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CONSISTENT WEIGHT DESIGN FOR THE 1989, 1992 AND 1995 SCFs, AND THE DISTRIBUTION OF WEALTH

BY ARTHUR B. KENNICKELL

Board of Governors of the Federal Reserve System

AND

R. LOUISE WOODBURN

Capital One

Estimates using survey data are determined by two factors: the data collected and the survey weights. This paper discusses the design and calculation of a set of consistent weights for the Surveys of Consumer Finances. Taking both these weights and the multiply-imputed survey data, we look at estimates of changes in the distribution of wealth over the first half of the 1990s.

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 that are interviewed, 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] 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.[2]

I. INTRODUCTION

The SCF is a triennial survey 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. The survey is intended to provide reliable information on the financial characteristics of U.S. households. To this end, the SCF employs a questionnaire that carefully frames a detailed sequence of questions on the components of households' assets, liabilities, income, employment

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[1]One notable exception is Weicher, 1996.

[2]A version of this paper available on the Internet at http://www.bog.frb.fed.us/pubs/oss/oss2/method.html contains additional information about the weight construction and comparisons of the consistent weights with earlier weights.

history, pensions, demographic characteristics, and their use of financial services.[3] Since the 1989 survey, the survey questionnaire, sample design, imputation technique, and important technical factors other than the weighting design have been held largely constant.

In 1992, two factors drove a change in the approach to weighting. First, a body of results had accumulated from ongoing SCF research related to sampling, nonresponse, and weighting. This research provided an empirical foundation for reconsidering the weighting design. Secondly, it was possible to use frame data that were previously unavailable in the weighting design. As described in Kennickell, McManus, and Woodburn (1996) (hereafter KMW), these weights followed many of the ideas developed by Heeringa, Conner, and Woodburn (1994) (hereafter HCW), and Kennickell and Woodburn (1992) (hereafter KW), for the 1989 SCF. To place the series of surveys beginning with 1989 on as common a basis as possible, a decision was made to weight the 1995 survey using the same procedures, and to reweight the 1989 data. Through the generosity of Stephen Heeringa at the Survey Research Center at the University of Michigan (SRC), we were given sufficient access to the 1989 frame data needed to make this calculation.[4]

Earlier work (e.g. KMW and Wolff, 1995) using the original 1989 SCF weights suggested that there was a substantial increase in the share of wealth held by the half percent wealthiest households between 1983 and 1989. However, under the consistently estimated weights reported in this paper, the direction of this change reverses, though the statistical confidence interval for the estimate is so large that it encompasses the original 1989 figure. *A priori*, our expectation was that the refinements introduced in the consistent weights would not alter this estimate substantially. The calculations are similar in outline. The fact that at least this one estimate changes so much should serve as a strong caution to anyone who wished to compare narrow SCF wealth estimates between 1983 and later years. It is also important to note that even consistent calculation of weights is no guarantee that the resulting weights are appropriate for all purposes.

The next section of this paper provides a brief overview of the SCF sample design. 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.

II. SCF Sample Design

To provide good coverage of broadly-distributed variables, such as credit card debt, and of narrowly-held variables such as corporate stock, the survey uses

[3]See Kennickell, Starr-McCluer, and Sundén (1997), for an overview of the data. As in most other surveys, missing data are a problem in the SCF [see Kennickell (1996)]. 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.

[4]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 structure of the data between 1989 and 1983 and the differences in the sample are probably at least as important as weighting differences.

a dual-frame sample design. A multi-stage national area-probability (AP) sample provides good representation of broadly-distributed characteristics.[5] 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.[6] Under an agreement with SOI, the list sample is selected from an annual sample of tax data, the individual tax file (ITF).[7] To protect the privacy of survey participants, a set of agreements between the Federal Reserve, SOI, and the survey contractor places 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. The SCF sample is selected from a version of the ITF for the calendar year preceding each 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 within 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.

