½ percent of households from 1983 to 1989. According to the consistently estimated weight series, the point estimate of the 1989 figure is much lower, though the standard error of the estimate is sufficiently large to encompass the original value.[50] This result could be taken to cast suspicion on work that has compared narrow measures of wealth distributions estimated using surveys with any differences in technique.

The consistent weights show a statistically significant increase in the share of household net worth held by the wealthiest ½ percent of households from 1992 to 1995, driven in large part by a rise in their share of personal businesses. However, looking more broadly over time, the standard error of the 1989 estimate is so large that one cannot reject the hypothesis that the 1995 and 1989 figures are the same. Other measures of the wealth distribution, e.g., the Gini coefficient, show no significant trend across any of these surveys. Although popular attention has focused on the concentration estimates in the past, we stress that no single measure of distribution is universally appropriate. Moreover, given the sensitivity of the concentration estimate, our feeling is that judgments on the path of that estimate may best be viewed in the context of a longer series of consistent data.

We have relied heavily on a type of bootstrap sampling to estimate the sampling errors for the point estimates that we report in this paper. This approach has been forced on us by the constraints on the information available about individual respondents. Our hope is that we will have the time and resources to further examine the sensitivity of this approach, and perhaps to develop a partial calibration method using data for the area-probability sample alone, for which classical methods apply. No doubt, thorny problems of differential nonresponse will complicate this research.

---

[50]It is noteworthy that the original and revised weights have very similar implications for most of the sorts of estimates for which we routinely use the SCF.

Nonresponse in both the area sample and the list sample remains a serious problem. Experience suggests that little more can be done in the field to increase the response rate. Indeed, in the most recent SCF, heroic efforts were needed simply to avoid much lower response rates. Our best hopes for progress probably lie in a better approach to nonresponse adjustment. For the area sample, little has been available on a case-by-case basis other than the identity of the PSU. As a part of the 1995 SCF, we designed a section of supplemental data to be collected for each case regardless of their ultimate disposition. In addition, we have been able to match some Census information at finer geographic levels. We expect to use these sources of information to investigate response effects in the AP sample. For the list sample, the frame data could undoubtedly bear investigation beyond that reported in Kennickell and McManus [1993].

We feel obliged to point out that this paper has not dealt seriously with error other than that arising through sampling and nonresponse (unit and item). Surveys are large integrated measurement devices with many possible points of error and control. Unfortunately, a very large proportion of the mathematical statistical apparatus developed in the field deals only with sampling and missing data. It is critical for progress that we follow and expand on the developing work on measurement error induced by question design and respondent perceptions (e.g., as summarized in Sudman, Bradburn, and Schwartz [1996]) , interviewer effects (e.g., Groves and Couper [1996]), interviewer training and motivation, consistent data processing (particularly editing), and other such areas.

BIBLIOGRAPHY

Avery, Robert B., Gregory E. Elliehausen, and Arthur B. Kennickell [1988] "Measuring Wealth with Survey Data: An Evaluation of the 1983 Survey of Consumer Finances," *Review of Income and Wealth* (December), pp. 339-369.

Burbidge, John B., Lonnie Magee, and A. Leslie Robb [1988] "Alternative Transformations to Handle Extreme Values of the Dependent Variable," Journal of the American Statistical Association, v. 83, no. 401, pp.123-127.

Frankel, Martin and Arthur B. Kennickell [1995] "Toward the Development of an Optimal Stratification Paradigm for the Survey of Consumer Finances," paper presented at the 1995 Annual Meetings of the American Statistical Association, Orlando, FL.

Fries, Gerhard, Barry W. Johnson, and R. Louise Woodburn [1997] "Analyzing Disclosure Review Procedures for the Survey of Consumer Finances," paper for presentation at the 1997 Joint Statistical Meetings, Anaheim, CA.

Groves, Robert M. and Mick P. and Couper [1996] "Contact-Level Influences in Face-to-Face Surveys," *Journal of Official Statistics*, Vol. 12, No. 1, pp. 63-83.

Heeringa, Steven G., Judith H. Conner and R. Louise Woodburn [1994] "The 1989 Surveys of Consumer Finances Sample Design and Weighting Documentation," working paper, Survey Research Center, University of Michigan, Ann Arbor, MI.

