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The measurement and structure of household wealth

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Abstract

This paper deals with methodological issues that arise in measuring household wealth. Two prominent American household surveys—the PSID and SCF—rely on different methodological approaches to the measurement of household wealth. In particular, SCF oversamples high-income households and has a far more extensive set of questions. In the top one percent of the wealth distribution, better measures of wealth are related to over-sampling of very wealthy households and the number of questions that are asked. However, one can characterize total household wealth holdings for the overwhelming majority of households with a relatively moderate number of questions. When successive waves of wealth modules are used to compute savings, the verdict on quality is more cautious, in part due to the inherently larger role measurement error plays in any first difference formulation. © 1999 Elsevier Science B.V. All rights reserved.

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There has been renewed interest in both Europe and America in the measurement and motives for household wealth accumulation and savings behavior. Encouraged by newly available data, theoretical models have focused on fundamental hypotheses about why people save (Deaton, 1992). While the issues examined are extremely diverse, these models are linked by a common need: reasonably reliable wealth and savings data to test their basic implications. Data quality is an issue of long-standing concern among researchers interested in wealth accumulation (Ferber, 1959; Curtin et al., 1989). Recently, available wealth data

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have proliferated in Europe and the United States, as some prominent surveys have incorporated wealth modules into their studies. Moreover, many of these surveys have panel designs so that changes in wealth and savings can be investigated.

This paper is divided into two major sections. The first deals with some methodological issues that arise in measuring household wealth. This section describes the data sources used and then highlights some recent innovations in the measurement of household wealth. We next summarize our principal findings comparing wealth measures obtained from two prominent American household surveys that include wealth modules. These surveys rely on significantly different methodological approaches to the measurement of household wealth. The second section summarizes our principal conclusions about how the structure of wealth holdings varies across households, how this structure has been changing over time, and the ability of multiple waves of wealth surveys to capture some salient dimensions of household savings.

1. The measurement of wealth and savings

1.1. *Data sources*

We rely on two micro-data sources that represent the best of recent U.S. attempts to improve measurement of household wealth for the entire age distribution. The first, the Panel Study of Income Dynamics (PSID), has gathered almost 30 years of extensive economic and demographic data on a nationally representative sample of approximately 5000 (original) families and 35,000 individuals who live in those families. Wealth modules were included in the 1984, 1989, and 1994 waves of the PSID and all three waves are examined here. PSID non-housing assets are divided into seven categories: other real estate (which includes any second home); vehicles; farm or business ownership; stocks, mutual funds, investment trusts and stocks held in IRAs; checking, savings accounts, CD's, treasury bills, savings bonds and liquid assets in IRA's; bonds, trusts, life insurance and other assets; and other debts. These wealth modules also include transactions questions about purchases and sales so that in principal active and passive savings can be distinguished.¹

The second survey's—the 1989 Survey of Consumer Finances (SCF)—primary purpose was to obtain detailed measures of all components of household wealth.

¹ The PSID was also the first study to use the unfolding bracket technique to reduce the missing data problem that has plagued surveys with wealth modules. If respondents initially responds 'don't know' or 'refuse' to a question, they are provided with a sequence of follow-up questions inquiring whether the value is greater or less than a certain amount. The value of unfolding brackets is not simply in reducing item non-response, but in obtaining more accurate measures of asset values. Juster and Smith (1997) conclude that use of this device increases estimates of total non-housing net worth by 20% for the HRS sample. As is almost always the case, increases in net worth estimates bring them closer in line with external control totals, a quality gain.

Since it was designed primarily as a wealth survey, SCF provides the most detailed measurement of household wealth available from a household survey and contains literally hundreds of questions on household wealth holdings. Many of the balances that are combined in the other surveys (such as checking, savings and money market accounts) are probed separately in the SCF. For example, checking accounts alone separately provide up to seven distinct accounts. Because wealth holdings are extremely positively skewed, SCF combined a representative area-probability sample with a special over-sample of very high income households obtained by a match with IRS records. As discussed below, one problem with the over-sample is that the initial response rate was low.

The two micro data sets have unique features that must be understood to insure comparability. First, the SCF was designed to represent the full range of the wealth distribution by the use of special sampling frames known to represent high-wealth households. Wealth, even more so than income, is heavily concentrated in a tiny fraction at the upper end of the distribution. Since response rates for very wealthy respondents are quite low, a conventional area probability sample (such as PSID) may routinely miss virtually everyone at the top end of the wealth distribution. The SCF solution combines an area sample with one obtained from tax files to retrieve households with high probabilities of being extremely wealthy, hopefully producing more reliable estimates of means, totals, and the overall shape of the distribution.

A second way the surveys differ involves the number of questions asked. Household wealth is not a simple concept. For some assets, such as businesses and real estate, valuation is difficult even in the best of circumstances. The myriad of financial instruments available can be mind-boggling; with variation in liquidity, risk and tax treatment only the simplest distinctions that can be made. Debt can also vary in the collateral requirements, interest payments, and duration. Since literally hundreds of distinctions can be made among assets, surveys must decide how respondents deal cognitively with such complexity and how much survey time they are able to devote to these issues.

These two American surveys have taken quite different approaches to this issue. In this dimension, the PSID is on one extreme with only seven separate questions on non-housing wealth. Three of the PSID questions address the value of tangible assets—real estate, business, and vehicles—so that only four questions deal with the vast array of possible financial assets. In contrast, SCF includes over 100 separate questions. The common assumption is that additional detail produces more reliable measures of aggregate wealth, but the real question is how much is actually lost by aggregation.

1.2. Comparisons among the surveys

Table 1 lists components of total household net worth across the three PSID waves. This table also provides a direct comparison between the two survey

Table 1
Household wealth: PSID and SCF (thousands of dollars)

	1984 PSID	1989 PSID	1994 PSID	1989 SCF	1989 PSID/SCF
Home Equity	43.4	51.6	46.2	59.5	86.8
Farm Business	24.9	29.0	25.0	51.1	56.7
Other Real Estate	20.5	29.2	25.0	30.3	96.4
Vehicle	8.3	9.8	11.2	7.1	138.5
<i>Sub-total Tangible Assets</i>	53.8	68.0	59.0	88.5	76.8
Stocks and Mutual Funds	10.7	16.4	29.6	19.6	83.4
Liquid Assets	18.3	22.4	20.1	23.7	94.5
Other Financial Assets	15.3	7.4	9.9	30.7	24.2
Other Debts	2.8	3.7	6.3	5.0	73.1
<i>Sub-total Financial Assets</i>	41.6	42.5	53.3	65.7	64.7
Total Net Worth	138.7	162.2	158.5	216.9	74.8
Total FOF Net Worth	193.7	211.9	202.2		

strategies by also listing mean wealth for the 1989 SCF. While the specific asset categories cannot be matched precisely, this table places all assets into groups as close as possible. These groupings largely reflect the PSID aggregation of assets.