The list sample is selected in two stages. First, to control costs, only cases living in one of the primary sampling units (PSUs) selected for the AP sample are included. Second, these eligible cases are separated into strata defined in terms of a wealth index, which is a type of capitalization of income flows observed in the ITF. The index corresponds roughly to the expected level of wealth. Strata corresponding to higher levels of the index are oversampled. Unlike households in the AP sample, list sample respondents have been given the opportunity since 1989 to refuse participation by postcard before being contacted by an interviewer.[8]

There are three noteworthy compromises in using the ITF for the SCF design.[9] First, the unit of observation in the ITF is the taxpayer, while the unit desired in the SCF is the household. However, the apparent effect of this unit

[5]See Tourangeau, Johnson, Qian, Shin, and Frankel (1993), for a discussion of the AP sample used for the 1995 SCF. The 1989 area sample was a complex 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 AP sample for 1989 and the 1992 AP sample were based on the same frame, which was drawn jointly by NORC and SRC. For details on the 1989 sample, see HCW.

[6]See HCW, KMW, and KW, and Kennickell (1998), for more information.

[7]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.

[8]This procedure is intended to provide an extra layer of protection of the privacy of list respondents. In the 1983 survey, an interview was attempted only for respondents who returned a postcard expressing active interest in participating; not surprisingly, some characteristics of participants in 1983 and the later years differ substantially.

[9]See Kennickell and McManus (1993) (hereafter, KM), for an extensive overview of these problems.

definition problem is minor. Second, the use of the areas selected for the AP sample implicitly assumes that wealthy households are distributed in the same way as the general population. Although Frankel and Kennickell, 1995, document some strong differences in these distributions, it appears that post-stratification adjustments in weighting are a satisfactory way of handling this problem. 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 few 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.

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 expressed as the probability of selection multiplied by the probability of response. This section outlines the design of the consistent SCF weight series, which is applied for the surveys beginning with 1989.[10]

The most natural way to proceed might be to compute a joint probability of observation of cases under the AP and list designs. Unfortunately, the data available for the two samples is too limited for this calculation to be possible.[11] Another possibility would be to compute population estimates by using the two frames separately with separate weights for each sample. However, issues connected with nonrandom nonresponse would complicate any simple comparison of the two samples, and legal constraints require disguising the separate identity of the list sample in the public data. A third possibility—the one we adopt—is to

[10]To ensure exact comparability in the weighting schemes for 1989, 1992, and 1995, the weights for the 1992 survey were also recomputed since the KMW paper. 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.

The weights computed by HCW and KMW explored a broad set of weighting designs. The intent of the HCW design was to stay as close as possible to simple connections to the original sample design in adjusting the weights for the two parts of the sample, and to use a post-stratification technique to assemble the samples. KMW computed two weights, one similar to that of HCW and one that used an explicit model to adjust for nonresponse. They combined the two samples using a structure to characterize the joint probability of observation under the two frames. The consistent weights share characteristics of both the HCW and the KMW weights, though a simple scatterplot suggests the consistent weights are closer to the former. The most obvious difference between the consistent weights and the earlier weights is that the newer weights incorporate more information about nonresponse and the structure of the population.

[11]For each case one would need to have a reliable measure of the probability of observation under each frame. Many assumptions are required even to approximate such a measure.

develop other means of calculating a single analysis weight to use with the data from 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 for nonresponse, irregularities in the frames, and deviations from known population totals. 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. Since some households file no tax returns and because the incidence of multiple filers increases at lower wealth levels, the AP 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 the AP sample, response rates for comparable areas have not moved appreciably between the 1989 and 1995 surveys, reflecting a continuing commitment to maintaining these rates in the face of increasing respondent resistance. In 1995, the overall response rate in the AP sample was about 66 percent, with higher rates in rural areas. The only information available to adjust for nonresponse is the location of the PSU from which the case was selected. Starting with the inverse of the initial probability of selection, the weights of the AP cases are ratio adjusted by PSU to equal the frame population totals. Then, these adjusted weights are raked to population figures for the geographic distribution of households, fine age categories, and age-homeownership groups computed using the March Current Population Survey for the survey year and using SCF unit definitions of households.[12] 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.

