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Choice, Chance, and Wealth Dispersion at Retirement

Steven F. Venti and David A. Wise

Why do some households have substantial wealth at retirement while others have very little? Indeed, why do some households with given lifetime earnings have substantial wealth at retirement, while other households with the same lifetime earnings accumulate very little wealth? In an earlier paper (Venti and Wise 1999), we evaluated the extent to which the different wealth accumulation of households with similar lifetime earnings could be accounted for by random shocks, such as health status and inheritances, that could reduce or increase the available resources out of which saving could be drawn. We concluded that only a small fraction of the dispersion in wealth accumulation within lifetime earnings deciles could be accounted for by random shocks and thus that most of the dispersion could be attributed to choice; some people save while young, others do not. We continue that analysis in this paper but with two additions: First, we attempt to evaluate the effect of investment choice on the accumulation of assets—in particular, how much of the dispersion in wealth can be accounted for by the choice between investment in the stock market and investment in presumably less risky assets such as bonds or bank saving accounts. Second, we attempt to understand the relationship between asset accumulation and individuals' assessment, just prior to retirement, of the adequacy of their saving and their saving behavior. This very exploratory

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analysis is an attempt to evaluate the usefulness of an experimental saving module administered to a subsample of Health and Retirement Study (HRS) respondents.

People, of course, accumulate different amounts of wealth in part because they have different earnings. We essentially set that dispersion aside by considering persons with similar lifetime earnings. Thus the discussion here is about the dispersion of asset accumulation among persons with the same lifetime earnings. Given lifetime earnings, we consider the importance of "chance" events versus the choice to save in determining asset accumulation. Over the course of a lifetime many events not directly under the control of the household may affect the accumulation of wealth. We refer to these as *chance events.* They may include both unfavorable shocks, such as health care costs, and positive shocks, such as inheritances.

We distinguish between such *chance* events, which affect the resources from which saving could be drawn, and the *choice* of how much to save of the resources that are available. In fact, we consider two components of saving choice: One is the choice to save or not to save; the other is saving mode or investment choice. Households with similar lifetime resources may invest in different assets that earn different rates of return. We might think of three groups: nonsavers, savers who invest conservatively and have low rates of return, and savers who invest in more risky assets and have higher rates of return. Persons who invest in bonds or bank savings accounts will have lower rates of return on average than those who invest in stocks.

Whether accumulated wealth is attributable to the choice to save rather than to chance can have significant implications for government policy. Many policies impose ex post taxes on accumulated assets. For example, elderly Americans who saved when young and thus have higher capital incomes when old pay higher taxes on Social Security benefits. Shoven and Wise (1997, 1998) show that those who save too much in pension plans in particular face very large "success" tax penalties when pension benefits are withdrawn. In addition, pension assets left as a bequest can be virtually confiscated through the tax system. The spend-down Medicaid provision is another example. The belief—perhaps unstated—that chance events determine the dispersion in wealth may weigh in favor of such taxes in the legislative voting that imposes them.

If, on the other hand, the dispersion of wealth among the elderly reflects conscious lifetime spending-versus-saving decisions—rather than differences in lifetime resources—these higher taxes may be harder to justify and appear to penalize savers who spend less when they are young. From an economic perspective, if wealth accumulation is random, taxing saving has no incentive effects. On the other hand, if wealth accumulation results from conscious decisions to save versus spend, penalizing savers may have substantial incentive effects, discouraging individuals from saving for their own retirement and limiting aggregate economic growth. It is important

to understand that this paper is about the dispersion in the accumulation of assets of persons with similar lifetime earnings. The issue raised here is not about progressive taxation, but rather about differences in taxes imposed on persons who spend tomorrow versus today, given the same after-tax lifetime earnings.

The same issue arises with respect to return on investments. In this case, higher expected returns come at the expense of more risk when young, just as higher saving rates come at the expense of lower consumption when young. And, just as it may be harder to justify imposing higher taxes on older households who choose to consume less and save more while young, it may also be harder to justify imposing higher taxes on older households for assuming greater risk while young. In addition, of course, the higher taxes may discourage saving and limit economic growth. Again, the question raised here is not about progressive taxation; it is about the different taxing of persons who assume risk while young versus those who do not, given the same lifetime earnings.

We begin this paper by controlling for lifetime earnings as reported in individual Social Security records. Given lifetime earnings, we examine the distribution of wealth, finding a very wide dispersion in the distribution of accumulated saving, even among families with the lowest lifetime earnings. We then show that only a small fraction of the dispersion can be explained by individual circumstances that may have limited the ability to save out of earnings. For persons in the *same lifetime earnings decile,* we do this by comparing the unconditional dispersion in wealth at retirement with the dispersion after controlling for chance events that may have affected lifetime resources out of which saving could have been drawn. Then we attempt to determine how much of the dispersion might be attributed to investment choices. Here we are limited by available data, having to rely on the allocation of assets at the time of the HRS.

We conclude that the bulk of the dispersion in wealth at retirement results from the choice of some families to save while other similarly situated families choose to spend. For the most part, controlling for lifetime earnings, persons with little saving on the eve of retirement have simply chosen to save less and spend more over their lifetimes. It is particularly striking that some households with very low lifetime resources accumulate a great deal of wealth, and some households with very high lifetime resources accumulate little wealth. We find these saving disparities cannot be accounted for by adverse financial events, such as poor health, or by inheritances. While better control for individual circumstances that may limit resources could change somewhat the magnitudes that we obtain, we believe that the general thrust of the conclusions would not change.[1]

1. It may be useful to view our estimates in the context of the broader literature on saving and consumption. Our focus is on the dispersion in saving among households with similar lifetime resources. The idea is to isolate empirically the portion of the saving variance attributable to individual choice (or "tastes") once differences in lifetime earnings are accounted

We then consider the wealth that would have been accumulated if families in our sample had followed specific saving plans throughout their working lives. This exercise shows that even families with modest lifetime earnings would have accumulated substantial wealth had they saved consistently and invested prudently over the course of their working lives.

Finally, we consider how asset accumulation, again controlling for lifetime earnings, is related to individual attitudes about saving and saving adequacy.

1.1 The Data

The analysis is based on household data collected in the baseline interview of the Health and Retirement Study (HRS).[2] The household heads were aged fifty-one to sixty-one in 1992 when the baseline survey was conducted. The analysis relies on the wealth of households at the time of the survey and on lifetime earnings, which is measured by historical earnings reported to the Social Security Administration.[3] The Social Security earnings data are available for 8,257 of the 12,652 HRS respondents. Comparison of respondents for whom we do and do not have Social Security records suggests that they are very similar. Selected characteristics of the two groups are shown in table 1.1. The groups have almost the same household income, the same average age, and the same years of education; the same proportion are married; and almost the same proportion are female. A slightly larger proportion of those for whom we have Social Security records are HRS primary respondents (64 percent versus 60 percent).

Our analysis is based on household rather than individual respondent data, however. Historical earnings for a single-person household required only that Social Security earnings records be available for that person. But for a two-person household, it was necessary to have historical earnings for both persons in the household if both had been in the labor force for a significant length of time. The HRS obtained such data for 1,625 single-

for. In most standard consumption models, dispersion in saving arises primarily from differences in household incomes. Such models do not aim to explain the variation in wealth among families with the same lifetime incomes. Some authors, such as Attanasio et al. (1995) and Venti and Wise (1990) allow saving choices to depend on household characteristics, like education and marital status. Another way to account for taste variation is to estimate a distribution of rates of time preference that fits the variation in saving, given income. This approach has been adopted by Samwick (1996). This approach equates taste and time preference but does not aim to distinguish choice (taste) from chance. Still another—and quite different—explanation for saving variation among households with similar resources is provided by behavioral models in which households differ in the level of discipline or self-control required to commit to a saving plan, as proposed by Shefrin and Thaler (1988). The aim is to explain why households make different choices, but, again, not to isolate the effects of choice versus chance events.

2. This section and the data appendix are largely reproduced from our earlier paper (Venti and Wise 1999). Some components of later sections also rely heavily on that paper.

3. See Juster and Suzman (1995) for a discussion of the structure and content of the HRS. Mitchell, Olson, and Steinmeier (2000) describe the attached Social Security earnings file.

Table 1.1 **Comparison of Social Security Data for Health and Retirement Study (HRS) Respondents**

Characteristic	Persons without Social Security Records	Persons with Social Security Records
Mean household income	$54,252.64	$53,434.20
Percent female	53.00	54.00
Mean age	55.57	55.40
Percent nonwhite	15.00	13.00
Mean years of education	12.37	12.40
Percent married	76.00	76.00
Percent primary respondent	60.00	64.00

Source: Weighted estimates from the HRS Wave I.

person households and for 2,751 two-person households, together comprising 4,376 of the 7,607 HRS households. Two additional sample adjustments were made. First, we retained households in which one or both members reported never having worked, even if the household member was missing a Social Security earnings record. We assumed zero earnings for such persons. Second, we excluded from the sample all households that included any member who had zero social security earnings *and* who reported working for any level of government for five (not necessarily consecutive) years. This latter restriction is intended to exclude households that have zero Social Security earnings due to gaps in coverage. The final sample includes 3,992 households.[4]

The other important data component is wealth at the time of the survey. We need a complete accounting of assets, including personal retirement assets such as IRAs and 401(k) balances, other personal financial assets, employer-provided pension assets, home equity, and assets such as real estate and business equity. In most instances the value of each asset is reported directly. For non-pension assets, the HRS survey reduces nonresponse considerably by adopting bracketing techniques for important wealth questions.[5]

In other cases asset values are not easily determined. The most important asset that is not directly reported is the value of benefits promised under employer-provided defined benefit pension plans. For persons who are retired and receiving benefits, this value can be approximated by using life tables to determine the expected value of the future stream of benefits. But for nonretired persons covered by a defined benefit plan—and for whom the benefit is not known—the value of future benefits can be only imprecisely imputed. The imputation process relies on the respondent de-

4. The present value of Social Security benefits is unavailable for an additional 167 households, and these have been excluded in preparing tables 1.3 and 1.4, leaving a sample of 3,825. Thus the sample is slightly smaller than was used in similar tables in Venti and Wise (1999).

5. Juster and Smith (1999) and Smith (1995) provide details.

scription of pension provisions and is described in detail in the appendix. The HRS also surveyed employers about the features of respondent pensions, but those data are not used in this analysis.

1.2 Lifetime Earnings and the Wealth of Households

Social Security earnings form a good measure of lifetime labor earnings for persons whose earnings are consistently below the Social Security earnings maximum and who have been in jobs covered by the Social Security system. Historically, the Social Security earnings maximum has been adjusted on an ad hoc basis. The percentage of HRS respondents exceeding the maximum was at its highest in the early 1970s, peaking at 26.9 percent in 1971. The percentage has been below 10 percent since 1981 and was 4.8 percent in 1991.