Compare first estimates for total net worth. The 1989 PSID aggregate household net worth is 75% of those contained in SCF. However, to evaluate quality, we need a standard to which household surveys can be compared. One way of monitoring household savings and wealth accumulation over time relies on yearly data provided by the Federal Reserve on household balance sheets (Flow of Funds—FOF). FOF data track not only trends in aggregate household net worth, but also provide details on the components that make up these aggregates. The most comparable FOF estimate of household net worth in that year is approximately US\$200,000²—so that SCF actually overstates FOF by 8% while PSID is 82% of FOF.³ The correspondence between the surveys varies considerably across the sub-categories. The alternative estimates of home equity are much closer (87%) and a reasonable degree of correspondence exists across all tangible assets where PSID estimates are 77% of SCF. The match is not nearly as close in the tangible wealth sub-categories where real estate numbers are almost identical while 1989 PSID mean farm and business equity is less than 60% of 1989 SCF means for this group. It is difficult conceptually to separate out property and other components of

² This FOF mean differs from Table 1 by adjusting for the inclusion of consumer durables in FOF accounts.

³ Avery and Kennickell (1991) report that the 1983 SCF is 5 to 15% lower than FOF measures indicating that the 1989 SCF estimates may be unusually high.

business or farm assets so that the division between property values and business may be relatively arbitrary. If we aggregate all tangible assets together, the specific placement of assets will not matter.⁴

There is a greater disparity in total financial assets where PSID estimates are about two-thirds of those of SCF. Financial assets are divided into only three groups in PSID; stock holdings, liquid assets, and other assets, and the ability of PSID to match SCF varies considerably across these three groups. PSID stock holdings are 83% as large as SCF, a match that would be even closer except for conceptual differences in what is included in IRA and Keogh accounts in the two surveys.⁵ At the same time, mean liquid assets holdings are almost identical in the two surveys. The difference in financial assets lies almost entirely in the final PSID catch-all category which produces estimates that are about 25% as large as those in SCF. This catch-all group apparently is where the quite different number of questions in the two surveys takes a toll. While PSID uses a single summary question, SCF employs many questions which provide separate memory prods for many diverse types of assets. In its efforts at brevity, PSID is trying to sweep too much up into a single question, and better estimates could be obtained with some additional questions.

Some reasons why these surveys provide different estimates is illuminated by examining the complete distributions of household wealth in both surveys. Up until the 30th percentile, the two wealth distributions are essentially identical after which they begin to depart.⁶ Fig. 1 shows the nature of the departure by plotting the ratio of PSID/SCF net worth for each percentile starting at the 26th. From roughly the 30th to 95th percentile, the different estimates of household wealth are considerably less than the 25% difference in mean total household wealth documented in Table 1. After the 97th percentile, the two wealth distributions start to separate, but it is not until between the 99th and 100th percentile that the departure becomes pronounced. For example, the richest one percent of PSID households have less than one-tenth the wealth of the richest one percent of SCF households.

These dramatic differences are clearly the consequence of SCF sampling from tax files to capture the upper end of the wealth distribution. Even though this segment represents only one in every 100 households, the consequences can be

⁴ There is one tangible asset where PSID provides higher estimates than SCF – vehicle equity. This difference arises from alternative survey approaches on how to best estimate the value of cars. While PSID asks respondents to provide their own estimates, SCF first obtains the make and year of each car from the respondent. It then looks up the blue book wholesale prices of these cars. If PSID respondents give retail car values in their responses, the discrepancy between the two alternative measures in Table 1 is understandable.

⁵ PSID respondents were requested to exclude non-stock holdings in their IRA accounts while these liquid assets are included in the SCF IRA and Keogh totals. These non-stock assets in PSID IRA and Keogh are placed in the PSID liquid asset category in Table 1.

⁶ If anything, in the bottom 30% of the distribution PSID net worth slightly exceeds SCF, in part we suspect because SCF does a better job at measuring all items of debt.

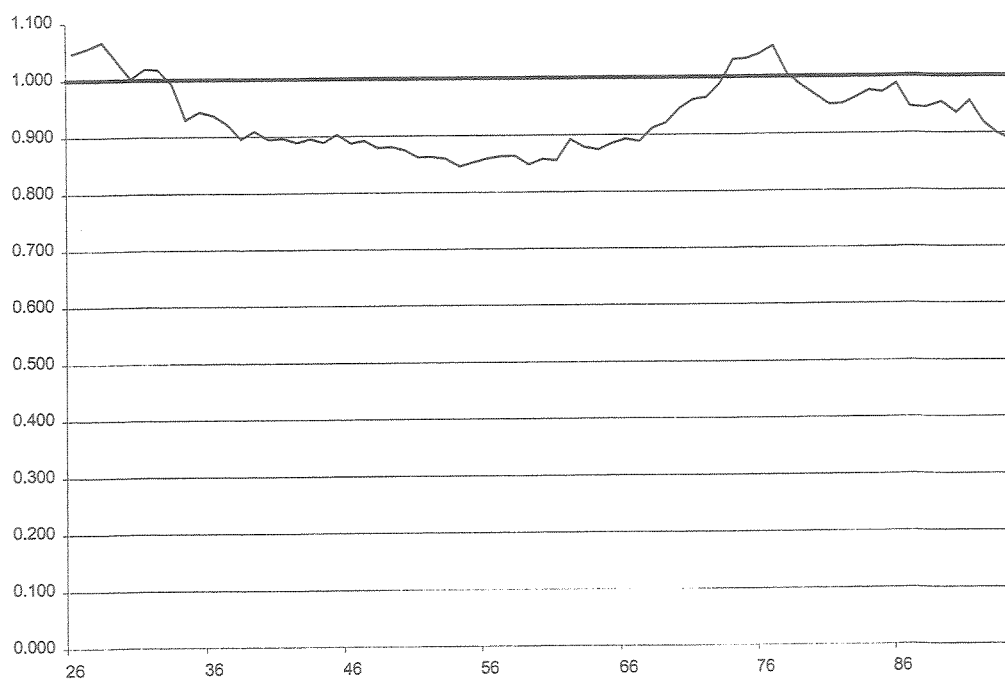


Fig. 1. Total net worth (PSID/SCF).