IIIb. *Separate Weights for List Sample*

Response rates in the list sample vary strongly by stratum. In 1995 about 40 percent in the least wealthy part of the sample participated, but only about 17 percent in the wealthiest part participated. Since 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.[13]

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

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

[13]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 and the probability of selection of the PSU where the case is located.

sampling strata—that is, misclassification appears to be a problem. In some such cases, the household composition may have changed since the time of the tax returns on which the sample is based; in some, income in the sample year may have been unusual; and for others 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.[14] 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.[15]

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. 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.

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, and for geographic areas defined as the four major Census regions crossed with self-representing PSU status.[16] Earlier research on nonresponse in the SCF list sample (see KM), 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.[17]

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. Thus, we need to adjust the sum of the list sample weights. Guided by evidence in KM, we adjust the size of all strata higher than the second one at the rate of overall population growth.[18] The sizes of the bottom two strata are adjusted proportionately to equal the total of the weights of the AP sample that reported filing a tax return for the preceding

[14]Since wealth is defined using the imputed survey data, weights of different implicates of the same observation may differ.

[15]Mulrow and Woodburn (1991), give an example of dealing with misclassification in the SOI Corporate Study.

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

[17]Since there is a 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 KM.

[18]Since 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.

year, less the total of the adjusted weights of the list sample cases in the higher strata.[19]

IIIc. *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. We compute the merged weight using a post-stratification technique based on the same measure of gross assets that is used in the reassignment of strata for some list sample cases as discussed earlier. While 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.

AP cases that did not file a return are given their nonresponse-adjusted weight as computed above, and these cases are not further adjusted. We divide the remaining cases into seven post-strata defined in terms of gross assets, 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.[20] The totals of the combined weights for post-strata 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.[21] 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.

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

[19]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.

[20]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,

$$\text{COMBINED\_WGT}_j = R^*_{ia}\text{AP\_WGT}_j + R^*_{il}\text{LIST\_WGT}_j,$$

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.

[21]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 a set of fine age categories estimated from the CPS.[22] Second, we rake the weights of these observations to totals for homeownership crossed with coarse age categories, and totals for the four Census regions. Finally, these weights are post-stratified again to the fine age categories used in the first of these final adjustments.

IIId. *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 linearization, 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.[23] 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.

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.[24] Each self-representing PSU is a pseudo-stratum, which we further subdivide into groups of geographic segments. To select each bootstrap replicate, we randomly select with replacement in each pseudo-stratum a number of areas equal to the number of areas in that group.[25] All AP observations in the selected areas are included in the bootstrap sample.

Reflecting the common geographic basis of the AP and list sample cases, list sample observations in the non-self-representing PSUs (the largest metropolitan areas) are selected into the bootstrap samples as many times as the PSU waschosen for the AP bootstrap sample. For list sample observations in self-representing PSUs, no comparable geographic selection can be made. To select 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

[22]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.

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

[24]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.

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

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.[26]

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.[27]

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 estimate 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.

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. Since 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. Since the data in the public versions of the surveys are altered to protect the privacy of individuals, some small differences in the results computed from those data may arise [see Fries, Johnson, and Woodburn (1997), and Kennickell (1997b)].

Table 1 provides information on mean and median household net worth (in 1995 dollars) from the 1989, 1992, and 1995 SCFs. 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,

[26]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.

[27]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 1

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*

Note: 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.

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.[28] The standard error for the 1989 mean 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.[29] 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 such small samples.[30] As is the case for the mean, the point estimate of the median declines in real terms over the 1989–95 period, but by not so large a fraction of its 1989 value. The decline is not significant at the 95 percent level of confidence.