For persons with incomes above the limit, reported Social Security earnings can significantly underestimate actual earnings. (In addition, as explained above, some persons may report zero Social Security covered earnings because they were employed in sectors not covered by the Social Security system, and we have excluded certain government employees from the sample.) Thus we do not rely directly on Social Security earnings to establish the level of lifetime earnings, but use reported Social Security earnings to *rank* families by lifetime earnings. Then we group families into Social Security earnings deciles, to which we refer hereafter as *lifetime earnings deciles.* We believe that the ranking by Social Security earnings represents a good approximation to a ranking based on actual total earnings, and that thus the deciles are a good approximation to actual lifetime earnings deciles. However, the problems caused by the earnings maximum and by zeros may make results based on the lowest and highest deciles less reliable than results based on the other deciles.

The mean present value of lifetime Social Security earnings within each decile is shown in table 1.2. To obtain lifetime Social Security income, the Consumer Price Index (CPI) was used to convert past earnings to 1992 dollars. The means range from about $36,000 in the lowest decile to just over $1,600,000 in the highest decile. Within the deciles the medians are essentially the same as the means.

The medians of assets, including Social Security wealth, are shown in table 1.3. For single persons Social Security wealth is the mortality-adjusted present value of benefits. For two-person families it is the sum of the mortality-adjusted present value of benefits calculated separately for each person. We have made no additional adjustments for joint mortality or survivorship benefits. Excluding Social Security, the median of total wealth ranges from $5,000 for families in the lowest lifetime earnings decile to almost $388,000 for families in the top lifetime earnings decile. Including Social Security wealth, the median ranges from $33,006 in the lowest decile to $577,107 in the top decile. Many assets are held by fewer

Table 1.2 **Present Value of Social Security Earnings by Lifetime Earnings Decile**

Lifetime Income Decile	Present Value ($)
1st	35,848
2nd	193,664
3rd	372,534
4th	567,931
5th	741,587
6th	905,506
7th	1,055,782
8th	1,186,931
9th	1,333,162
10th	1,637,428

Source: Weighted estimates based on sample of 3,992 households as described in section 1.1 of the text.

than half of the households—indicated by zero medians. The 5th and 6th income deciles span the median of lifetime earnings, and the medians of total wealth in these earnings deciles are $105,166 and $144,188, respectively, excluding Social Security. Fewer than half of the families in these deciles have IRA or 401(k) accounts. Fewer than half have business equity or real estate. And the value of other assets is low. The median of employer-provided pension assets (excluding 401[k] accounts) is $4,000 for the 5th and $14,035 for the 6th lifetime income decile, not much higher than the median values of vehicles—$6,000 and $8,000 respectively. The median levels of financial assets are only $3,000 and $7,000 respectively. The largest component of the wealth of these families is home equity; the medians are $29,000 and $39,000, respectively.

The means of assets by lifetime earnings decile are shown in table 1.4. Comparison of the means and medians foretells the wide dispersion in assets, even among families with similar lifetime earnings. The means are typically much higher than the medians, and in some lifetime earnings deciles the mean of financial assets is more than ten times as large as the median.

1.3 The Distribution of Wealth for Given Lifetime Earnings

We discuss first the distribution of wealth within lifetime earnings deciles. We then consider how much of the dispersion can be accounted for investment choice and by chance shocks to resources. Personal chance events—like health status or children—that might be expected to limit the resources out of which saving might be drawn. Investment choice—e.g., between stocks and bonds—that may be expected to affect the accumulation of assets given saving out of available resources. To the extent that chance events and investment choices are correlated, however, there is of

Table 1.3 **Median Level of Assets by Lifetime Earnings Decile and Asset Category, Health and Retirement Study (HRS)**

	Income Decile									
Asset Category	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Financial assets	0	70	80	2,000	3,000	7,000	9,500	17,000	25,000	36,500
Personal retirement assets	0	0	0	0	0	1,500	5,000	12,000	25,000	40,000
IRA	0	0	0	0	0	0	1,700	5,000	12,000	21,000
401(k)	0	0	0	0	0	0	0	0	0	0
Traditional pension	0	0	0	0	4,000	14,035	33,793	40,808	58,000	83,259
Defined contribution	0	0	0	0	0	0	0	0	0	0
Defined benefit	0	0	0	0	0	0	0	1,497	3,083	22,690
PV pension income	0	0	0	0	0	0	0	0	0	0
Vehicles	300	1,700	3,000	5,000	6,000	8,000	10,000	10,000	12,000	15,000
Business equity	0	0	0	0	0	0	0	0	0	0
Other real estate	0	0	0	0	0	0	0	0	0	3,000
Home equity	0	8,000	19,000	23,000	29,000	39,000	50,000	60,000	70,000	77,000
Home value	0	17,000	35,000	35,000	45,000	67,000	75,000	85,000	100,000	120,000
Mortgage debt	0	0	0	0	0	9,000	5,600	11,000	15,000	20,000
Social Security wealth	0	54,754	75,335	88,692	101,234	108,619	117,764	119,950	137,673	175,542
Total wealth, excluding Social Security	5,000	34,429	52,803	82,620	105,166	144,188	189,832	221,692	305,536	387,609
Total wealth, including Social Security	33,006	85,448	125,759	168,878	203,084	261,072	312,037	349,549	453,265	577,107

Source: Weighted estimates based on the HRS sample described in section 1.1 of the text.
Note: Zero medians indicate that asset is held by less than 50 percent of households.

Table 1.4 **Mean Level of Assets by Lifetime Earnings Decile and Asset Category, Health and Retirement Study (HRS)**

	Income Decile									
Asset Category	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Financial assets	20,566	16,369	18,635	31,871	34,245	36,988	50,339	56,837	112,356	88,420
Personal retirement assets	5,628	4,337	6,266	10,185	10,340	16,000	28,291	40,531	65,461	76,454
IRA	3,730	3,683	4,325	6,843	8,035	11,219	18,904	24,528	39,391	52,706
401(k)	1,898	654	1,941	3,341	2,305	4,781	9,386	16,003	26,070	23,748
Traditional pension	12,382	19,285	22,301	32,603	38,107	55,383	79,646	91,843	132,369	145,626
Defined contribution	20	2,008	2,498	4,431	3,461	5,137	8,886	14,193	22,498	18,185
Defined benefit	8,224	8,563	11,436	17,089	18,821	28,614	37,574	50,684	73,454	93,074
PV pension income	4,138	8,713	8,368	11,083	15,825	21,633	33,206	26,966	36,416	34,367
Vehicles	3,353	4,291	7,022	8,519	11,155	12,691	18,694	15,700	16,142	19,698
Business equity	85	2,884	5,107	23,140	42,628	28,716	45,793	27,982	78,164	55,817
Other real estate	19,213	12,884	20,548	39,257	38,350	54,481	45,940	55,894	57,611	80,771
Home equity	17,842	32,488	33,129	38,941	44,342	53,143	65,596	73,628	91,297	98,326
Home value	23,997	43,997	46,674	57,834	62,417	76,721	96,452	104,887	126,176	139,148
Mortgage debt	6,155	11,508	13,544	18,893	18,076	23,578	30,857	31,259	34,879	40,821
Social Security wealth	16,494	49,665	67,962	82,951	95,980	108,749	116,674	119,172	135,626	172,476
Total wealth, excluding Social Security	79,069	92,538	113,009	184,515	219,166	257,402	334,298	362,413	553,400	565,112
Total wealth, including Social Security	95,563	142,203	180,971	267,466	315,146	366,151	450,972	481,586	689,026	737,588

Source: See table 1.3.

course no way to parcel out a separate effect for each of these factors. Thus we proceed in a way that indicates the maximum portion of dispersion that could be attributed to each.

1.3.1 Dispersion in Asset Accumulation Given the Same Lifetime Earnings

The dispersion in total accumulated wealth by lifetime earnings decile is shown in figure 1.1. For each earnings decile, the figure shows five quantiles: the 10th, 30th, 50th, 70th, and 90th. The median is the 50th quantile. Ten percent of families have wealth below the 10th quantile, 30 percent have wealth below the 30th quantile, and so forth. Several features of the data stand out. Perhaps not surprising, a noticeable proportion of households in the lowest lifetime earnings deciles have accumulated almost no wealth by the time they have attained ages fifty-one to sixty-one. Half of those in the lowest earnings decile have less the $5,000 in wealth, as do 30 percent of those in the 2nd decile, 20 percent of those in the 3rd, and 10 percent of households in the 4th earnings decile. But even among households with the highest lifetime earnings, some households have very limited wealth. For example, 10 percent of households in the 6th earnings decile have less than $30,000 in assets, and 10 percent of those in the 9th earnings decile have less than $100,000.

To address the principle question of this paper, it is the dispersion of wealth that is the most critical, and here the data are striking. Even controlling for lifetime earnings, the range of wealth is enormous. In the 5th lifetime earnings decile, the 90th quantile is thirty-five times the size of the 10th quantile. The range is less extreme in higher earnings deciles but still very wide: the 90th quantile is 16, 19, 12, 10, and 9 times as large as the 10th quantile in the 6th through the 10th lifetime income deciles, respectively.

While many families with low lifetime earnings have very limited wealth—as do some who earned the most—the wide dispersion in accumulated wealth is evident among those with low and high lifetime earnings alike. Thus some families with the lowest lifetime earnings have accumulated noticeable wealth. For example, the 90th quantile is approximately $150,000 for the lowest decile and is well above $200,000 for the 2nd and 3rd deciles.

The dispersion at the highest levels of wealth accumulation is itself substantial and is presented separately in figure 1.2, which shows the 90th, 95th, and 98th quantiles by lifetime earnings decile. The 98th quantile is typically two and a half to three times the size of the 90th quantile. Overall there is enormous variation in wealth accumulation among households whose members had similar earnings over their lifetimes. The wide variation in wealth will not be new to many readers; not so widely appreciated is the vast variation in wealth among households with similar lifetime earnings.