Internal Revenue Service [1992] "Individual Income Tax Returns, 1990."

Kennickell, Arthur B. [1997a] "Multiple Imputation and Disclosure Protection: The Case of the 1995 Survey of Consumer Finances," working paper, Board of Governors of the Federal Reserve Board.

_____ [1997b] "Using Range Techniques with CAPI in the 1995 Survey of Consumer Finances," *Proceedings of the Section on Survey Research Methods*, 1996 Annual Meetings of the American Statistical Association, Chicago, IL.

_____ [1991] "Imputation of the 1989 Survey of Consumer Finances: Stochastic Relaxation and Multiple Imputation," 1991 Proceedings of the Section on Survey Research Methods, Annual Meetings of the American Statistical Association, Atlanta, GA.

_____ [1997] “Multiple Imputation and Disclosure Protection: The Case of the 1995 Survey of Consumer Finances,” paper presented at the Record Linkage Workshop, Washington, DC.

_____ and R. Louise Woodburn [1992] "Estimation of Household Net Worth Using Model-Based and Design-Based Weights: Evidence from the 1989 Survey of Consumer Finances," mimeo Board of Governors of the Federal Reserve System.

_____ and Douglas A. McManus [1993] "Sampling for Household Financial Characteristics Using Frame Information on Past Income," *Proceedings of the Section on Survey Research Methods*, 1993 Annual Meetings of the American Statistical Association, San Francisco, CA.

_____, _____, and R. Louise Woodburn [1996] “Weighting Design for the 1992 Survey of Consumer Finances,” working paper, Board of Governors of the Federal Reserve System.

_____, Martha Starr-McCluer, and Annika E. Sundén [1997] "Family Finances in the U.S.: Recent Evidence from the Survey of Consumer Finances," *Federal Reserve Bulletin* (January), pp. 1-24.

_____, and Annika E. Sundén [1997] “Pensions, Social Security, and the Distribution of Wealth,” working paper, Board of Governors of the Federal Reserve System.

Kish, Leslie [1965] *Survey Sampling*, John Wiley, New York.

Little, Roderick J.A [1993] “Post-Stratification: A Modeler’s Perspective,” Journal of the American Statistical Association, Vol. 88, No. 423, pp. 1001-1012.

Mulrow, J.M. and R. Louise Woodburn [1991] “An Investigation of Stratification Errors,” *Proceedings of the Section on Survey Research Methods*, 1990 Joint Statistical Meetings, Atlanta, GA.

Oh, H. Lock and Fritz Scheuren [1987] “Modified Raking Ratio Estimation,” *Survey Methodology*, v. 13, pp. 209-219.

Projector, Dorothy S. and Gertrude S. Weiss [1966] “Survey of Financial Characteristics of Consumers,” Board of Governors of the Federal Reserve System.

Sitter, R.R. [1992] “A Resampling Procedure for Complex Survey Data,” Journal of the American Statistical Association, 87(419), pp. 755-65.

Strudler, Michael, Lock H. Oh, and Fritz Scheuren [1987] "Protection of Taxpayer Confidentiality with Respect to the Tax Model, " *Statistics of Income and Related Administrative Record Research: 1986-1987*, Internal Revenue Service (November), pp. 279-286.

Sudman, Seymour, Norman M. Bradburn, and Norbert Schwarz [1996] *Thinking About Answers*, Jossey-Bass, San Francisco.

Tourangeau, Roger, Robert A. Johnson, Jiahe Qian, Hee-Choon Shin, and Martin R. Frankel [1993] "Selection of NORC's 1990 National Sample," working paper, National Opinion Research Center at the University of Chicago, Chicago, IL.

Weicher, John C. [1996] "The Distribution of Wealth: Increasing Inequality?" American Enterprise Institute for Policy Research, Washington, DC.

Wolff, Edward N. [1996] "International Comparisons of Wealth Inequality," Review of Income and Wealth, Series 42, No. 4 (December), pp. 433-451.

_____ [1995] Top Heavy, The Twentieth Century Fund Press, New York, NY.