[28]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 $SX^2_{imp} = (1/4)*\sum_{i=1\text{ to }5} (X_i\text{-}mean(X))^2$ and the sampling variance SX^2_{samp} is given by $SX^2_{samp} = (1/998)*\sum_{r=1\text{ to }999} (X_r - \text{mean}(X))^2$. For the imputation variance, the mean function is taken with respect to all five implicates. Since we have computed bootstrap weights only for the first implicate, for the sampling variance calculations, the mean function is taken with respect to the 999 bootstrap replicates of the first implicate.

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

[30]For example, if we take the 999 means computed for the standard error of the 1989 mean in Table 1, 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.

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.

TABLE 2

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

Note: 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, which is one of a large number of possible summary measures of an overall distribution.[31] Table 2 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 the final FRB weights.[32] The estimates for 1989–95 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 slightly less than one standard error higher than the 1995 figure, and about one and a quarter standard errors higher 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

[31]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 distributions, 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.

[32]Projector and Weiss (1966), report an estimate of 0.76 from the 1963 SFCC.

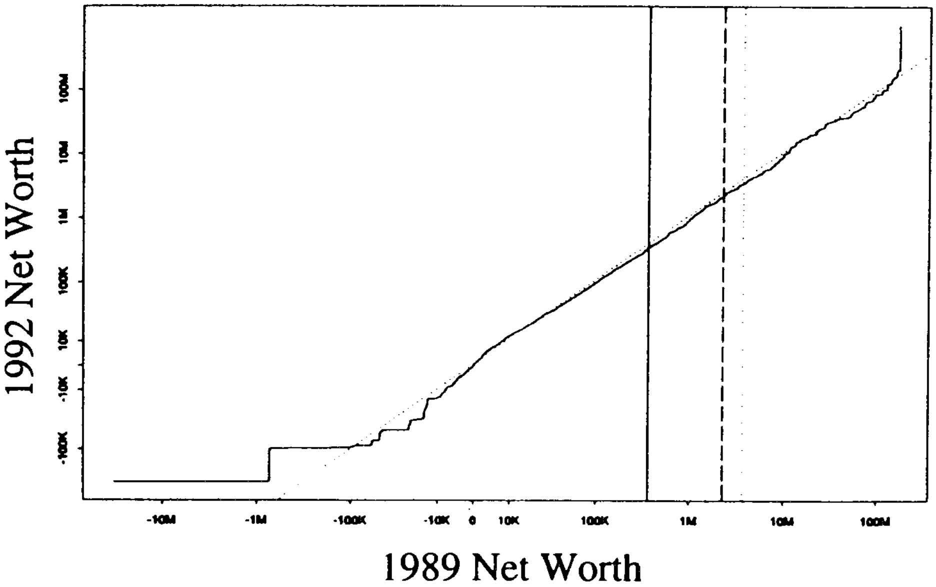

Figure 1. Q–Q Plot of 1992 NW vs. 1989 NW

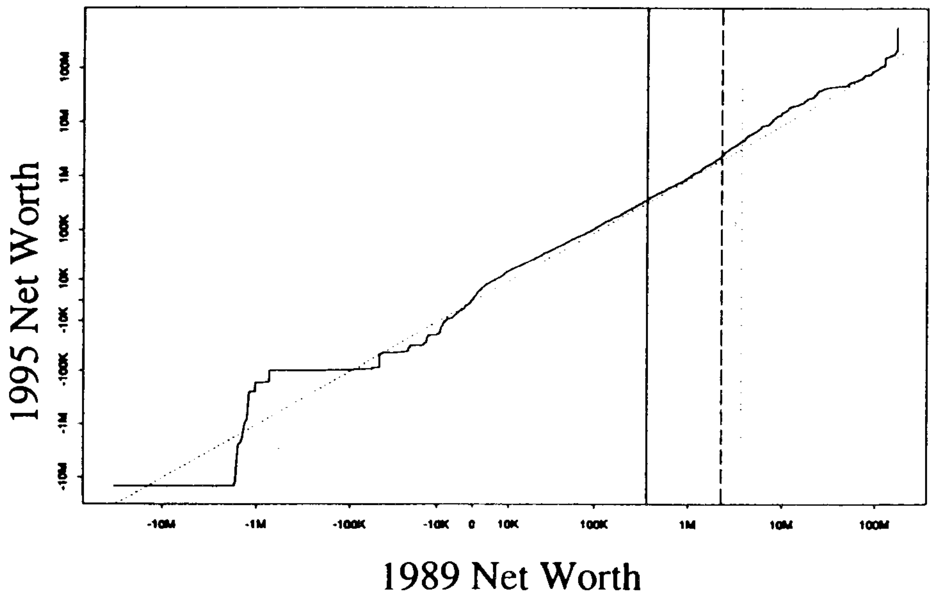

Figure 2. Q–Q Plot of 1995 NW vs. 1989 NW