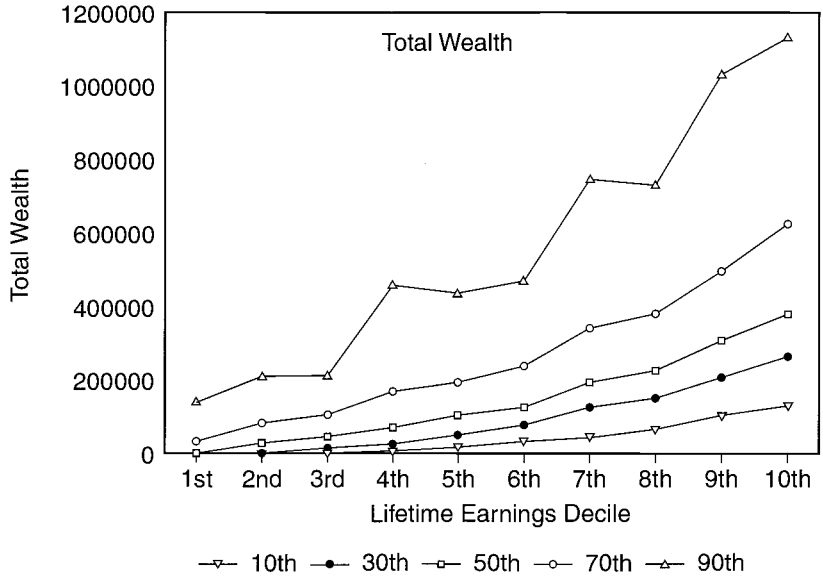

Fig. 1.1 Wealth quantiles: total wealth

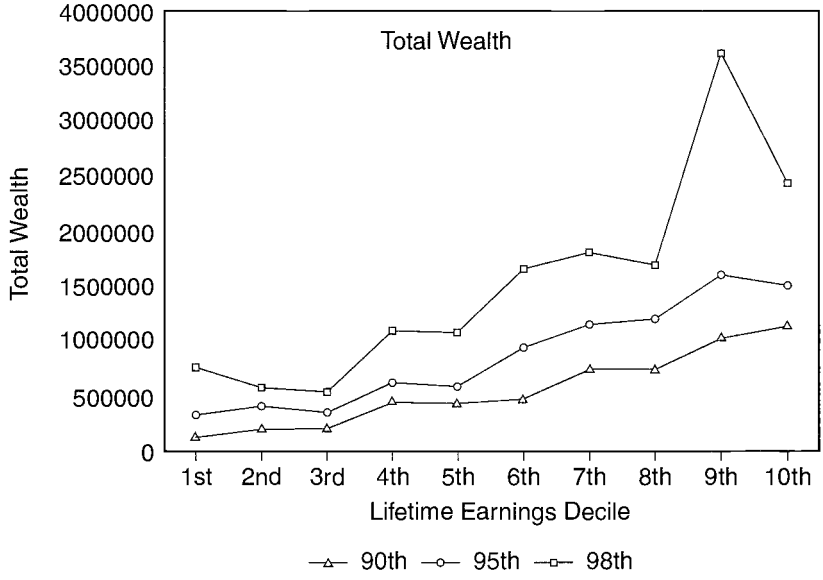

Fig. 1.2 Top wealth quantiles: total wealth

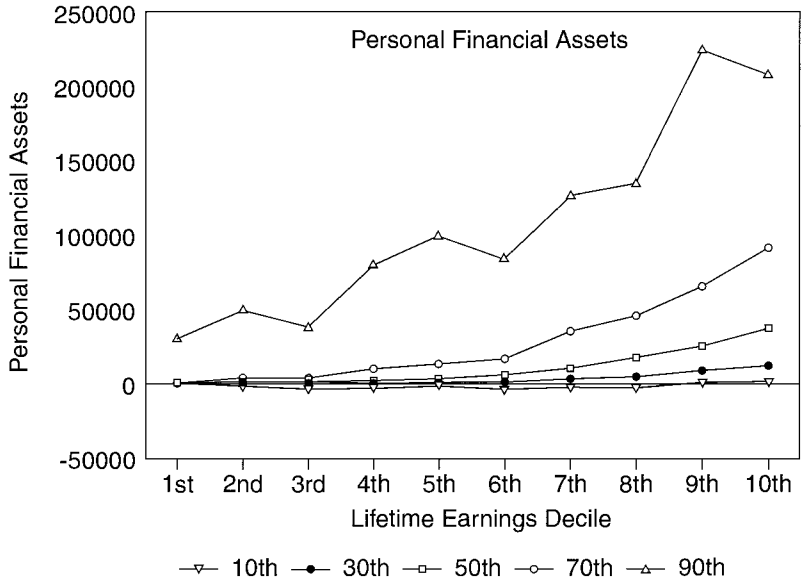

Fig. 1.3 Wealth quantiles: personal financial assets

Figure 1.3 shows the dispersion of personal financial assets (excluding personal retirement assets such as IRA and 401[k] accounts). That most people don't save much is not new. That many of those with high earnings save so little is, however, striking. The 10th quantile is negative or close to zero for every lifetime earnings decile! The same is true for the 20th quantile, with the exception of the highest earnings decile, for which the 20th quantile is a paltry $6,400. The medians range from zero for the lowest three deciles, to $3,000 and $5,800 for the 5th and 6th quantiles, to $10,000 for the 70th, to $36,500 for the highest income decile. Like the dispersion in total wealth, the range of personal financial assets from the 10th to the 90th quantiles is extremely broad and the dispersion is even greater when the top quantiles are considered, as in figure 1.4.

Almost all of the HRS respondents have had the opportunity to contribute to either an IRA or a 401(k) plan. It is not surprising, then, that personal retirement saving has become an important component of the wealth of some HRS households. Quantiles of personal retirement saving assets by lifetime earnings decile are shown in figure 1.5. Although personal retirement accounts are now an important form of personal saving, only about half of HRS households have such accounts. Most households in the highest lifetime earnings deciles have such accounts but households in the lowest deciles do not. Like the dispersions in personal financial saving and in total wealth, even for households with similar lifetime earnings the

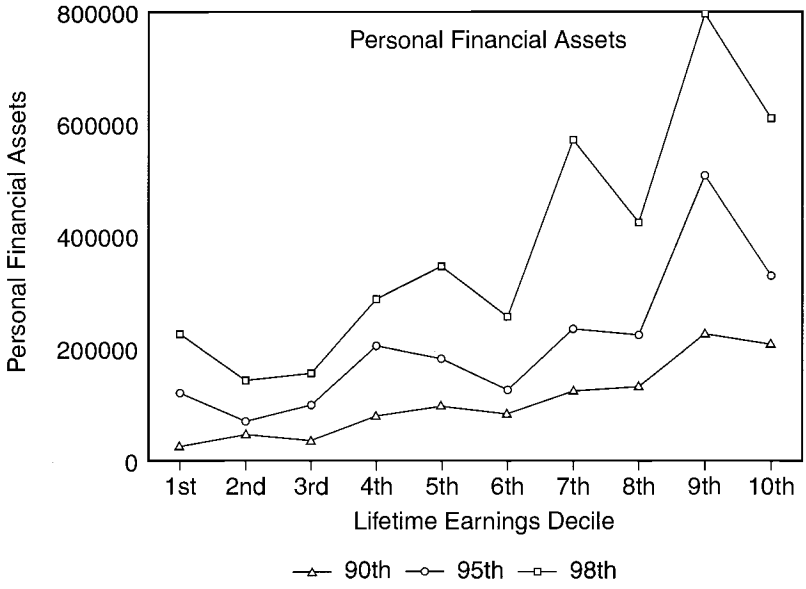

Fig. 1.4 Top wealth quantiles: personal financial assets

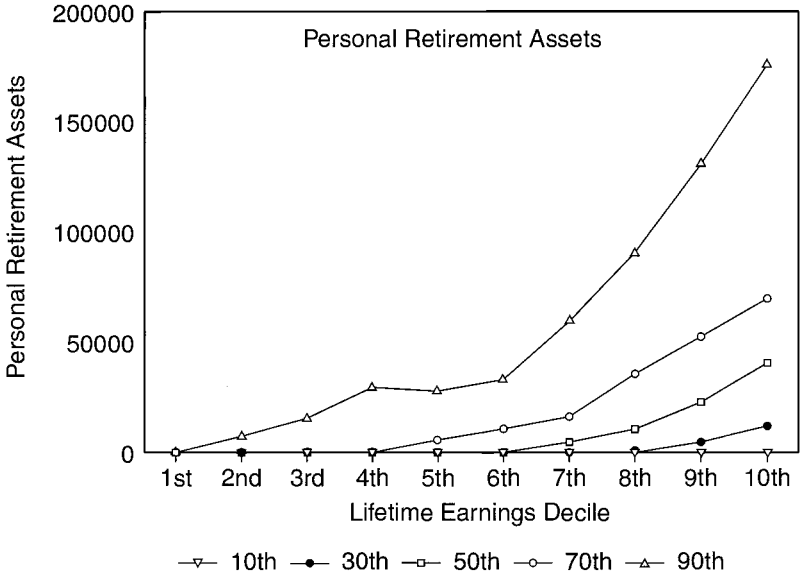

Fig. 1.5 Wealth quantiles: personal retirement assets

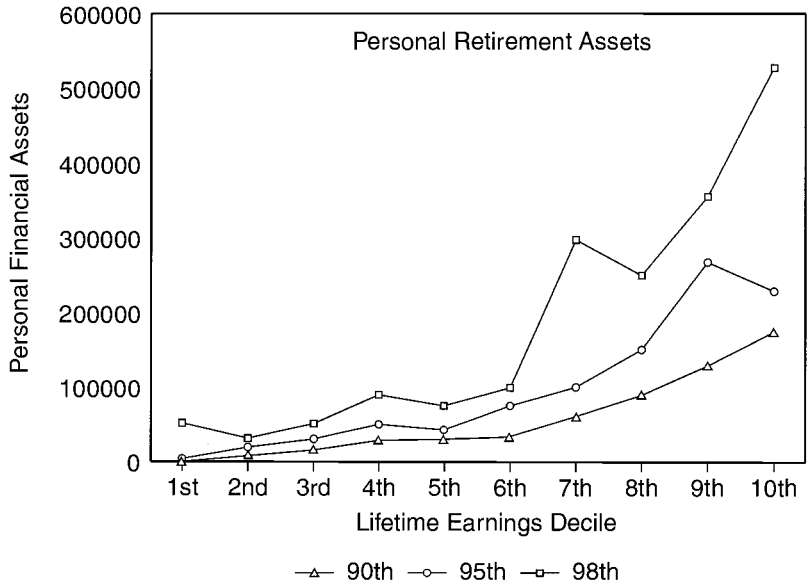

Fig. 1.6 Top wealth quantiles: personal retirement assets

variation in personal retirement assets is very large. Again, substantial variation is observed in the top quantiles as shown in figure 1.6. Although we have no way of knowing how much the IRA and 401(k)—as well as Keogh—limits constrained the personal retirement saving of HRS households, it is likely that many households at the top quantiles were constrained by the limits.

1.3.2 Chance Events versus Saving Choice and Investment Choice

We want to obtain an indication of how much of the dispersion in saving can be attributed to chance and how much to choice: *Chance* is intended to represent circumstances that may affect the resources available for saving, given lifetime resources. We attribute to *saving choice* the dispersion that remains after accounting for chance circumstances that limit or enhance resources. We also consider how much of the dispersion in wealth can be attributed to the *investment choice* of savers. We proceed in two steps: First, we consider how much of the dispersion in wealth can be attributed to chance events; what is not accounted for by chance events, we attribute to saving choice. Then we consider separately the effect of investment choice on the dispersion of wealth. We emphasize the effect of adjustment for chance events and investment choices on the distribution of wealth within lifetime earnings deciles. Thus the exposition is necessarily graphical, for the most part. We do present, however, some more-standard

measures of reduction in dispersion when chance events and investment choices are accounted for.