dramatic given the extreme skew to wealth distribution. Indeed, a much smaller group of households within the top one percent produces these differences. To see this, Table 2 shows the relative wealth numbers at selective one-in-a-thousand percentiles. This chart demonstrates that for all assets the real departure does not begin until the top one-tenth of 1% (one-in-a-thousand households). If mean SCF net worth is computed across all its households except the wealthiest one-in-a-

Table 2
Selected PSID/SCF wealth percentiles

Percentile	Total net worth	Farm/ Business	Checking/ Savings	House equity	Real estate	Stock/ MF/IRA	Other fin. assets
50.0	87.5	NA	143.0	83.3	NA	NA	NA
80.0	96.6	NA	128.0	90.7	NA	50.7	22.2
90.0	93.5	NA	124.0	88.0	100.0	76.9	33.3
95.0	87.8	92.6	108.0	90.2	89.9	97.8	34.3
99.1	72.9	54.6	85.0	89.7	114.7	86.2	24.9
99.5	62.9	73.0	80.4	90.7	112.1	73.4	23.8
99.9	59.5	64.8	80.8	73.1	95.7	64.0	15.6
100.0	9.4	7.6	3.0	8.3	11.1	16.6	1.6

thousand, mean SCF net worth equals US\$192,408. The PSID would be 85% of that total. The top 1% of SCF households possess 34% of total household wealth while the upper one-in-a-thousand control 13%.

The unique segment of the SCF sample is actually even more extreme as the wealthiest PSID household would place it at the 99.935 SCF percentile. Therefore, PSID has no representation of any households within the wealthiest six in 10,000 American households. In contrast, SCF has 113 sample households with a higher wealth than the richest PSID household and 459 households with wealth above its top 1%. While 6 in 10,000 may seem a small number, not so when the subject is household wealth. With approximately 93 million American households in 1989, the wealthiest 60,000 American households are not in the PSID sample. Based on SCF, these 60,000 households have an average wealth of US\$40,000,000 and possess 10% of total household wealth. Equivalently, two trillion dollars of household wealth has no representation in the PSID.

SCF efforts to represent the wealthiest households is one reason the two surveys differ. However, Fig. 1 indicates that this over-sampling alone is not a complete explanation. PSID and SCF produce different estimates (albeit by a more modest amount) of total net worth between the 30th to 95th percentile as well. Within this range, the discrepancy maximizes around the median and is actually somewhat smaller among the upper middle class. What accounts for these more modest disparities? To address that issue, it is necessary to examine the distributions of the principal components of household wealth also included in Table 2. Since large fractions of households do not possess many of these types of assets, these percentile are provided only at the median household and above.

Ownership rates for housing and tangible assets are identical in PSID and SCF so all differences reflect valuation. There is a persistent difference of about 10% in housing equity for all homeowners. If home equity is separated into value and mortgage, median SCF home values also exceed those in PSID by about 8%. Not surprising, the much larger discrepancies among the extremely wealthy also appear in home equity. When PSID misses the extremely wealthy households, their very expensive Beverly Hills or Park Avenue homes are also not counted. While the discrepancies in other real estate equity are limited to the extremely wealthy households, there is a more persistent disparity in farm-business equity. Placing values on businesses is one of the more complex fields in accounting so that it is not surprising that PSID misses the mark with a single question. It is more remarkable that they even come as close as Table 2 indicates.

Except for the extremely wealthy, values of liquid assets are somewhat higher in PSID. While the percent differences are high, the actual dollar difference between the surveys is typically only a few thousand dollars. We believe this difference is conceptual; as mentioned above, PSID includes liquid assets in IRA-Keogh accounts in this category while SCF includes them as a separate category. In contrast, SCF stock equity is always greater, a difference that becomes very large among the extremely wealthy. With the exception of these

extremely wealthy households, PSID actually does a better job at measuring stock equity among those households who have significant stock holdings. We hypothesize that the absence of significant probing by PSID understates more modest stock holdings. Stock equity are salient fractions of wealth for household with significant portfolios who may need little prompting about their value.

Finally, the most dramatic difference occurs in the catch-all PSID other asset category. Here, prevalence rates are quite different with half of SCF but only one-quarter of PSID with positive amounts. The long list of a variety of assets in SCF elicits many more yes responses on ownership in this category. Moreover, across the entire set of owners, PSID other asset values are always well below those in SCF. The far more comprehensive set of SCF wealth questions apparently does produce a more complete accounting of household assets and with it higher asset values. This is a measure of the gain from having 150 or so questions instead of only seven. But not all the additional SCF questions produced a yield since the return is concentrated in the business and other asset categories.

Two factors then give larger SCF estimates of household wealth – over-sampling of the extremely wealthy, and the more comprehensive SCF set of wealth questions. It is tempting to view these as unambiguous improvements, but for some applications they may not be. The extremely wealthy remain a very difficult population to sample and SCF response rates in this sub-sample are often extremely low. For example, in 1983, only 9% of the over-sampled wealthy households agreed to participate in the survey. In light of the extreme skew of the wealth distribution and the inherent difficulty in sampling this population, the wave-to-wave variability in SCF estimates of household wealth held by the extremely wealthy are unstable and produce considerable variability in population-wide wealth estimates over time. Consequently, time series estimates of mean household wealth are much more variable in the SCF than in any of the other household surveys (and more variable relative to the FOF benchmark).

Second, the additional SCF questions come at a cost in terms of other survey content. If one wants to explain why people have different amounts of wealth, we may be better off with a 90% accurate estimate of wealth with the compensating gain of having data on many of the potential explanatory factors that might matter. Moreover, the information yield from many SCF questions was quite limited in terms of a more accurate estimate of total wealth.⁷ For example, the long list of questions on liquid assets did not produce a higher (better) estimate of total liquid assets. PSID could certainly profit from additional wealth questions, but the optimal number of question may lie between 10 and 20. Even with these additional questions, the PSID should never be used to describe savings and wealth behaviors of the always intriguing but somewhat elusive extreme financial elite.

⁷ SCF's primary purpose in including many of these questions was not to obtain a better wealth estimate.

1.3. Time-series changes in wealth

Table 1 also describes time-series changes in household wealth as revealed in the PSID. Mean wealth increased significantly (17%) between the 1984 and 1989 waves, after which there was a slight 2% decline between the 1989 and 1994 waves.⁸ While the amplitude is smaller, the signs of these PSID changes in aggregate household wealth are consistent with FOF measures listed in the last row of Table 1. FOF mean household wealth rose by 9% between the 1984 and 1989 waves, but subsequently declined by 5% by 1994.