against the net worth value of that percentile in the 1992. Figures 2 and 3 show corresponding quantile–quantile plots of the distributions in 1989 and 1995, and in 1992 and 1995, respectively.[33] To highlight the interesting differences in the distributions, the (nominal) values have been subjected to a transformation which

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

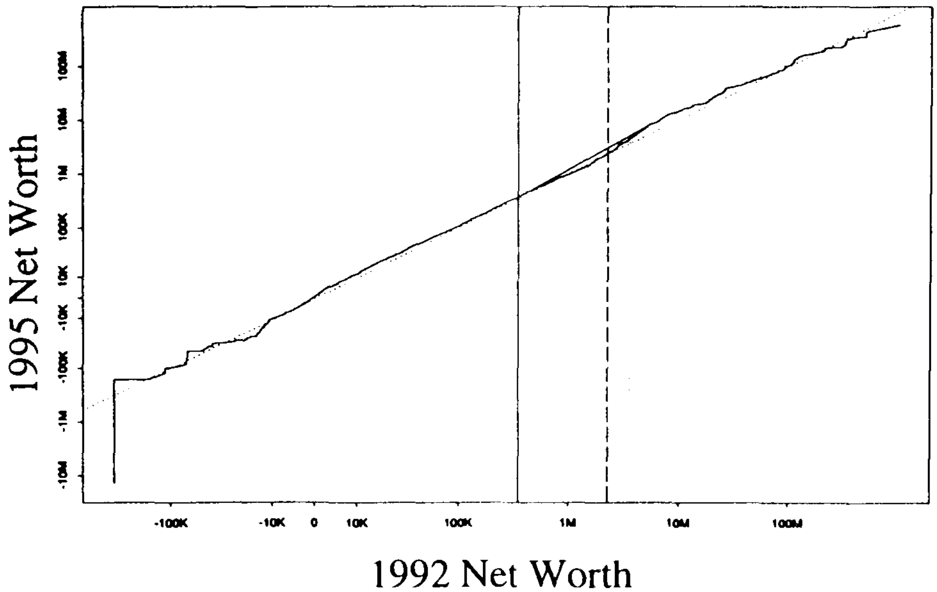

Figure 3. Q–Q Plot of 1995 NW vs. 1992 NW

is intended to compress the large spread in the tails of the distribution.[34] 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 deviation 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.

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, mainly reflecting 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. Since

[34]Due to 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.

there 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. Nonetheless, the bottom of the distribution in 1995 may be shifted in a more negative direction than in 1989 or 1992.

TABLE 3

PROPORTION OF TOTAL NET WORTH HELD BY DIFFERENT PERCENTILE GROUPS: 1989, 1992, AND 1995 SCFS

	Percentile of the net worth distribution			
Survey year	0–89.9	90–99	99–99.5	99.5–100
	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*

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

To look more directly at groups within the wealth distribution, Table 3 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 for 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 half percent wealthiest households, the next-wealthiest half 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 half percent of households increased in 1995 over both the 1989 and 1992 levels. 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 half percent from 1992 to 1995.