In considering chance events that affect resources we do not want to control for education, ethnic group, and other attributes that may be correlates of the taste for saving. Rather, we want to consider individual circumstances that may enhance or limit funds out of which saving could be drawn. We consider inheritances and gifts, health status, age, number of children, and marital status. Age, of course, is not a chance event, but the range of ages of HRS household heads is likely to be systematically related to asset accumulation. Children and marital status are also not truly chance events. They might more properly be thought of as choices made early in one's lifetime that may later limit resources out of which saving can be drawn. Thus we include these with chance events. In effect, including these household attributes tends to exaggerate the dispersion that might be attributed to truly chance events.

That inheritances and gifts might ease the burden of saving seems clear. Poor health and associated health expenditures may increase the burden of saving. Health status may also affect lifetime earnings and thus the earnings deciles of households. However, the question here is whether, given earnings, health status may affect the resources out of which households might plausibly save. Unfortunately, we have only limited indicators of health status and know little about health over a person's lifetime. Thus we use health status at the time of the survey as an imperfect control for medical circumstances. It is likely that expenses associated with children also reduce the pool of resources that could be saved. Indeed, under some circumstances children could be a substitute for saving for retirement. Finally, marital status, if only because of economies of scale, may be a determinant of resources out of which saving could plausibly be drawn.

Within each lifetime earnings decile, we first predict wealth with a simple specification of the form

$$
\begin{aligned}
(1)\quad \text{Wealth} = {} & \text{Constant} + \beta_1(\text{Married}) + \beta_2(\text{Never Married}) \\
& + \beta_3(\text{Widowed, Divorced, or Separated}) + \beta_4(\text{No Children}) \\
& + \beta_5(\text{Number of Children if} > 0) + \beta_6(\text{Age}) \\
& + \beta_7(\text{Poor Health Single Person}) + \beta_8(\text{Poor Health 1 of 2 in Family}) \\
& + \beta_9(\text{Poor Health 2 of 2 in Family}) + \beta_{10}(\text{No Inheritances}) \\
& + \beta_{11}(\text{Amount of Inheritances Received} < 1980) \\
& + \beta_{12}(\text{Amount of Inheritances Received 1980 to 1988}) \\
& + \beta_{13}(\text{Amount of Inheritances Received} > 1988),
\end{aligned}
$$

with appropriate normalizing restrictions for the indicator variables. From this equation, we obtain predicted wealth. Then, within each earnings decile, adjusted wealth is determined by

$$\text{(2)}\quad \text{Adjusted Wealth} = (\text{Unadjusted Wealth}) - (\text{Predicted Wealth}) + (\text{Mean of Wealth}),$$

which gives distributions of adjusted and unadjusted (observed) wealth with the same means.

We follow a similar procedure to determine the effect of investment choice on wealth dispersion. Even among households that save the same proportion of earnings, accumulated wealth may differ because some households have invested savings in the stock market (for example), while others have saved through bank saving account or money market funds. The average rate of return on stock investments is much higher than the rate of return in money market funds, but the risk associated with stock investments is also higher—or at least is perceived to be higher. Other households invested primarily in housing, and so forth. We don't know the investment choices that households made over their lifetimes. The HRS did, however, obtain information on the percent allocation of financial asset saving (excluding IRA and 401[k] accounts) for five components of financial assets. We use this information, together with information on the proportion of wealth in housing and five other asset categories, as an indicator of the lifetime investment choices of a household. Within each lifetime earnings decile, we again predict wealth, but based on investment choices, with a specification of the form

$$\begin{aligned}\text{(3)}\quad \text{Wealth} = {} & \text{Constant} + \beta_1(\%\ \text{Wealth in Personal Financial Assets}) \\ & + \beta_2(\%\ \text{Financial Assets in Stocks}) + \beta_3(\%\ \text{Financial Assets in Bonds}) \\ & + \beta_4(\%\ \text{Financial Assets in Money Market Accounts}) \\ & + \beta_5(\%\ \text{Wealth in IRA, 401(k), and Keogh Accounts}) \\ & + \beta_6(\%\ \text{Wealth in Employer Pensions}) \\ & + \beta_7(\%\ \text{Wealth in Business Equity}) + \beta_8(\%\ \text{Wealth in Vehicles}) \\ & + \beta_9(\%\ \text{Wealth in Housing}) + \beta_{10}(\%\ \text{Wealth in Other Real Estate}).\end{aligned}$$

To evaluate the dispersion in total financial assets—including IRA, 401(k), and Keogh accounts—that might be accounted for by investment choice, we use

(4) Total Financial Assets = Constant

+ β_1(% Financial Assets in Stocks) + β_2(% Financial Assets in Bonds)

+ β_3(% Financial Assets in Money Market Accounts)

+ β_4(% Financial Assets in Certificates of Deposit)

+ β_5(% Financial Assets in Other Interest-Bearing Accounts).[6]

Again, we determine adjusted total financial assets as in equation (2), above.[7]

We could, of course, adjust for both chance events and investment choice at the same time. Making separate adjustments to the same base, however, allows us to compare the effect of chance events on wealth dispersion with the effect of investment choices on dispersion. The two sets of variables may be correlated, however. To the extent that they are positively correlated, some of what is attributed to chance in the first adjustment should be attributed to investment choice instead, and some of what is attributed to investment choice in the second adjustment should be attributed to chance events. Thus, this procedure maximizes the adjustment attributed to each. (Standard measures of reduction in dispersion presented below suggest that the correlation between the two sets of variables is rather small, however.)

In referring to investment decisions as choice, it is important to distinguish this choice from risk—or the chance outcomes that the choice may yield. It seems clear that part of the wealth accumulation of savers is due to choice—conservative versus risky assets—and that part is due to chance. Chance may play a particularly prominent role in housing investments. For example, a person who purchased a home in Boston twenty years ago likely benefitted from large capital gain. On the other hand, a person who purchased in Houston may well have lost money. We will find, however, that the wide dispersion in accumulated wealth pertains to all forms of assets; dispersion is not peculiar to housing equity. There is, of course, a chance aspect to financial asset accumulation as well. Given the level of

6. Stocks include shares of stock in publicly held corporations, mutual funds, and investment trusts. Bonds include corporate, municipal, government, or foreign bonds, and bond funds. Money market accounts include checking or saving accounts and money market funds. Certificates of deposit include certificates of deposit, government saving bonds, and treasury bills. Other interest-bearing accounts include other saving or assets, such as money owed to the individual by others; a valuable collection made for investment purposes; an annuity; and rights in a trust or estate.

7. Because the shares of total wealth, or total financial assets, can be calculated only if wealth is positive, only observations with positive wealth values are included in the estimation samples. This reduces the sample from 3,992 to 3,584 households.

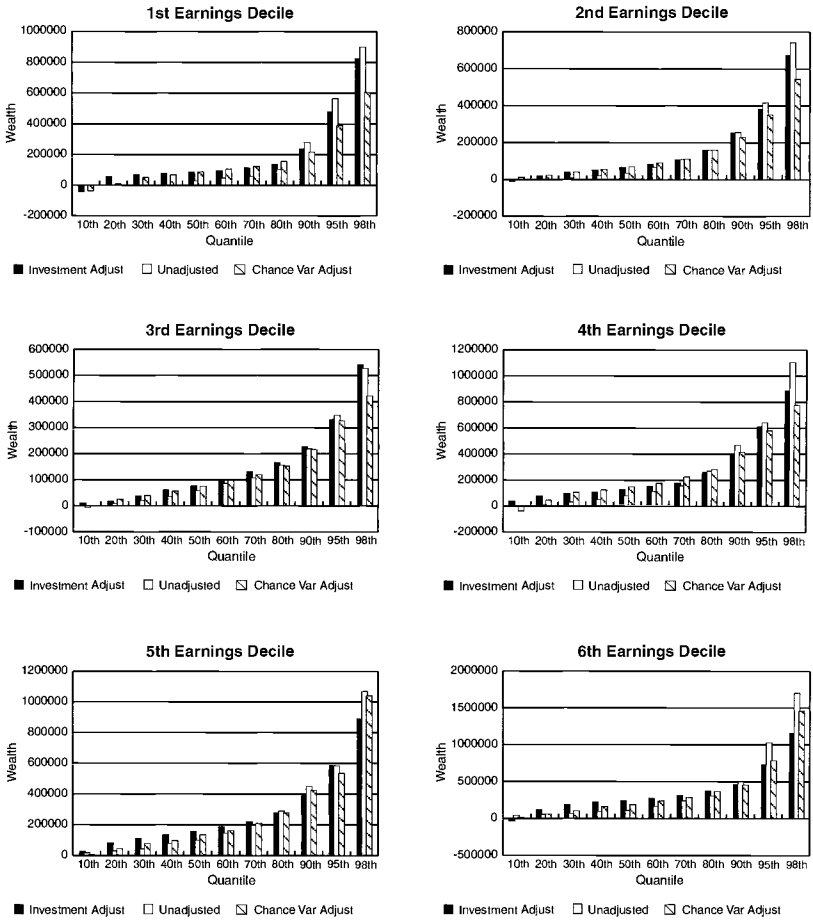

Fig. 1.7 1st–10th earnings deciles, adjusted v. unadjusted wealth quantiles

risk, some savers will be winners and have large returns while others will have lower returns. However, unlike a random shock to financial resources due, for example, to illness, this risk and associated distribution of shocks to accumulation is chosen.

Figure 1.7 shows graphs of the adjusted compared to the unadjusted quantiles for each lifetime earnings decile. The middle bar of each panel shows unadjusted wealth quantiles. The bars behind show the quantiles adjusted for investment choice. The bars in front show quantiles adjusted for chance events, or individual circumstances. Overall, the adjustment for individual circumstances does not have much effect on the dispersion of wealth. Thus we conclude that, for the most part, within-decile differences in saving can be attributed to differences in the amount of earnings that

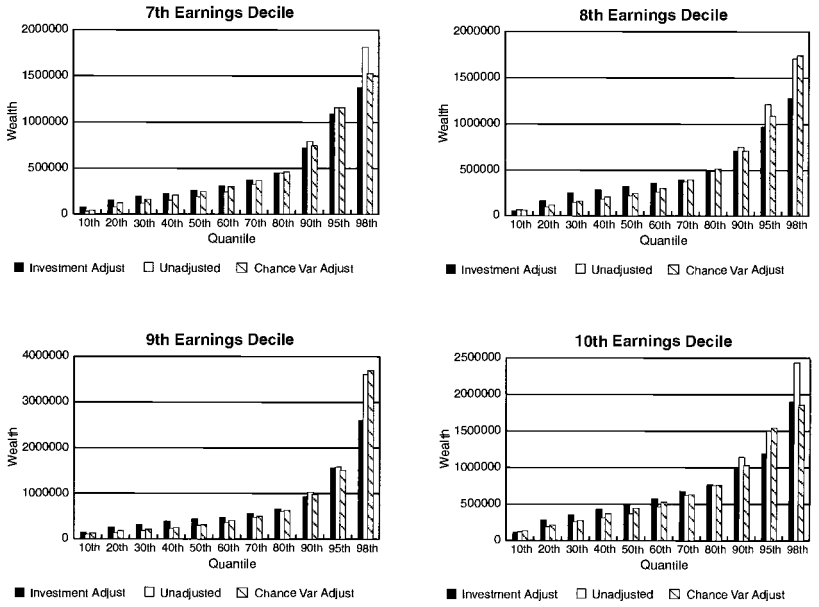

Fig. 1.7 (cont.)

households choose to save; some choose to save a good deal, many choose to save very little. Some of the dispersion can be attributed to investment choices. But investment choice, too, accounts for only a small part of the dispersion in wealth within earnings deciles. Overall, the small reduction in dispersion that can be attributed to chance events is about the same as the reduction that can be attributed to investment choices. Or, put another way: The increase in dispersion that results from differing household investment choices is approximately the same as the increase that can be attributed to chance events; both are small.