There are even sharper secular changes in some components of the wealth portfolio. Our summary will focus on two salient components – housing and stocks – because their yearly movements highlight some critical behavioral and measurement issues. Not surprisingly, equity in the home is the most important asset for most American households, comprising 31% of total household wealth in 1984. Six in every ten households owned a home, a rate that drifted slightly upward over this period. Real housing equity exhibited very large swings (a 19% increase between 1984 and 1989 followed by a subsequent 10% decline).

Is it plausible that American housing cycles were as great as those suggested by the PSID? A common external nationwide index of American housing prices is the yearly series on the median price of a single family home.⁹ According to this index, the latter half of the 1980s was a housing boom as the median price of single family homes increased by 8% between 1984 and 1989. Median home prices subsequently declined by about 2% in real terms between 1989 and 1994. The comparable PSID series – median home prices among home owners – matches reasonably well—a 6% real increase between 1984–1989 and a subsequent 3% drop between 1989–1994.¹⁰ The much greater post-1989 decline in PSID home equity resulted from a significant expansion in mortgage debt. Among homeowners, there was a 28% increase in mortgage debt in those years.

Another dramatic trend recorded in Table 1 concerns the almost three-fold rise in stock equity over these ten years. This expansion coincided with the recent boom in the American stock market. For example, the Standard and Poors Index of 500 stocks increased in real terms two and one-half fold between 1984 and 1994. A less well known trend is that stock ownership was also increasing rapidly at the same time, a trend apparently captured by the PSID. In 1984, one in every

⁸ PSID other savings number in 1984 is unusually high due to a few large outlier values that are miscodes.

⁹ See National Association of Realtors, Washington, DC Real Estates Outlook: Market Trends and Insights.

¹⁰ The much larger increase in mean PSID housing equity between 1984 and 1989 results from a far larger increase in mean (18%) than median (6%) home prices during this period. Apparently, this housing boom was far more concentrated among more expensive homes (or in more expensive areas of the country).

four American households owned stock directly; by 1994 this had increased to more than one in three. The large increases in wealth that are due to capital gains in the equity market offer an important opportunity to test the role of capital gains in affecting household savings. The data contained in Table 1 suggest that household surveys such as PSID can capture the main secular swings in major wealth sub-categories as housing and corporate equity.

1.4. The structure of wealth

Table 3 presents some salient dimensions of the structure of wealth for selected demographic sub-groups from the three PSID wealth samples. Across these ten

Table 3
Family net worth (thousands of 1996 dollars)

	1984			1989			1994		
	Median	Mean	Percent	Median	Mean	Percent	Median	Mean	Percent
All families (1)	47.0	138.7	100.0	47.9	162.2	100.0	51.1	158.5	100.0
All families (2)		144.1			162.2			161.2	
All families (3)		135.2			162.2			153.2	
All families (4)		144.8			162.2			152.1	
<i>Age of head</i>									
Less than 25	2.9	17.6	8.7	2.4	11.1	6.5	4.9	26.2	6.3
25–34	12.9	40.4	25.7	12.6	44.2	24.1	13.9	61.2	23.4
35–44	63.1	161.8	18.7	52.9	139.9	22.7	46.4	125.5	25.2
45–54	103.7	246.9	13.1	92.4	316.2	12.9	100.7	230.1	17.7
55–64	111.2	204.6	14.4	140.4	289.1	13.4	147.6	281.0	10.4
65 or more	87.2	178.7	19.4	95.1	193.5	20.5	105.4	240.6	17.0
<i>Education of head</i>									
Less than high school degree	26.6	77.0	28.7	23.1	93.8	26.8	21.1	86.2	21.4
High school degree	43.9	105.9	35.2	44.3	114.4	32.0	42.2	107.0	32.3
Some college	51.9	133.6	16.2	49.8	170.0	20.1	57.4	152.8	20.7
College degree or more	102.1	295.7	19.4	99.5	314.7	21.0	106.5	295.8	24.6
<i>Race of head</i>									
White	59.4	157.8	84.2	60.5	183.8	83.3	65.3	180.2	82.7
Black	3.8	28.8	12.8	6.3	37.6	14.0	8.4	38.3	12.7
Other	15.0	73.0	3.0	23.6	139.3	2.7	24.2	98.5	4.6
<i>Marital status of head</i>									
Married	84.9	202.0	55.1	95.8	247.3	52.6	87.5	218.7	56.4
Not married	12.8	61.2	44.9	15.0	68.0	47.4	16.6	80.6	43.5

(2) Age distribution adjusted; (3) marital status adjusted; (4) age, education, and marital status adjusted.

years, growth rates in mean household wealth exceeded the secular increase in median household wealth, suggesting that wealth inequality was also rising. During this period, it is well documented that family income inequality was rising—a phenomenon that apparently also characterizes wealth distributions.¹¹

Even more so than income, there exists an extremely strong positive tilt to wealth profiles by age. Using the 1989 PSID, household wealth at ages 55–64 is about six and one-half times greater than wealth of those households ages 25–34. In contrast, the ratios of household incomes of these two age groups is only 1.4 to one. Consequently, aggregates of wealth (and wealth–income ratios) may be sensitive to the age distributions in different samples. Table 3 also indicates that there were quite different secular trends by age. Median and mean household wealth actually declined for those ages 35–44 while rising rapidly among those ages 55–64. Indeed, the largest wealth increases were observed for retired households (a 35% increase in mean wealth).¹² This increasing tilt to the wealth–age gradient is one of the more salient secular changes in wealth holdings in the United States. While the improved situation for retired households is encouraging, the decline in wealth among younger households may be particularly troublesome as it may speak to problems in the amount of savings of the baby-boom cohorts.

There is also a strong wealth gradient with educational attainment; far sharper than the income–education gradient. Mean household wealth in 1984 for college graduates was almost US\$300,000 compared to about US\$77,000 for high-school dropouts. While higher incomes among college graduates are part of the reason for the wealth–schooling disparities, the absence of any significant saving behavior among those with a high school degree or less also plays a central role. For example, in 1984 mean wealth–income ratios were 4.5 for college graduates compared to 2.7 for those who failed to graduate from high school.

Table 3 also shows that race differences in wealth in the United States are enormous—far larger than those that exist in income (see Smith, 1995a). In 1984 non-white median incomes were only 60% of median income for white households, while the ratios of median household net worth were only 6%. There was some racial convergence in both median incomes and wealth, apparently at a somewhat more rapid rate for wealth, but the disparities still remain large by 1994. Finally, there are similarly large disparities in wealth by marital status. Marriage can affect wealth accumulation for a number of reasons. Most directly, marriage combines the separate assets of men and women into a single unit so that, on average, married households will have twice the wealth of single households. But differences by marriage are much greater than that with married couples typically

¹¹ These results are consistent with those reported in Wolff (1994) using the 1983 and 1989 SCFs.