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 half percent of households. Moreover, this increase appeared regardless of whether the HCW weight or the KW weight was used for the calculation. Given the relationship of the revised 1989

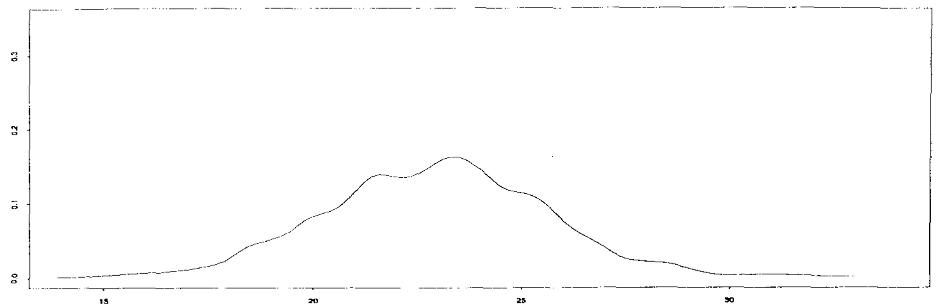

Figure 4. ASH Plot of the Distribution of the Percent of 1989 Net Worth Held by the Half Percent Wealthiest Families, Consistently Estimated Weights

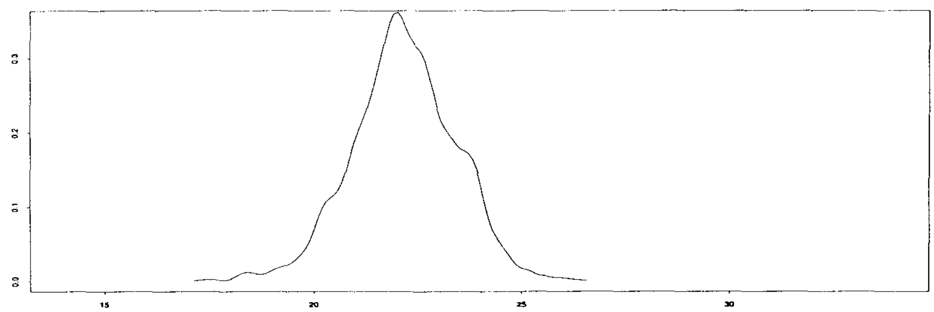

Figure 5. ASH Plot of the Distribution of the Percent of 1992 Net Worth Held by the Half Percent Wealthiest Families, Consistently Estimated Weights

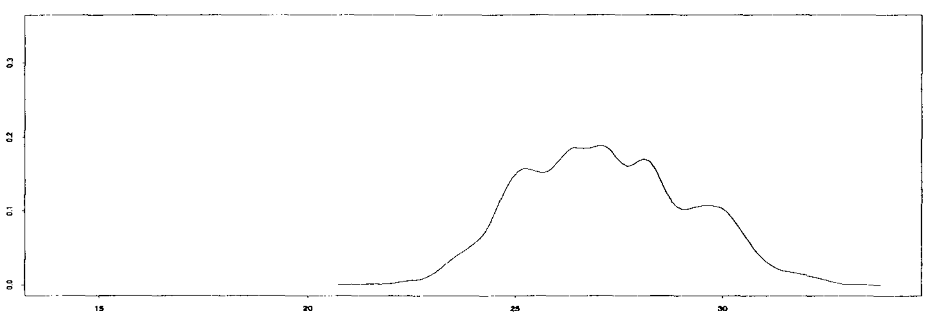

Figure 6. ASH Plot of the Distribution of the Percent of 1995 Net Worth Held by the Half Percent Wealthiest Families, Consistently Estimated Weights

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 to comparisons of surveys that are done in different countries