The comparison of adjusted and unadjusted distributions, however, does reveal some systematic patterns. With respect to the adjustment for chance events: First, the adjustment reduces the 95th and 98th quantiles in almost every decile, and the reduction in the 98th quantile is especially noticeable. Second, for the 5th to the 10th deciles, the adjustment for chance events has very little effect on all but the extreme quantiles. Modest leveling occurs within the 3rd and 4th deciles, with the 90th quantile reduced a bit and the lower quantiles raised a bit. Third, the greatest leveling occurs in the 1st and 2nd lifetime earnings deciles, in which the highest quantiles are reduced and the lowest quantiles raised. Still, in all deciles an enormous dispersion in assets remains after adjusting for the individual circumstances.

The adjustment for investment choices also reveals some systematic pat-

terns. This adjustment has little effect on wealth dispersion in the bottom three lifetime earnings deciles. The greatest effects are in the upper deciles. The 98th quantile is reduced in almost every decile, especially in the upper ones. The 95th quantile is reduced in most deciles as well, but only marginally in all but the 6th, 8th, and 10th deciles. The lower quantiles tend to be raised in each earnings decile.

Finally, controlling for education and ethnic group (which are typically found to be related to saving and presumably influence the taste for saving) has only a very modest effect on the distributions. By way of illustration, figure 1.8 shows the quantiles for the 7th earnings decile when these variables are added to the list of individual circumstances. The principle effect of the addition of these "taste" variables is to increase a bit the lower quantiles. Nonetheless, the major dispersion remains: Some people choose to save, and others don't.

For comparison, more traditional measures of unconditional versus conditional variance (controlling for individual circumstances) are shown in table 1.5. Starting with the unconditional variance in wealth, controlling for lifetime earnings decile reduces the residual standard deviation by 5.05 percent. When lifetime earnings decile plus the individual chance events are controlled for (with complete interaction of earnings decile and attributes), the reduction is 9.08 percent. Thus 4.03 percent (9.08 percent − 5.05 percent) might be attributed to the chance events. When lifetime earnings decile plus investment choices are controlled for (again with complete interaction of earnings decile and investment choice), the reduction is

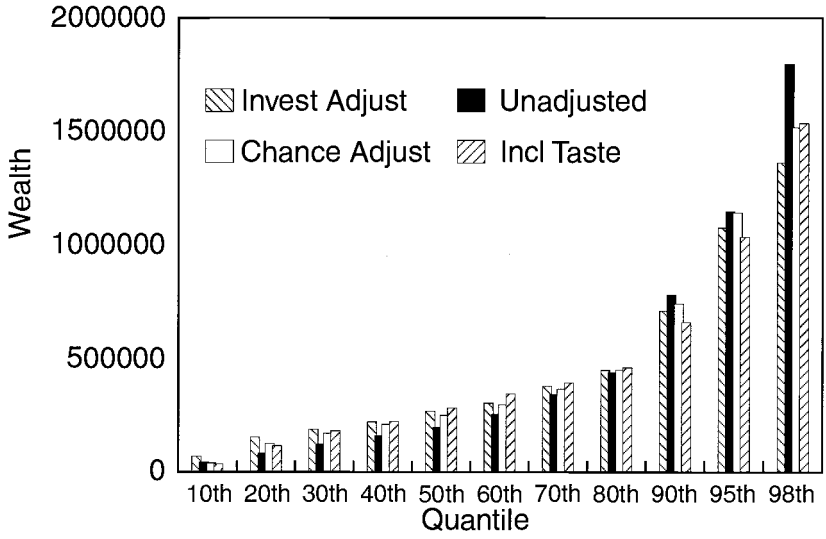

Fig. 1.8 7th earnings decile: adjusted v. unadjusted wealth quantiles

Table 1.5 Percent Reduction in Residual Variance of Total Wealth, by Control Variables

Total Sample	
Control Variables	Percent Reduction vs. Unconditional Standard Deviation
(A). Lifetime earnings decile	5.05
(B). (A) + chance variables	9.08
(C). (A) + investment choice variables	12.98
(D). (A) + (B) + (C)	15.32
(E). (D) + "taste variables" (education and race)	16.00

By Lifetime Earnings Decile

	Control Variables			
Decile	Chance Variables (B)	Investment Choice Variables (C)	(B) + (C) (D)	(D) + "Taste Variables" (education and race) (E)
1st	6.84	7.18	10.29	10.12
2nd	23.15	8.29	26.41	27.90
3rd	1.47	9.39	10.33	10.54
4th	26.55	15.01	32.67	32.83
5th	3.35	16.30	16.91	17.82
6th	5.22	12.17	14.29	25.58
7th	9.88	13.78	19.52	20.70
8th	2.32	13.53	13.67	15.45
9th	1.88	19.67	19.76	19.98
10th	4.00	17.52	19.49	21.02

Source: See table 1.3.

Notes: Because shares could not be computed if total wealth is less than or equal to zero, only families with positive levels of total wealth are used. The following investment shares were used: financial assets, personal retirement saving, traditional pension assets, business equity, vehicles, home equity, and other real estate.

12.98 percent, and 7.93 percent (12.98 percent − 5.05 percent) might be attributed to investment choice. Thus, by this conventional measure, only a small proportion of the dispersion in wealth can be attributed to chance events. Little of the dispersion can be attributed to the investment choices of savers. By these measures, the effect of investment choice is somewhat greater than the effect of chance.

Controlling for earnings decile, chance events, and investment choice reduces the residual standard deviation by 15.32 percent. Or, 10.27 percent (15.32 percent − 5.05 percent) can be attributed to both chance events and investment choices together. The maximum that can be attributed to chance events, plus the maximum that can be attributed to investment choice, which is 11.96 percent (4.03 percent + 7.93 percent), is not much

greater than the reduction of 10.27 percent that can be attributed to both jointly. Thus there is little correlation between the two sets of factors; if there were no correlation, the sum of the individual reductions would equal the joint reduction.

The effect of controlling for chance events and for investment choice within earnings decile is shown in the second panel of table 1.5. Controlling for chance events typically reduces the residual standard deviation by only a few percentage points (although as high as 23 percent in the 2nd and 27 percent in the 4th decile). Thus, within earnings deciles, little of the dispersion can be ascribed to these individual attributes. Controlling for investment choice typically yields a larger reduction in residual variance than controlling for the chance events. In this case the reduction ranges from about 3 percent to 16 percent. In the higher deciles, in particular, the reduction due to investment choice is around 13 percent on average, whereas the reduction due to chance events is around 4 percent on average. Although these measures are not inconsistent with the graphical information, they provide no detail on how the distribution of wealth may be affected by the individual attributes, and that is what we wish to emphasize; thus the figures highlighted above.

We have focused on the dispersion of total wealth. Within lifetime earnings deciles, wide dispersion characterizes all asset categories. Little of the dispersion can be attributed to individual household circumstances. For example, figure 1.9 shows adjusted and unadjusted quantiles for personal financial assets (including personal retirement assets) for households in

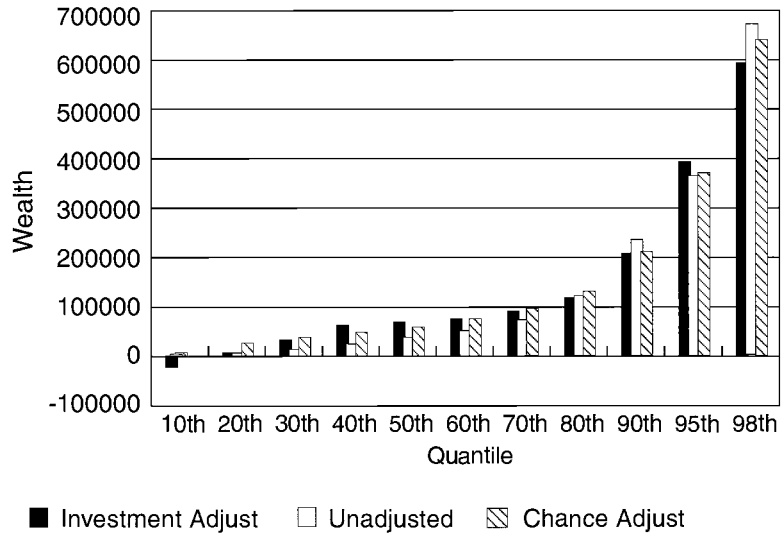

Fig. 1.9 7th earnings decile: adjusted v. unadjusted financial wealth

the 7th lifetime earnings decile. Although the top adjusted quantiles are lower than the unadjusted quantiles, overall, the adjustment has only a modest effect on the dispersion.

1.4 The Wealth That Consistent Saving Would Have Produced

We see that a large fraction of households on the eve of retirement have meager financial asset saving and, indeed, limited total wealth. We now ask what the wealth of HRS respondents might have been had they saved consistently for retirement throughout their working lives. The answer to this question can be illustrative only, because it requires a choice of saving rate out of income and a choice of rate of return. We make calculations based on several different saving rates and rate of return values. Basically, we ask, What if a proportion s of earnings had been saved each year, and each year this saving had been invested in assets earning a rate of return r?[8] Using a given s and a given r, we calculate the resulting asset accumulation of our sample. There is one important limitation to this method: Historical earnings are reported only up to the Social Security earnings limit, as emphasized above. Actual earnings in these deciles may be substantially higher than Social Security reported earnings.