¹² Similar time series trends are reported by Kennickell et al. (1997) using SCF data only for 1989, 1992, and 1995.

Table 4
Wealth income ratios by components of wealth (HRS-wave 1)

Type of assets	All	No high school diploma	High school diploma	Education of head	
				Some college	College
Financial Assets	1.47	0.63	1.15	1.46	2.07
Household Assets	4.84	3.69	4.18	5.00	5.74
Social Security	2.12	3.28	2.65	1.96	1.33
Pensions	1.85	1.25	1.74	1.69	2.26
Total Wealth	8.81	8.22	8.57	8.65	9.33

having three and one-half times as much wealth as non-married households. There is evidence that marriage may actually encourage savings beyond the sum of what the two partners would have done individually (Smith, 1995b).

Trends in age, marriage, and schooling may then play significant roles in secular changes in wealth. The 2nd to 4th row of Table 3 indicates the relative importance of these demographic forces by computing age, marriage, and education standardized levels of mean household wealth. Combined, trends in age and marriage distributions explain about 25% of the increase in mean wealth over this period. By a wide margin, schooling carries the load explaining most of the wealth growth that took place.

One limitation of many household surveys including the PSID is that it does not measure some other large sources of wealth—annuities paid during retirement—that are especially relevant right before and during retirement. The two important annuities in the American system are social security and private pensions. Social Security is an almost universal public sector retirement annuity where the benefit is tied through a progressive formula to past earnings. Occupation pensions typically also are related to salary, but they are far from universal and are much more common in the larger private firms. For example, 53% of HRS respondents report that they are covered by a pension. Fortunately, HRS made a determined effort to measure both social security and pension wealth.¹³

Table 4 lists wealth–income ratios for the sub-components of wealth across schooling groups. This table documents some stark contrasts in these components in their relative progressivity. By far, financial assets are the most unequally distributed component; relative to household income, financial assets are 3.3 times larger among college graduates compared to those who did not graduate from high school. Pensions are also regressive in their distribution, reflecting the greater prevalence of occupation pensions among high wage workers. In contrast, social security is quite progressive with social security wealth income ratios three times larger among high school dropouts than among college graduates. The final row in

¹³ The numbers reported here were derived from respondents' reports of their future expected social security and pension annuities. See Smith (1995a) for the details of this calculation.

Table 4 combines all forms of household wealth. Compared to household wealth alone, total wealth is relatively uniformly distributed across schooling groups.

2. Wealth inequality

The most striking aspect of household wealth distributions is its extreme inequality. Because income dispersion will be transmitted into wealth inequality through past savings behavior, the first panel of Table 5 depicts wealth inequality by listing selected percentiles of 1994 PSID wealth within certain deciles of current household income.¹⁴ The full sample row, which isolates percentiles of the wealth distribution without any stratification on current household income, indicates that dispersion in household wealth far exceeds that observed in current household income. In 1994, the standard deviation in wealth is almost seven times larger than the standard deviation in current income. Wealth inequality becomes particularly extreme among the wealthiest households. Wealth at the 90th percentile exceeds median household wealth by a factor of 7 to 1, while 95th percentile wealth exceeds wealth at the 90th percentile by 66%.

Even after controlling for current income, dispersion in household wealth remains quite large. Consider households whose current income places them around the average—the fifth income decile. The 1994 mean (median) net worth is about US\$123,000 (US\$37,000) among these average income households. Yet, even within the median income decile, some households are quite wealthy while others have little at all. Wealth varies from being on net in debt for those in the bottom 10% to more than US\$432,000 among those in the top 5% of wealth. While current income is important, it actually explains little of the vast dispersion in wealth.

One reason may be that current income is often a poor proxy for longer-run resources. Some households in the lowest current income decile may have lots of wealth because their incomes may only be temporarily low. A symmetric statement applies among low-wealth households whose income is temporarily high. To gauge the importance of this problem, Table 5 also presents data stratified by averages of household incomes across all PSID waves in which the household participates. The distinction between current and long-run income does matter especially among those with very low yearly incomes. Compared to current household incomes deciles, means and standard deviations of household wealth are systematically smaller in the bottom decile when the 1994 data are stratified by average household incomes. Some households with low yearly incomes have higher wealth than expected because their current incomes are unusually low. Consequently, the wealth–income gradient is steeper when arrayed against average rather than current income.

¹⁴ This treatment here follows that of Venti and Wise (1999).

Table 5
Wealth distribution within income deciles (thousands of 1996 dollars)

Current income		Total wealth		Total wealth percentiles									
		Mean	S.D.	10	20	30	50	70	90	95			
<i>A. 1994 Current Income</i>													
Deciles	Mean	S.D.	Mean	S.D.	10	20	30	50	70	90	95		
1994													
1	4.6	4.11	49.5	155.5	-0.4	0.0	0.0	1.7	25.3	137.0	257.2		
3	20.6	2.16	71.9	154.2	-1.6	0.9	4.2	22.7	78.1	198.2	271.9		
5	34.8	2.22	122.5	412.5	-2.0	2.1	7.9	36.9	101.2	323.6	432.1		
7	52.8	3.14	137.2	263.0	3.0	14.8	29.5	64.3	121.2	323.6	524.2		
10	175.5	139.35	576.6	1,087.1	48.5	91.7	143.3	282.5	540.7	1,176.3	2,003.7		
Full sample	52.3	64.7	158.5	456.5	0.0	3.2	12.1	51.1	123.3	363.6	601.8		
<i>A. Average Income</i>													
1984													
1	8.0	2.28	19.1	52.3	-0.9	0.0	0.0	0.8	8.7	63.7	87.2		
3	19.6	1.55	45.2	160.6	-0.8	0.3	2.3	8.9	35.3	122.6	191.0		
5	30.8	1.82	69.7	120.7	0.6	4.8	10.5	31.6	70.6	181.9	248.0		
7	43.2	1.94	132.6	401.8	6.0	18.8	34.6	64.9	117.2	302.1	487.0		
10	97.8	38.91	615.1	1,380.9	81.8	133.5	180.4	289.3	481.7	1,209.9	1,959.9		
Full sample	38.9	28.2	138.7	503.0	0.0	3.0	10.8	47.0	112.7	300.6	481.0		
1989													
1	7.9	2.34	16.1	39.1	-0.9	0.0	0.0	0.6	8.2	50.4	87.6		
3	20.8	1.67	37.6	74.7	-2.3	0.0	1.9	10.0	36.0	112.5	169.5		