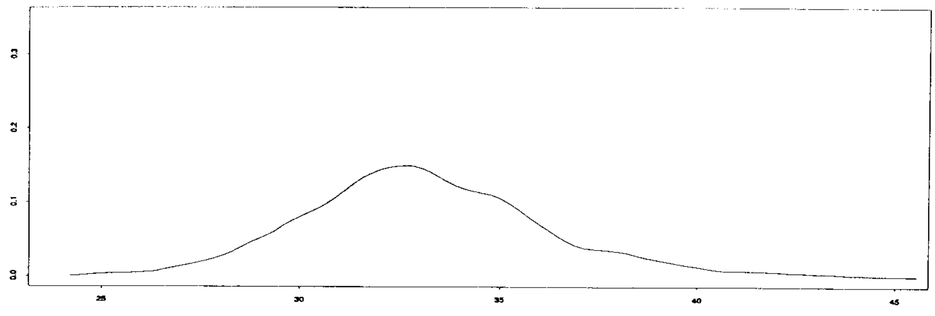

Figure 7. ASH Plot of the Distribution of the Percent of 1989 Net Worth Held by the Bottom 90 Percent Wealthiest Families, Consistently Estimated Weights

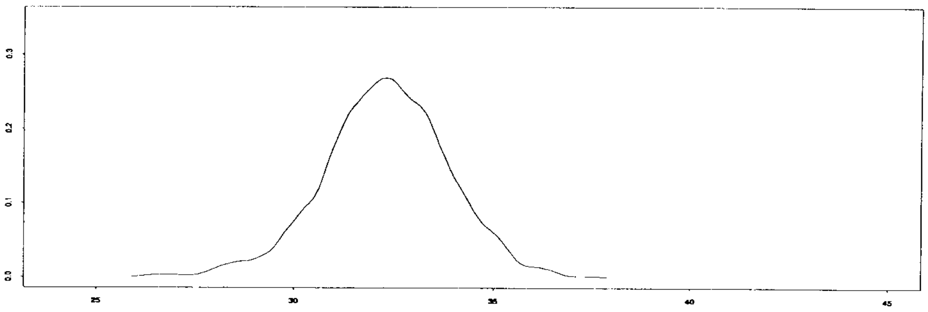

Figure 8. ASH Plot of the Distribution of the Percent of 1992 Net Worth Held by the Bottom 90 Percent Wealthiest Families, Consistently Estimated Weights

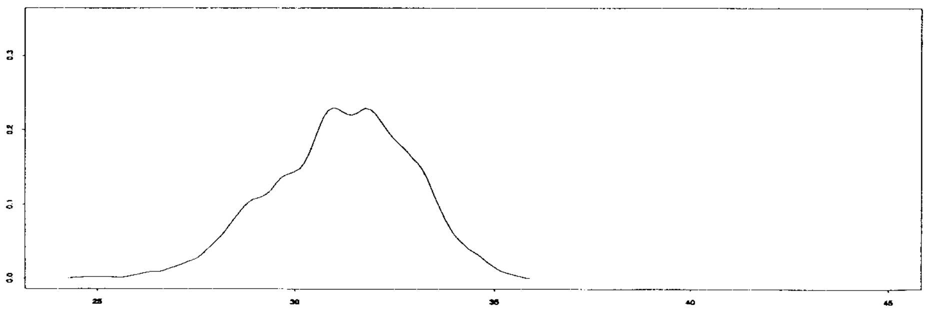

Figure 9. ASH Plot of the Distribution of the Percent of 1995 Net Worth Held by the Bottom 90 Percent Wealthiest Families, Consistently Estimated Weights

[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 sampling distribution of the share of net worth held by the top half of one percent of the net worth distribution in 1989, 1992, and 1995 respectively, using the consistently estimated weights computed for the 999 bootstrap replicates.[35] Although the mode of the distribution of the share of net worth held by the half 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. Figures 7–9 show the comparable distribution for the bottom 90 percent of the wealth distribution. The estimates for the share held by families in this group also show a relatively large variability in 1989, mainly 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.