Because of this limitation of the Social Security data, we also make calculations based on the annual March Current Population Survey (CPS), which reports earnings well above the Social Security maximum.[9] We follow this procedure: (a) We identify lifetime earnings deciles, as described above, using the Social Security earnings histories of each family in the HRS. (b) Using the annual March CPS, we calculate earned income deciles by age for the years 1964–91. Using published data on median earnings prior to 1964, we extrapolate this series back to 1955. Thus we obtain CPS earnings histories by decile for the years 1955 to 1991. (c) To compare the Social Security with the analogous CPS data, we assign each HRS household to a CPS decile according to the household Social Security earnings decile. The CPS earnings histories begin at age twenty-five, and a given household is assumed to have been in the same decile since age twenty-five. (d) Using this earnings profile and these saving and rate of return values, we calculate accumulated wealth up to the age of the respondent at the time of the survey in 1992.

Results for several saving rates (s) and nominal investment returns (r) are shown in table 1.6. For each combination of s and r, the first column presents results using only the Social Security earnings data. The second column shows the results of the alternative calculation based on the CPS

8. These calculations assume a constant rate of saving as a person ages.

9. The ratio of the CPS maximum to the Social Security maximum has ranged from a low of just under 2 in 1981 to a high of over 20 in 1964. In 1991 the CPS reported earnings up to a maximum of $200,000; the Social Security maximum was $53,400 in that year.

Table 1.6 **Assets at the Time of the Health and Retirement Study (respondents having saved throughout their working lives)**

Earnings Decile	Saving Rate (s) and Rate of Return (r)											
	s = .05, r = 6%		s = .05, r = 12.5%		s = .10, r = 6%		s = .10, r = 12.5%		s = .15, r = 6%		s = .15, r = 12.5%	
	SS	CPS	SS	CPS	SS	CPS	SS	CPS	SS	CPS	SS	CPS
1st	1,608	34	4,329	137	3,216	69	8,658	275	4,824	103	12,987	412
2nd	9,178	11,402	24,887	38,066	18,356	22,804	49,773	76,133	27,534	34,207	74,660	144,199
3rd	18,321	23,738	50,004	73,290	36,642	47,475	100,008	146,580	54,962	71,213	150,012	219,870
4th	28,236	33,627	78,897	100,608	56,472	67,253	157,794	201,216	84,708	100,880	236,690	301,825
5th	37,083	42,606	105,962	124,198	74,166	85,212	211,925	248,395	111,249	127,819	317,887	372,593
6th	45,490	51,079	125,965	144,557	90,981	102,158	251,930	289,113	136,471	153,237	377,896	433,670
7th	53,617	61,056	150,462	173,856	107,234	122,112	300,923	347,712	160,851	183,168	451,385	521,567
8th	60,073	71,689	163,745	199,094	120,147	143,378	327,490	398,189	180,220	215,068	491,236	597,283
9th	67,457	88,701	183,935	251,229	134,914	177,401	367,869	502,459	202,370	266,102	551,804	753,688
10th	83,810	125,418	226,230	354,536	167,620	250,835	452,460	709,072	251,430	376,153	678,690	1,063,609
All	40,487	50,935	111,442	145,957	80,975	101,870	222,883	291,914	121,462	152,805	334,325	437,872

Source: See table 1.3.

earnings data. Calculations are made for three values of *s* (5, 10, and 15 percent) and two values of *r* (6 and 12.5 percent). The assumed values of *s* reflect what we believe to be "reasonable" rates of saving for households. Indeed, if saving is broadly defined to include investments in housing, businesses, pensions, and vehicles, then a rate of even 15 percent may be conservative. The rates of return of 6 percent and 12.5 percent are the mean annual returns for long-term corporate bonds and the Standard and Poor's (S&P) index, respectively, between 1926 and 1995.

For the most part, the Social Security earnings histories and the CPS constructed histories yield rather similar results, although the CPS histories are associated with greater wealth accumulation. The greatest differences occur at the top earnings deciles and are typically larger for large saving rates and rates of return. The actual assets with which these accumulations should be compared is unclear. We are inclined to compare these values to all financial assets that might be used for support in retirement—that is, personal retirement assets, firm pension assets, and other personal financial assets. For convenience, the medians of these assets are shown by lifetime earnings decile in the first column of table 1.7. Since housing equity typically is not used to finance retirement spending, at least not until advanced ages, it is convenient to make comparisons excluding housing equity, which is the largest asset of the majority of households. In any case, total wealth is also shown in the second column of table 1.7. (The comparison should be with the actual median, and not the mean, because the same saving and rates of return are assigned to all households. In addition, within a decile, the same CPS earnings are assigned to all households.)

Saving rates of 10 percent would typically yield much larger assets than the median of actual total financial assets. Consider the 6th lifetime in-

Table 1.7 **Actual Median Total Financial Assets and Total Wealth, by Lifetime Earnings Decile**

Lifetime Earnings Decile	Total Financial Assets ($)	Total Wealth ($)
1st	0	3,000
2nd	431	28,800
3rd	6,770	47,025
4th	22,000	72,504
5th	35,668	105,166
6th	46,882	126,082
7th	86,000	195,000
8th	111,465	224,000
9th	162,825	305,536
10th	213,855	380,115

Source: See table 1.3.

Note: Total financial assets include personal retirement, firm pension, and other financial assets.

come decile, for example. The figure for actual median total financial assets in this decile is $46,882. With a rate of return of 6 percent, a saving rate of 10 percent would have produced median assets of about $100,000 at the time of the survey. At the average rate of return for the S&P 500, the accumulation would have been between $250,000 and $300,000. The actual median of total (financial and nonfinancial) wealth in the 6th decile is $126,082. In all income deciles, the "as if" accumulation of financial assets is much larger than the actual accumulation of financial assets. Indeed, for saving rates of 10 percent and the S&P 500 rate of return, the "as if" potential accumulation is much larger than total actual wealth. The average age of the HRS respondents is only fifty-six, however, so assets projected to age sixty-five could easily be more than double those reported in table 1.6. Nonetheless, these potential saving accumulations are in stark contrast with the actual saving of these families. With the illustrative lifetime saving rates and investment returns, families in all but the lowest decile would have accumulated sizable wealth by the time of the HRS survey.[10]

Saving rates like those used in these illustrative calculations are likely to be increasingly common with the continuing spread of 401(k) plans. For example, if current trends continue, it would not be unusual for a person to contribute 10 percent of earnings to a 401(k) and to invest in an S&P 500 index mutual fund. It is easy to see that consistent lifetime saving, perhaps through a 401(k) plan, could yield large asset accumulations for a very substantial fraction of households. This prospect is considered in some detail by Poterba, Venti, and Wise (1998).

1.5 Self-assessed Saving Adequacy, Attitudes toward Saving, and Asset Accumulation

Two experimental saving modules were administered to subsamples of respondents in the third wave of the HRS. Each of the two modules was given to 10 percent of respondents, although not the same respondents. The goal of these experimental modules was to explore possibilities for discovering more about the attributes of persons who save compared to those who don't, with the ultimate goal of understanding more about what determines saving behavior. In addition, the modules asked respondents about the adequacy of their retirement saving. We explore here the relationship between responses to the saving module questions and realized saving as described in section 1.3.

The experimental module sample sizes are small. There are 460 observa-

10. In the CPS data, families in the lowest Social Security earnings decile are assumed to have been in the lowest earnings decile in all years. Thus in most years these families are assumed to be zero earners.

Table 1.8 Adequacy of Saving versus *Q*

Question	Response	Percent	Total Wealth *Q*	Total Financial Assets *Q*
Over the past twenty or thirty years, do you think now what you saved was (M9-4):	About right	24	61	64
	Too little	76	46	43
	Too much[a]			
If you could do it again, do you think you would save (M9-4c):	About the same	31	57	55
	More	69	45	46
	Less[b]			
Including Social Security and pensions, will you have enough saving to maintain your living standard after retirement? (M10-10)	Yes	67	58	57
	No	33	46	46
If yes: How do you expect your standard of living in retirement to compare to your present standard of living? (M10-11f)	Higher	8	44	50
	Same	75	60	58
	Lower	17	60	54

Source: Tabulations from experimental savings modules of the 1996 HRS.

[a]Less than 2 percent of the respondents answered "Too much," and these responses have been excluded.

[b]Less than 1 percent of the respondents answered "Less," and these responses have been excluded.

tions in one of the two that we use, and 390 in the other. About half of these observations are not used here, primarily because of missing Social Security records.[11] Thus, we need a convenient way to measure the realized saving of each household in such a way that we can avoid separate analyses by lifetime earnings decile. The 10 percent samples do not yield large enough sample sizes to do this reliably. Thus we calculate a variable *Q*, which in this paper is the within-decile wealth quantile of each household. For example, if a household has wealth just at the median of other households within an earnings decile, the *Q* assigned to this household is 50. This measure is independent of earnings decile. It tells us how the wealth of each household compares to the wealth of other households with similar lifetime earnings. Thus two households in different lifetime earnings deciles but with the same *Q* can be thought of as having a similar taste for saving. Households with different *Q* values have different tastes for saving.

We first consider the relationship between self-assessed adequacy of saving and *Q*. Table 1.8 shows respondent answers to several questions, together with their *Q* values. The first question asked whether the respondent's saving over the past twenty or thirty years was "About right," "Too little," or "Too much." Almost 75 percent of the respondents said "Too little." About 25 percent said "About right." Virtually no one said

11. There is no reason to believe that these exclusions are not random, as shown in table 1.1.

"Too much." Those who said "About right" had an average Q with respect to total wealth of 61—meaning that, on average, they were at the 61st percentile of the total wealth distribution within their lifetime earnings decile. Those who responded "Too little" had an average Q of 46. Thus a large fraction of respondents say they saved too little, and they have Q values substantially lower than those who say they saved enough. (To judge the difference in wealth of these two groups, the 61st quantile is typically about one and one-half to two times the size of the 46th quantile.) The last column of the table reports Q values based on total financial assets, including IRAs and 401(k) balances. Comparisons based on financial assets typically parallel those based on total wealth, as they do in this case. Apparently consistent with responses to the first question, the next question reveals that about two-thirds of respondents said they would save more if they could do it again, and about a third said they would save about the same.

The third question asked whether, including Social Security and pensions, the respondent would have enough saving to maintain his or her standard of living after retirement, 67 percent said yes and only 33 percent said no. Thus, many households who say they did not save enough also say they will be able to maintain their standard of living in retirement. However, of those who said yes, the average Q was 58; it was only 46 for those who said no. Apparently a substantial portion of respondents with relatively low Q say they will be able to maintain their standards of living (e.g., if those who said yes have Q values between 16 and 100, the average would be 58), even though many of these also say they have saved too little. Of those who answered yes, about 75 percent said they could maintain the *same* standard.

From the experimental modules, can we learn anything about the relationship between individual attributes and realized asset accumulation? Apparently we can. Table 1.9 shows responses to a series of questions about individual behavior or attitudes together with average Q values. It is clear that there is a strong relationship between the age at which respondents started saving for retirement and Q: Those who started saving before age twenty-five have an average Q of 63. Q declines consistently with postponement of retirement saving; respondents who never started to save for retirement have an average Q of 37.