5	32.5	1.80	80.1	154.9	1.5	7.2	14.9	36.5	78.4	200.3	277.2
7	45.7	2.01	132.6	270.6	6.3	18.9	37.5	72.5	131.4	298.0	414.5
10	106.0	51.20	768.2	1,543.6	92.9	161.3	220.5	374.9	597.2	1,544.4	2,509.9
Full sample	41.3	31.9	162.2	559.9	0.0	2.8	11.3	47.9	122.1	358.5	573.3
1994											
1	8.7	2.86	21.4	61.0	-1.6	0.0	0.0	0.7	9.9	72.7	126.5
3	23.1	1.68	42.9	85.9	-2.3	0.5	3.2	11.6	42.4	111.9	181.9
5	35.3	1.79	95.3	385.5	-1.5	5.3	12.2	36.4	88.3	200.3	327.8
7	48.8	2.08	137.1	227.7	5.3	19.0	34.8	76.9	146.5	316.2	451.1
10	115.3	53.07	668.8	1,084.4	70.6	135.4	210.3	383.7	650.3	1,323.8	2,088.0
Full sample	44.7	34.1	158.5	456.5	0.0	3.2	12.1	51.1	123.3	363.6	601.8

A. 1994 Financial wealth

Current income	Average income		Financial wealth		Financial wealth percentiles									
	Mean	S.D.	Mean	S.D.	10	20	30	50	70	90	95			
Deciles														
1	8.7	2.86	5.7	39.3	-2.3	0.0	0.0	0.0	0.0	0.0	7.4	26.4		
3	23.1	1.68	14.5	55.6	-6.9	-2.4	-0.8	0.0	3.3	49.5	98.5			
5	35.3	1.79	24.6	74.4	-10.5	-3.7	-0.7	2.1	14.2	79.1	131.8			
7	48.8	2.08	39.6	119.0	-10.1	-1.1	1.6	11.6	31.4	114.9	194.9			
10	115.3	53.07	267.0	668.4	2.1	20.0	52.7	121.2	247.7	627.1	955.5			
Full sample	44.7	34.1	53.3	237.6	-6.3	-1.1	0.0	4.2	27.4	145.5	257.2			

Controlling for dispersion in long-run average household incomes leaves much of wealth dispersion among households unexplained. Among those with the lowest 10% of average income in 1994, the wealthiest 5% have US\$126,500 while every household in the bottom half has less than US\$700. Similarly, within households with the highest tenth of average income in 1994, the top 5% have more than US\$2,000,000 in wealth while the lowest 10% have less than US\$71,000.

Inequality is even larger in financial assets whose 1994 distribution is also displayed in Table 5. Most American households have very few financial assets, but a few have a great deal. The median financial wealth of the median long-run income household in 1994 is only US\$2100. Even though PSID does not sample the extremely wealthy, the richest 5% in the highest income decile have more than US\$900,000 in financial assets alone. Once again, incomes alone can offer little explanation for the varying amounts of financial wealth held by households. For example, the top 5% of those in the lowest income decile have greater financial wealth than 40% of households in the top average income decile.

Table 5 also enables us to describe secular trends in wealth inequality.¹⁵ If across-year ratios of wealth at percentiles are used as the metric, wealth inequality did rise, but primarily in the upper half of the distribution. Between 1984 and 1994, there was essentially no change below the median, median wealth increased by about 9%; while in the 80th percentile and above wealth increases averaged over 20%. Across these ten years, wealth disparities did rise, but, in addition, wealth dispersion among the well-to-do also increased. Trends were even more dramatic in financial wealth as standard deviations in financial wealth holdings were two and one-half times higher in 1994 than in 1984. Once again, these increases in dispersion are particularly pronounced at the highest incomes deciles. For example, the standard deviation of wealth expanded three-fold among households in the top 10% of average incomes. These trends we suspect were largely fueled by the stock market boom. Among the well-to-do, households with financial portfolios largely invested in stocks were the big winners while the remainder stayed in place.

So far we have mainly catalogued the factors that do not explain wealth dispersion among households. Another possibility that can be easily dismissed is that it is the consequence of past financial inheritances (Smith, 1999). Bequests cannot play a central role since very few American households have received financial inheritances of any consequence at all. The reasons instead lie in three factors: (1) very different savings rates across households (even among those with the same income), (2) different ex-post rates of return on those savings, and (3) measurement error in assets. These different savings rates may in part reflect risk aversion, rates of time preference, or liquidity constraints (Deaton, 1992). A particularly promising recent explanation is the disincentives to private savings

¹⁵ Standard deviations are sensitive to a few extreme values.

provided by income transfer programs, especially those which contain very low liquid asset limits for program eligibility (see Hubbard et al., 1995). Even households who save the same amount may experience different yields on their past savings. Variances in rates of return, even if they are uncorrelated over time, can produce heterogeneity in wealth holdings over time.¹⁶

2.1. Measuring savings in household wealth surveys

The reputation of savings measures derived from household surveys is even more suspect than that of household wealth. There are three different ways to measure savings among individual households. First, savings can be measured as the difference between disposable personal income and consumer expenditures, with both income and expenditures measured directly. Second, savings can be computed as the algebraic sum of net new money put into assets plus net repayments of debt obligations. Finally, savings can be measured as the first difference in wealth between two time periods, adjusted for any capital gains or losses and net transfers into the household.

These alternative ways of measuring savings all have pluses and minuses from the perspective of feasibility and cost. While measuring consumption and income directly and calculating savings as the difference between the two may yield the most valid conceptual estimate of actual saving, it has two deficiencies. First, it requires an enormous amount of survey time. The typical consumption survey, such as the American Consumer Expenditure Survey, collects detailed information about all expenditures, involves very substantial costs, and apparently still produces substantial biases (typically underestimates) of total consumption (Sabelhaus, 1998). Since so much time is required to obtain consumption measurements, it is usually not feasible to measure the other explanatory variables required by models of saving behavior.

The direct measurement of saving runs into a different problem. The relevant concept of savings is net new money put into a number of different asset types, plus the net deduction in debt over all debit accounts. But households do not normally think in terms of the cumulative net change in these accounts over extended periods of time, since decisions moving funds into or out of these accounts are expenditure decisions—the net effect on savings is a residual. Asking households to recall the net additions or debits to all financial accounts is very demanding cognitively, and the few past attempts do not seem to be successful.