To better understand the underlying dynamics of wealth over the 1989–95 period, Tables 4–6 disaggregate the wealth distribution by the same percentile groups as in Table 3 and by a set of component wealth and liability variables. Among the wealthiest half 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 6). Bonds, trust assets, and stocks are also important for the group. Underlying the increased share of overall net worth of the wealthiest half percent in 1995, there was a notable increase from 1992 (Table 5) 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. 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.

V. Summary and Future Research

This paper is a part of a continuing 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 most important methodologies have been fixed. The only substantial technical

[35]Since 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.

TABLE 4

HOLDINGS AND DISTRIBUTION OF ASSETS, DEBTS, AND INCOME, BY PERCENTILES OF NET WORTH, 1989

(All dollar figures are given in billions of 1989 dollars)

	Percentile of the net worth distribution									
	All households		0–89.9		90–99		99–99.5		99.5–100	
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 accounts	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.	3,143.0		2,161.0		565.0		89.0		328.0	
Wgtd num. units (M)	93.0		83.7		8.4		0.5		0.5	

Note: Standard errors due to imputation and sampling are given in italics. See variable definitions below.

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 weights 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.

TABLE 5

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		0–89.9		90–99		99–99.5		99.5–100	
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	1,746.8	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 accounts	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.	3,906.0		2,570.0		687.0		104.0		543.0	
Wgtd num. HHs (M)	95.9		86.3		8.6		0.5		0.5	

Note: Standard errors due to imputation and sampling are given in italics. See variable definitions below.

As expected from earlier work, wealth is highly concentrated, with the top half percent wealthiest households owning more than a quarter of household net worth in 1995. Earlier weights for the 1989 SCF, which were based on less information than the consistent weights, indicated that there had been a dramatic increase in the concentration of wealth among the wealthiest half percent of households from 1983 to 1989. However, 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.[36]

[36]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.

TABLE 6

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		0–89.9		90–99		99–99.5		99.5–100	
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 accounts	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	58.6	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:										
Mln net worth ($Th)	−14,467.4		−14,467.4		368.3		2,544.5		4,762.0	
Num. of obs.	4,299.0		2,829.0		804.0		172.0		494.0	
Wgtd num. units (M)	99.0		89.1		8.9		0.5		0.5	

Note: Standard errors due to imputation and sampling are given in italics. See variable definitions below.

The consistent weights show a statistically significant increase in the share of household net worth held by the wealthiest half 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

VARIABLE DEFINITIONS FOR TABLES 4–6

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.

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 want to be very clear that we do not believe that the consistent weight design we develop here is the only correct approach. There may well be many other feasible approaches that are possibly more appropriate for some purposes. What we can say about the consistent weight series is that it is based on a large amount of empirical research on the nature of SCF nonresponse, frame problems, and similar issues. In the process of developing these weights, we have explored a range of variations around the final assumptions, and the estimates we have examined have appeared to be robust within that range. In our view, an important purpose of this paper is to open the normally opaque discussion of weights to other researchers for comment and criticism.

Due to the magnitude of the nonresponse problem in the SCF, this issue is always in the forefront of our research.[37] Experience suggests that little more can be done 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 adjustments. For the area sample, little has been available in the past on a case-by-case basis other than the identity of the PSUs where observations lived. 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

[37]Due to its nonresponse problems, the SCF has been compared unfavorably with other surveys. However, the reader should note that similar problems are almost surely latent in other surveys which lack the means to identify the problem.

some Census information at fine geographic levels. Preliminary investigation of these data (Kennickell, 1997a) suggests that there is an empirical basis for improved adjustments in the AP sample. For the list sample, the frame data could undoubtedly bear investigation beyond that reported in KM.

We feel obliged to point out that this paper has not seriously addressed 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, weighting, 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.

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