It also appears that having a target or planned level of saving makes a difference. Those who said they had such a target have an average Q of 56, while those who had no target have an average Q of 48. Most of those who had a target also said they had a plan for achieving that target, and most also said the plan included trying to save something out of each paycheck. If the plan included saving out of each paycheck, the average Q was 59; if not, the average Q was 36. A question on a different module asked simply: "Over the past years, did you have a plan for retirement

Table 1.9 Saving Behavior and Attitudes versus *Q*

Question	Response	Percent	Total Wealth *Q*	Total Financial Assets *Q*
At what age did you start saving for retirement? (M9-3)	≤25	13	63	58
	26–35	17	57	56
	36–45	21	54	53
	46–55	20	48	49
	≥56	3	47	45
	Never	26	37	34
Thinking over the past twenty or thirty years, did you have some target or planned level of saving? (M9-5)	Yes	23	56	54
	No	77	48	46
If yes: Did you have a plan for achieving that goal? (M9-5a)	Yes	81	59	56
	No	19	55	47
If yes: Did the plan include trying to save something out of each paycheck? (M9-5b)	Yes	92	59	56
	No	8	36	41
Over the past years, did you have a plan for retirement saving? (M10-4)	Yes	47	60	63
	No	53	48	44
How well do these statements describe you? (0 means doesn't, 10 means closely) (M10-20)				
I never seemed to get caught up on my bills so I could save for the future.	0–3	43	53	54
	4–6	28	57	58
	7–10	28	51	47
I could never stick to a saving plan.	0–3	44	57	61
	4–6	26	50	45
	7–10	30	53	51
I thought Social Security or employer pensions would take care of my retirement income.	0–3	44	58	59
	4–6	28	52	52
	7–10	28	50	46
If you put $10,000 in a saving account when age twenty-five, how much would you have now, at a 5 percent interest rate?	<$35,000	16	54	52
	$35,000–75,000	33	46	45
	$75,000–105,000	29	48	46
	>$105,000	22	58	58
Thinking of your planning for retirement over the past twenty or thirty years, how important did you think the following sources would be in providing your retirement income? (0 means unimportant, 10 means very important) (M9-2)				
Social Security	0–3	8	68	55
	4–6	24	54	49
	7–10	68	47	48
Employer-provided pension	0–3	23	44	41
	4–6	16	41	39
	7–10	62	55	54

(*continued*)

Table 1.9 (continued)

Question	Response	Percent	Total Wealth Q	Total Financial Assets Q
IRAs, 401(k) or Keogh	0–3	36	45	39
	4–6	22	49	47
	7–10	41	54	56
Other personal saving or investment	0–3	21	36	33
	4–6	27	45	42
	7–10	52	58	57
Other sources	0–3	47	44	44
	4–6	31	51	50
	7–10	23	61	54

Source: See table 1.8.

saving?" In response to this question, 47 percent said yes, and they had an average Q of 60; 53 percent said no and had an average Q of 48. The implications are that having a plan to save for retirement contributes to asset accumulation, and that trying to save something out of each paycheck may be the key to greater asset accumulation.

The questions asking how respondents would characterize themselves seem only weakly related to asset accumulation. Those who said they could never "get caught up on [their] bills" or that they could "never stick to a saving plan" accumulated about the same as those who said these attributes did not describe them. Given the promise of Social Security benefits, it may be that many households rationally choose to save little, in particular those with low lifetime earnings, for whom the Social Security replacement rate is relatively high. But only about a quarter of respondents said they "thought Social Security or employer pensions would take care of [their] retirement income." The average Q of this group was 50, not much lower than the average of 58 for those who said this view did not characterize them. The difference in Q values for total financial assets is greater—46 versus 59. Thus the responses suggest some relationship between expected Social Security and employer pension benefits and other saving, but certainly not enough to explain the very low asset accumulation of a large fraction of respondents. Even for respondents in the lower lifetime earnings deciles there appears to be little relationship between the anticipated importance of Social Security and Q values for total wealth, as shown in the tabulation that follows. The responses do suggest, however, that respondents in the lower earnings deciles who anticipated that Social Security and pensions would be important have lower total financial asset Q values than those who thought Social Security and pensions would be less important.

Response	Earnings Decile		
	1st–3rd	4th–7th	8th–10th
	Total Wealth Q		
0 to 3	59	63	56
4 to 6	61	56	42
7 to 10	60	45	52
	Total Financial Asset Q		
0 to 3	56	65	57
4 to 6	59	54	45
7 to 10	36	42	51

This sort of finding might be contrasted with results based on theoretical models of economic behavior. Hubbard, Skinner, and Zeldes (1995), for example, use a life-cycle model of saving, which accounts for precautionary motives for saving, to simulate the dispersion in wealth of low-income households in particular. They show how under their model social insurance programs with asset-based means testing can discourage saving by households with low expected lifetime incomes.

Could limited financial literacy be one reason some people don't save? To explore this possibility, the survey posed a question intended to test respondents' understanding of compound interest. Respondents were asked what they thought would be the current value of $10,000 saved at age twenty-five if the interest rate had been 5 percent. Depending on the age of the respondent in 1992, the appropriate answer is between $40,000 and $70,000. Although a small proportion of respondents give answers below this range, more than half give answers well above this range; about a third are within the range. However, there seems to be no clear relationship to asset accumulation.

Finally, the saving modules include a series of questions about anticipated sources of retirement income. Respondents who thought Social Security benefits would be important have an average Q of 47; those who thought Social Security benefits would be unimportant have an average Q of 65. The question discussed above, which asked whether the statement that "Social Security or employer pensions would take care of [the respondent's] retirement income" described the respondent's saving behavior, seemed related only to the saving of persons with low lifetime earnings. The response to this question suggests a more general correspondence between reliance on Social Security and saving. Greater anticipated importance of IRAs and 401(k) plans would almost surely be associated with greater wealth because they are included in total wealth and in total financial assets. Employer-provided pensions, however, are not included in total financial assets. Keeping in mind that Q controls for earnings decile, it is rather striking to find that respondents who anticipate that pensions

will be important in retirement have an average Q of 55, while those who say pensions will be unimportant have an average Q of only 44. Such evidence may perhaps support the view that saving has a multiplier effect: Saving in one way induces saving in other forms, as well. Having an employer pension, for example, may be accompanied by information about financial needs in retirement.

In addition to the questions discussed above, the experimental modules asked respondents whether, in thinking about their financial futures, they were concerned about several events: job loss, financial market collapse, and health care costs. The results are presented in table 1.10. Few were very concerned about job loss or financial market collapse, but a large number of respondents were concerned about potential health care costs. The concern with health care costs is weakly related to Q. Job loss, on the other hand, is a much greater concern for those with low Q than for those with higher Q: Those who say they aren't concerned with job loss have an average Q of 55, while those who are very concerned have an average Q of only 39. Concern with financial market collapse is not strongly related to Q, although those who are more concerned about this event have some-

Table 1.10 Financial Concerns versus Q

Question	Response	Percent	Total Wealth Q	Total Financial Assets Q
In thinking about your financial future, how concerned are you with (M9-7):				
health care costs?	Hardly	19	54	50
	Some	29	52	53
	A lot	52	47	44
job loss?	Hardly	67	55	52
	Some	15	44	50
	A lot	18	39	36
financial market collapse?	Hardly	43	45	43
	Some	31	55	55
	A lot	26	53	51
costs of supporting parents?	Hardly	78	51	51
	Some	13	47	38
	A lot	8	45	42
costs of supporting children?	Hardly	64	51	51
	Some	23	54	49
	A lot	13	39	38

Source: See table 1.8

what higher Q values than those who are unconcerned, perhaps as should be expected.

1.6 Conclusions and Discussion

In 1953, Milton Friedman wrote a paper he titled "Choice, Chance, and the Personal Distribution of Income." In this paper he states:

> Differences among individuals or families in the amount of income received are generally regarded as reflecting . . . circumstances largely outside the control of the individuals concerned, such as unavoidable chance occurrences and differences in natural endowment and inherited wealth. . . . The way that individual choice can affect the distribution of income has been less frequently noticed. The alternatives open to an individual differ, among other respects, in the probability distribution of income they promise. Hence his choice among them depends in part on his taste for risk. . . . The foregoing analysis is exceedingly tentative. . . . Yet I think it goes far enough to demonstrate that one cannot rule out the possibility that a large part of the existing inequality of wealth can be regarded as produced by men to satisfy their tastes and preferences. (277–78, 289–90)

Now, more than forty years later, "People earn just enough to get by" is a phrase often used to explain the low personal saving rate in the United States. The implicit presumption is that households simply do not earn enough both to pay for current needs and to save. Yet in other developed countries the saving rate at all income levels is much higher than in the United States. Even in Canada—in many respects similar to the United States—the personal saving rate is almost twice as high as in the United States. Such international comparisons alone suggest that saving depends on much more than lifetime earnings.

We show in this paper that at all levels of lifetime earnings there is an enormous dispersion in the accumulated wealth of families approaching retirement. In the United States it is not only households with low incomes that save little. A significant proportion of high-income households also save very little. Furthermore, not all low-income households are nonsavers. Indeed, a substantial proportion of low-income households saves a great deal. We then consider the extent to which differences in household lifetime financial resources explain the wide dispersion in wealth, given lifetime earnings. We find that very little of this dispersion can be explained by chance differences in individual circumstances—"largely outside the control of the individuals"—that might limit the resources from which saving might plausibly be made. Thus we conclude that the bulk of the dispersion must be attributed to differences in the amount that households choose to save. Choices vary enormously across households. Some

choose to save more and spend less over their working lives while others choose to save little and spend more while working. Wide dispersion in saving is evident at all levels of lifetime earnings, from the lowest to the highest. The differences in saving choices among households with similar lifetime earnings lead to vastly different levels of asset accumulation by the time retirement age approaches.

Perhaps more closely related to the choice of risk that Friedman emphasized, we also consider how much of the dispersion in wealth might be accounted for by different investment choices of savers—some more risky, some less risky—again, given lifetime earnings. We find that investment choice matters but that it is not a major determinant of the dispersion in asset accumulation. It matters about as much as chance events that limit the available resources of households with the same lifetime earnings. Thus, although investment choices make a difference, the overwhelming determinant of the accumulation of wealth at retirement is simply the choice to save.

As a benchmark, we also considered the assets that the HRS respondents would have accumulated had they saved given amounts over their working lives and had earned given returns on their saving. Saving 10 percent of earnings and earning the average annual S&P 500 return (which has been 12.2 percent since 1926) would have led to accumulated assets much much greater than the typical financial assets of HRS households at the time of the survey.