The final method computes saving as the difference in net worth between two time periods. The major drawback is that the measurement of wealth may involve error, so that the measured first difference in wealth may consist of measurement

¹⁶ The argument that there are different ex-post rates of return does not assert that some households are persistently better investors year-after-year than other households are.

error rather than true change. The measurement error problem may be exacerbated by the need to calculate capital gains or losses and net wealth inflows. But asking the household to report on its current net worth is a much simpler cognitive task that can be accomplished reasonably well in only about 5–6 min of survey time, while the standard capital gains data take only an additional 1–2 min. In contrast, measuring consumption directly may take several hours.

The multiple PSID wealth modules can be used to evaluate how well savings can be estimated through this third method. Based on a sample of PSID households who were in the survey in 1984, 1989, and 1994, the total change in household wealth between 1984 and 1994 was computed. One reason this change does not measure savings is that there are wealth increments when individuals originally outside the household joined, and symmetrically, wealth decrements when some 1984 PSID family members left. The family may also receive inheritances in the form of new assets, and money may be withdrawn from pensions and added to household wealth. Net wealth transfers into the household are defined as the sum of money taken out of pensions, the value of inheritances received, and assets brought in by new family members minus any assets previous family members took with them when they left.

The PSID also includes a short module asking the amount of money put into real estate or business, net transfers into stocks, bonds, and annuities. This module allows one to separate so-called active savings from wealth accumulation that is a consequence of capital gains. Capital gains are defined as the change in the total value of stocks, businesses, housing and real estate minus the net amount the household puts into these assets between 1984 and 1994. It is not possible without knowing which assets were involved to allocate net transfers between active and passive savings.

Table 6 lists mean changes between 1984 and 1994 in total net worth, total non-housing wealth, net transfers, and active and passive savings. Active and passive savings are also expressed relative to average household income (comparable to a savings rate). For these households, the mean change in total wealth was US\$59,000, almost four times the median change in net worth. Wealth accumulation exhibits an inverted v age pattern with a peak in the 45–54 age interval, after which wealth accumulation rates decline with age, with an especially pronounced shift during the retirement years. This pattern is consistent with the most basic prediction of the life-cycle model where one saves during working years for one's retirement. The total change in wealth accumulation both absolutely and relative to household income also rises rapidly with education. These differences in wealth change by schooling are quite large.¹⁷

¹⁷ If medians are used, wealth accumulation rates of college graduates are four times larger than wealth accumulation of high school graduates.

Table 6
Mean family saving from 1984 to 1994 (thousands of 1996 dollars)

	Active saving ^a	Passive saving ^a	Total wealth change	Net transfers	Annualized active saving rate (percent) ^b	Annualized passive saving rate (percent) ^b
All families	47.6	11.7	59.3	10.2	10.3	2.3
Age of head (in 1984)						
Less than 25	46.5	14.2	60.7	1.2	19.5	4.6
25–34	61.2	7.9	69.1	5.5	17.3	2.0
35–44	64.9	7.4	72.3	11.7	12.1	2.1
45–54	60.1	25.5	85.6	26.8	10.2	4.1
55–64	42.1	13.4	55.5	7.0	5.1	1.5
65 or more	–16.0	6.5	–9.5	6.4	–4.9	0.6
70 or more	–19.8	3.1	–16.7	2.2	–6.8	–0.7
Education of head (in 1984)						
Less than high school degree	13.2	1.2	14.3	2.0	2.5	0.6
High school degree	30.8	7.3	38.2	12.0	8.2	2.2
Some college	53.2	6.3	59.5	6.8	13.9	0.4
College degree or more	108.3	34.4	142.7	19.2	19.7	5.9

Source: PISD.

^aSaving figures include net transfers.

^bSaving rates are defined for each household as the fraction of average income in 1984 annualized by dividing by 10.

Table 6 demonstrates that the issue of wealth transfers into and out of the household is not a trivial one. Between these ten years, there was a net wealth transfer into the household of US\$10,300, approximately 17% of the total change in household wealth. This net transfer represents neither active savings or capital gains. The size of these transfers suggests that wealth surveys must record them. But they also must go beyond the current PSID module in inquiring about the specific nature of the assets involved, whether the household subsequently reshuffled that portfolio, and how much of that money went into consumption.

While the separation between active and passive savings in Table 6 is crude, both active and passive non-housing savings were significant during this ten year period. Measured by means, capital gains comprised about 20% of total wealth accumulation during this period. Capital gains are more uniformly distributed across age groups so that the implied active savings rates conform much more closely to the life-cycle model. For example, the total non-housing wealth change of households 65 and over was a negative amount (US\$ – 9500). This total

savings resulted from a positive capital gain of US\$6500 which offset a decline in active savings of US\$16,000. The implied yearly active savings rate out of long-run income over this period is 10.3%. If this rate is adjusted proportionably by net transfers, the active savings rate from long-run income would be 8.5%.

Table 7 highlights the distribution of wealth changes across households stratified by their 1984 average household income levels. As was true for wealth levels, there exists a great deal of dispersion in wealth changes over these ten years. While this ten year period witnessed significant capital gains, a third of the households actually suffered a wealth loss. In fact, one in every ten households experienced a wealth loss of over US\$69,000. While most households enjoyed modest levels of wealth accumulation, some households added a great deal to their wealth over this period. For example, one in every ten PSID households had a wealth increment of over US\$245,000. Once again, income alone explains little of the variation among households in either levels or changes in total household wealth.

Dividing mean changes in wealth by mean income within deciles provides a rough approximation to long-run savings rates by income strata. These computed wealth accumulation rates increase across income deciles, but the increase is only especially large between the ninth and tenth income decile. Between these two income deciles, wealth accumulation almost doubles.

The fourth panel of Table 7 shows that there exists great dispersion in changes in financial wealth as well and changes in financial wealth are a much more non-linear function of household income. While there remains enormous variation with income strata, the large financial wealth increases are concentrated in the lower right hand part of this panel.

The middle two panels in Table 7 display the distributions of active savings and capital gains. Active savings is characterized as very modest for the average household, significant positive savings for a large fraction of households and actually negative savings for a smaller fraction of households. Table 7 also demonstrates that a quarter of households had neither capital gains or losses. About 20% of PSID households had significant positive capital gains and one in 20 enjoyed extremely large amounts of capital gains (about US\$229,000). There are households who suffered large capital losses – in about 10% of PSID households the losses exceeded US\$81,000. It is difficult to know whether some of these losses simply represent measurement error in asset values (high 1984 prices relative to 1994) or a real capital loss. The contamination effect of such measurement error on our estimation of behavioral functions can be extreme. For example, at virtually all wealth deciles, the capital gains–income function is extremely non-linear with capital gains concentrated within the top two income deciles. However, this relationship largely disappears when we examine mean capital gains and mean incomes across income deciles. This disappearance is the consequence of some large negative values for capital gains in the top two income strata.

Table 7
Wealth change from 1984 to 1994 (thousands of 1996 dollars)

Deciles	1984 Average income		Change in wealth		Percentiles									
	Mean	S.D.	Mean	S.D.	10	20	30	50	70	90	95			
1	9.3	2.83	12.1	71.2	-29.3	-9.8	-3.9	0.0	4.5	60.3	116.1			
3	23.6	1.81	15.9	109.3	-39.6	-13.3	-4.2	5.0	22.1	97.8	152.2			
5	35.4	1.66	41.6	255.8	-87.6	-33.0	-11.4	10.3	50.6	125.4	252.8			
7	47.3	1.92	73.2	217.1	-67.7	-28.6	-0.7	33.1	88.9	266.4	436.2			
9	66.9	4.65	105.0	287.7	-73.0	-29.7	1.1	79.4	147.9	353.4	554.6			
10	103.1	38.28	191.2	505.0	-269.7	-101.0	-14.4	139.1	314.1	753.2	923.5			
Full sample	42.9	28.8	59.3	239.8	-69.0	-25.2	-4.6	12.4	65.6	244.3	420.9			
<i>Active saving from 1984 to 1994 (thousands of 1996 dollars)</i>														
1	9.3	2.83	6.6	50.4	-22.5	-6.6	-1.4	0.0	4.1	55.5	94.8			
3	23.6	1.81	17.0	97.1	-39.0	-10.5	-2.3	5.5	26.8	86.1	139.3			
5	35.4	1.66	29.3	108.4	-53.2	-21.1	-4.1	14.4	44.7	134.1	211.8			
7	47.3	1.92	54.0	118.2	-37.6	-8.1	4.0	29.2	72.5	192.5	324.1			
9	66.9	4.65	84.5	174.8	-52.5	-10.1	14.2	64.6	115.2	228.2	317.8			
10	103.1	38.28	46.4	287.1	-119.9	-43.4	5.3	101.9	237.0	528.4	682.7			
Full sample	42.9	28.8	47.6	147.8	-46.5	-12.2	-1.4	14.8	55.4	184.5	284.5			
<i>Passive saving from 1984 to 1994 (thousands of 1996 dollars)</i>														
1	9.3	2.83	5.5	53.8	-13.1	-4.7	0.0	0.0	0.0	20.5	58.4			
3	23.6	1.81	-1.1	55.9	-33.3	-16.9	-7.8	0.0	0.4	31.4	55.8			
5	35.4	1.66	12.3	232.1	-86.8	-39.8	-19.3	-4.5	9.7	63.6	145.2			
7	47.3	1.92	19.2	168.6	-77.0	-41.0	-19.6	0.0	33.6	142.3	254.0			
9	66.9	4.65	20.5	198.2	-140.5	-57.4	-34.0	0.3	64.5	217.2	313.8			
10	103.1	38.28	44.7	432.3	-336.3	-146.9	-70.0	27.1	118.0	454.4	824.0			
Full sample	42.9	28.8	11.7	192.3	-81.4	-34.3	-15.3	0.0	15.7	112.9	228.5			
<i>Financial wealth change from 1984 to 1994 (thousands of 1996 dollars)</i>														
1	9.3	2.83	5.6	37.5	-9.3	-2.8	-0.8	0.0	0.6	11.0	39.5			
3	23.6	1.81	5.7	74.4	-18.8	-8.1	-3.1	0.1	5.3	37.1	83.2			
5	35.4	1.66	14.2	160.8	-40.7	-11.1	-3.6	1.5	15.2	55.3	124.3			
7	47.3	1.92	33.1	117.8	-30.2	-8.0	-1.3	14.3	36.9	118.8	190.6			
9	66.9	4.65	84.2	162.2	-25.3	-10.0	6.4	42.7	92.3	257.8	392.2			
10	103.1	38.28	48.0	302.5	-90.4	-25.1	7.3	89.1	208.4	544.1	676.2			
Full sample	42.9	28.8	35.2	143.0	-28.7	-8.2	-2.1	2.5	24.8	132.4	246.1			

Some of the wealth changes displayed in Table 7 are so large that they must reflect measurement error in wealth. If measurement error is not perfectly correlated across time periods, changes in wealth will contain significant amounts of measurement error. Indeed, if true household wealth did not change, all that Table 7 would display are patterns of measurement error in wealth. This is an unlikely extreme since there is no reason why patterns of measurement error should exhibit the observed patterns across age, education, and marital status groups.

Yet, the likely size of measurement error in wealth is quite disturbing especially since most economic models deal most directly with wealth change. One manifestation of this problem is that almost all models of wealth and wealth change are characterized by single digit R^2 (see Avery and Kennickell, 1991; Browning and Lusardi, 1996). What can be done to improve the situation? While there has been little testing of alternative survey research strategies, the main problem may be that there is no survey exploration of reasons for particularly large wealth changes. Given the likely anchoring problems, pre-loading of prior wave values would not appear to be a sound strategy. However, given modern CATI and CAPI capabilities, pre-loads can be used ex-post to isolate cases with large changes in specific asset components. A relatively few follow-up questions can then be put to the respondent about the reasons for such a large between-wave change. These questions would serve the dual purpose of uncovering the real reason for such a large change as well as serving as a verification (or correction) about current or prior wave asset values. While further improvements in wealth levels are still possible, most of the mileage for better measurement probably lies in wealth change. The advantage of having multiple measures of wealth in panel surveys has not yet been exploited to obtain better wealth measurement.

3. Conclusion

This paper examined the quality and structure of household wealth as measured in household surveys. Better measures of wealth are related to the use of unfolding brackets that reduce item non-response, the over-sampling of very wealthy households, and the number of questions that are asked. However, it appears that one can characterize total household wealth holdings for the overwhelming majority of households with a relatively moderate number of questions. Some components of household wealth are measured more easily than others. With relatively short wealth modules, it is difficult to distinguish between business and property assets and to itemize sub-components in the financial wealth portfolio. When successive waves of wealth modules are used to compute savings, the verdict on quality is more cautious, in part due to the inherently larger role measurement error plays in any first difference formulation. But, few systematic attempts have been made to improve wealth measurement in panel surveys that exploit the fact respondents may help resolve some of the larger discrepancies in asset values.

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