Perhaps based on the presumption—contrary to Friedman's conjecture—that differences in wealth can be attributed more to differences across households in adverse circumstances that limit saving, rather than to explicit individual choices, government policy often penalizes persons who have saved over their lifetimes. For example, persons with the same lifetime earnings will face very different tax rates on Social Security benefits: Those who saved will pay higher taxes while those who didn't will pay lower taxes. Shoven and Wise (1997, 1998) show that persons who save too much through personal or employer-provided pensions face enormous tax penalties when they use these accumulated assets for retirement support. The evidence that differences in retirement wealth are due largely to saving choice while younger brings into question this tendency in tax policy. Although the distribution of the tax burden will inevitably be based on many factors, most observers believe that the extent to which older persons with more assets are taxed more should depend in part on how they acquired the assets. Chance accumulation may weigh on the side of heavier taxes on those who have accumulated. On the other hand, accumulation by choosing to consume less when young, while others choose to consume more when young, weighs against heavier taxes on those who accumulate assets for retirement. As emphasized at the outset, this paper is about the dispersion in the accumulation of assets of persons with *similar*

lifetime earnings. The issue raised here is not about progressive income taxation, but rather, given the same after-tax earnings, about differences in the tax imposed on persons who save today in order to spend more tomorrow, versus those who spend all today. Our analysis suggests that a very large proportion of the variation in the wealth of older households can be attributed to household saving choices while younger rather than to chance events that may have limited the resources available for saving. To the extent that most asset accumulation is due to choice rather than chance, our results also suggest that ex ante taxing of saving may have more serious consequences for saving than may previously have been thought.

Finally, we explored the relationship between household saving and information about household saving that was obtained through two experimental saving modules administered in the third wave of the HRS. In general, the experimental module responses were consistent with household realized asset accumulation. About three fourths of respondents said they had saved too little over the past twenty or thirty years, and we found a strong relationship between our Q value—a household's percentile level of assets, given lifetime earnings—and whether respondents thought they had saved enough. The accumulation of retirement assets is very strongly related to the age at which persons began to save for retirement. In addition, persons who accumulated more retirement assets tended to have a saving target or plan, and the plan typically included saving a portion of each paycheck. Those who accumulated little were more likely to say that they just couldn't get caught up on their bills or that they had a hard time sticking to a saving plan. Low saving rates seem to be related only weakly to an expectation that Social Security or employer pension plans would take care of retirement income, even among households with low lifetime earnings. The potential cost of health care is an important concern of a large fraction of households, and this concern appears to be unrelated to asset accumulation. On the other hand, there appears to be relatively little concern about job loss, supporting children or parents, or financial market collapse. The results from the HRS experimental saving modules suggests to us that this type of information collection might fruitfully be pursued in more depth.

Appendix

The Sample

The analysis is based on the first wave of the Health and Retirement Study (HRS), which sampled families with heads aged age fifty-one to

sixty-one in 1992. This wave of the HRS includes 12,652 respondents in 7,702 households. For two reasons our analysis was based on only 3,992 households.

First, in 379 married or partnered households, one of the respondents did not respond to the survey. Because the pension wealth of both members is a critical component of the analysis, we have deleted these households from the sample.

Second, the analysis relies heavily on lifetime income as measured by Social Security earnings records. These records are available for only 8,257 of the 12,652 HRS respondents. The analysis is based on household rather than individual respondent data. Historical earnings for a single-person household required only that Social Security earnings records be available for that person. For a two-person household, it was necessary to have historical earnings for both persons in the household if both had been in the labor force for a significant length of time. The HRS obtained such data for 1,625 single-person households and for 2,751 two-person households, together comprising 4,376 of the 7,607 HRS households.

Two related sample adjustments were made. First, we retained households in which one or both members reported never having worked, even if the household member was missing a Social Security earnings record. We assumed zero earnings for such persons. Second, we excluded from the sample all households that included any member who had zero Social Security earnings *and* who reported working for any level of government for five (not necessarily consecutive) years. This latter restriction is intended to exclude households that have zero Social Security earnings due to gaps in Social Security coverage. The final sample includes 3,992 households.

Wealth

Total wealth is comprised of the following broad categories:

Financial Assets: Stocks, mutual funds, investment trusts, checking or saving account balances, money market funds, CDs, government saving bonds, treasury bills, bonds, bond funds, and other savings or assets, less unsecured debt.

Personal Retirement Assets: IRA, Keogh, and 401(k) balances.

Firm Pension Assets: Defined-contribution plan balances (other than 401[k]) and the present value of promised defined-benefit plan benefits. (See the section "Pension Wealth," following.)

Net Vehicle Equity

Net Business Equity

Real Estate: Real estate other than main home, net of debt

Home Equity: Value of primary residence less outstanding balances on all mortgages, home equity loans, and lines of credit used.

Pension Wealth

Imputation of Key Missing Data

It is particularly difficult to produce a measure of pension wealth for this sample.[12] Many respondents were missing key pieces of data needed to construct pension wealth. For some types of pensions, less than half of the respondents provided data complete enough to calculate pension wealth directly. A brief overview of the procedures used to impute these missing data follows.

In the HRS, the information required to construct pension wealth comes from three sources: the pension on the current job for persons still working, the pension on the last job for persons no longer working, and pension income by source for persons receiving benefits.[13]

All currently employed workers were asked if they were "included in" a pension plan "through your work" (if self-employed), or if they were "included" in a pension plan "sponsored by your employer or union" (if not self-employed). Each respondent could list up to three plans. About 76 percent of the respondents listed a single plan, 21 percent listed two plans, and the remaining 3 percent of the respondents listed three plans. Respondents were most likely to cite a defined benefit (DB) plan as their first plan. Of the first plans reported, 61 percent were DB and 34 percent were defined contribution (DC) plans. Of the second plans reported, only 16 percent were DB; 81 percent were DC. Most of the third plans reported were DC.

For each of the three plans, if the reported plan type was DB, "both," or "don't know," then the respondent was first asked the expected age of retirement, then asked to give an estimate of the pension benefit at retirement. The benefit could be expressed as a percentage of final salary, as an amount ($) per unit of time (month, quarter, year, etc.), or as a lump sum at retirement. Most respondents (44 percent) gave an amount per unit of time, and we have converted these to annual pension benefits. For those providing a percent of final salary (15 percent) we have also computed an annual pension benefit using an assumed (see below) annual rate of growth of earnings until the expected date of retirement. Still, data are missing;

12. Our estimates of pension wealth are based on the respondent's report of the provisions of employer-sponsored pension plans. The HRS also conducted a survey of employers. Information from this latter survey is not used in this analysis.

13. There is also some information on pensions associated with previous jobs (other than the last job), but we judged these data to be too incomplete to use at this time.

the remaining 41 percent of the plans require imputation. To impute pension benefits we first divide the sample by the number of plans (three could be listed), type of response (DB, DC, or both), and ten wage-and-salary income deciles. We then used a hotdeck imputation procedure using these ninety cells.[14]

If the reported plan type is "DC" or "both," then the survey asks for the balance accumulated in the plan. Missing data, although still a problem, are not as severe as for DB plans: For 71 percent of DC plans an account balance is reported. If the plan type is DC, then further details on the type of plan are requested. Responses to these detailed questions are used to categorize DC contributions as contributions to either "401(k) plans" or to "traditional DC plans." Our definition of "401(k) plans" broadly includes the HRS response categories "401(k)/403(b)/SRA," "thrift of saving plan," "tax shelter," "IRA/SEP," "SEPP," or any response combination that includes these (e.g., some respondents indicate their plans to be a combination of a 401[k] and a thrift plan). The category "traditional DC plans" covers the remaining types of DC plans, including ESOPs and money purchase plans. If a respondent indicated plan type "both," then no detailed questions about plan type were asked. For these plans the entire balance is assumed to be in a "traditional DC plan," thus perhaps underestimating 401(k) balances. For plans known to be DC, but for which the balance is unknown, the hotdeck imputation method is again used, based on plan number, plan type (traditional DC and 401[k]), and ten wage-and-salary income deciles.

Persons not currently employed are asked about their most recent job. As above, they can specify four pension types: DB, DC, both, and don't know (DK). However, each respondent could provide information on only one plan. In general, the follow-up questions parallel the questions asked for the current job discussed above. We will note only the differences here. First, persons covered by DB plans are asked about expected future benefits, benefits currently being received, and benefits already distributed as a lump sum. We disregard all but the former because benefits currently received are picked up elsewhere in the survey (the income section, see below), and benefits already paid out will show up as IRA balances if rolled over (and do not represent pension wealth if not). If covered by a DC plan, the balance is included only if "left to accumulate" with the former employer. DC balances rolled over into an IRA, converted to an annuity, or withdrawn are not included. Finally, respondents who indicated coverage by "both" plan types were asked, "How much money was in your account when you left that employer?" The survey does not ask how much remains in the account as of the survey date. Based on the proportion of

14. About 9 percent of the DB plans were also missing the expected age of retirement. We use the modal response of age sixty-two in these cases.

DC balances remaining with the employer to accumulate, we randomly include the balances of 33 percent of these respondents. Again, missing DB benefits and DC data are imputed by the hotdeck method described above. Unfortunately, there is no way to distinguish between 401(k) balances and traditional DC plan balances acquired on prior jobs. Thus, all DC balances are assumed to be from traditional DC plans.

The final source of information on pension wealth is from income currently being received. We use income streams from pensions, annuities, and veterans' benefits. There is no way to distinguish between DC and DB sources, so we report these data as a separate category (PV pension income) in tables 1.3 and 1.4.

Constructing Pension Wealth

For DC-type pensions the reported balance is our measure of pension wealth. For persons expecting DB pension benefits and persons currently receiving pension income, we compute the present value of the benefit stream using the following assumptions: Mortality data are based on population averages by gender, age, and birth cohort provided by the Social Security Administration; see Mitchell, Olson, and Steinmeier (2000) for a discussion of these data. For discounting and earnings growth we use the "intermediate" interest rate assumptions used by the Social Security Administration; see Board of Trustees (1995). Public pensions are assumed to be fully indexed, again using the "intermediate" projections of the Social Security Administration; see Board of Trustees (1995). Private-sector pension benefits are not indexed.

Respondents were asked to provide the expected pension benefits at their expected dates of retirement. If benefits are not currently being received, they are assumed to commence at the expected age of retirement (the mean is sixty-two). The average age of HRS respondents is fifty-five. Thus, for the typical HRS respondent, retirement benefits do not begin for another seven years. We have assumed that their responses to the expected pension-benefits question are denominated in future (date of retirement) dollars. Moreover, we have assumed that the benefit amount is a single-survivor benefit. Accordingly, we use individual survival probabilities in the computation of the present value. If we assumed instead that the responses represented joint-survivor benefits, calculated pension wealth would be somewhat higher.

We further assume that when respondents report expected pension benefits, they do not anticipate separating from their employers prior to retirement. This assumption allows us to calculate the present value of retirement wealth conditional on continued years of service until retirement. The component of this wealth "earned" as of the survey date is this present value multiplied by the ratio of years of service at the survey date to years of service at the expected date of retirement. This adjustment is necessary

to make the present value of DB benefits comparable to the accumulated balance in a DC plan at the date of the survey.

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