Forecasting Retirement Needs and Retirement Wealth

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Chapter 5
Explaining Retirement Saving Shortfalls

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Much has been made in the popular press and among researchers of the failure of Americans to save adequately for their own retirement. U.S. households saved around 10–12 percent of income between the 1950s and the 1970s, but the national saving rate dropped sharply over the 1990s. This pattern raises serious concerns regarding Americans' ability to fund adequate and sustainable post-retirement consumption levels. This concern is sharpened in view of projected social security shortfalls and the national pension shift from defined benefit to defined contribution plans (Mitchell et al. 1999). Clearly, future retirees will bear a larger responsibility for ensuring their own wellbeing in retirement, yet there is reason to believe that they are seriously underestimating their retirement saving needs.

Our objective in this chapter is to use the Health and Retirement Study to explore the factors that appear to drive retirement saving shortfalls, and for whom the shortfalls appear most serious. The HRS offers a unique opportunity to analyze the household wealth of families on the verge of retirement, inasmuch as it contains detailed questions on housing, pensions, social security, and other financial wealth (Juster and Suzman 1995). In what follows we first briefly review what is known about saving profiles for older Americans and outline the nature and scope of saving shortfalls. We then go on to describe several factors that might be anticipated to affect people's ability to meet these saving targets, and explore the impact of socioeconomic factors, health status factors, and preference proxies on the shortfall pattern with a multivariate statistical analysis.

Modeling Saving Shortfalls

There is some controversy regarding projections of the future retirees' likely wellbeing at older ages. A Congressional Budget Office study (1993) com-

pared the income and accumulated assets of the baby boom generation to those of their parents, and it concluded that boomers seem to be on track for retirement. By contrast, Bernheim (1992, 1994) used an augmented life cycle model as a benchmark and produced dramatically contradictory results. Specifically, he argued that U.S. households were saving at about one-third of the level that was adequate to fund retirement.

Our goal in the present analysis is to use estimated measures of pension and social security wealth, and derived saving shortfall measures, to determine what factors influence observed shortfall patterns. Related research by Moore and Mitchell (this volume, hereafter MM) used the Health and Retirement Study to show that saving shortfalls are considerable for many older Americans, with the typical older household needing to save 16 percent more of annual income to reach target retirement saving levels. There we did not, however, establish the kinds of factors that appear to explain the shortfalls.[1]

For the empirical evaluation, we begin with measures of current retirement wealth for respondents in the HRS datafile surveyed in 1992. These represent expected present values of contingent future income (pensions, social security) combined with current values of financial assets and housing wealth. In that year, mean total household wealth—which included net financial wealth + net housing equity + pension wealth + social security wealth—stood at around half a million dollars, with the median household having approximately $325,000 in total retirement wealth.[2]

It might seem that such a sum would be sufficient to leave the median older household in good shape for retirement, but further analysis indicates the inadequacy of asset accumulation for many HRS households. In order to establish this, we first forecast financial wealth to respondents' retirement ages by projecting four types of household assets, with future growth rates depending on their past trajectories: 1) net financial wealth, which includes such assets as savings, investments, business assets, and nonresidential real estate less outstanding debt not related to housing; 2) net housing wealth—the current market value of residential housing less outstanding mortgage debt; 3) pension wealth, or the present value of retirement benefits; and 4) present value of social security. The forecasting methodology for financial wealth uses the techniques developed in MM. For instance, housing wealth is projected using HRS responses on the purchase price of each participant's house, year of purchase, and mortgage payment amount and frequency. Interest rates are drawn from the average interest rate for households in the American Housing Survey with the same year of purchase. Given these interest rates, we then determine amortization schedules for mortgages and project reduction in housing debt over time. This in turn implies an increase in net housing wealth. Pension wealth is projected to retirement based on the plan provisions of employer provided Summary Plan Descriptions and HRS data on salary and tenure of service where

appropriate. Individuals are assumed to remain with their current employer until the retirement age. Assumed asset allocation for pension saving is in accordance with that observed by Schieber and Goodfellow (1998), and returns assumed on defined contribution pensions are consistent with historical averages derived from Ibbotson (1996). Mortality is assumed to be as per actuarial tables obtained from the Social Security Administration. Social security wealth is derived from the earning and benefits file (EPBF) as described in Mitchell, Olson, and Steinmeyer (this volume, hereafter MOS).[3]

Deriving saving shortfalls requires that we then project retirement wealth forward to age 62 for each HRS household, and then compute how much additional saving beyond existing assets and pension plans would actually be needed to smooth that family's consumption patterns as of that retirement date.[4] The benchmark used to determine adequacy of saving is the replacement rate, an income level in retirement that is sufficient to smooth consumption before and after retirement (allowing for changes in tax status and the change from saving to spending in retirement).[5] Each household's replacement rate is solved for in conjunction with the determination of its saving rate, so as to determine how much income it would need in retirement to attain pre-retirement consumption levels.[6] For example, if the determined rate was 0.80 for a household with an income of $50,000 per year pre-retirement, the suggested annual income level in retirement is $40,000 for that household given differences in taxes and saving. More generally, assets needed at retirement are the result of taking into account 1) household income at retirement, 2) the appropriate replacement rate for that income level, and 3) a joint and survivor annuity factor allowing for the age composition of the household (either individual or married couples).

The rate of saving necessary to meet these levels is solved for simultaneously with the household's replacement rate. Given a replacement rate, the shortfall between a household's projected value of assets and its projected need determines its prescribed saving rate. This rate represents a prescription of what the older household would need to save as a percent of income each year until retirement to achieve that projected need. If the resultant projected saving rate were too small (large) to meet the projected need, the replacement rate is lowered (raised) until replacement and saving rates come into balance.

Saving Shortfalls on the Verge of Retirement

Retirement wealth levels are unevenly distributed across the older U.S. population, a point depicted in Table 1. Here overall wealth levels are given as of 1992, and also as of the respondent's retirement age.[7] The results show that a household in the median decile of the sample could anticipate retirement assets of about $380,000 for retirement at 62, with social security benefits representing more than a third of this sum, private pensions close to $100,000,

TABLE 1: Household Wealth by Marital Status in the HRS, 1992 and Projected to Retirement

Wealth Quintile	*Wealth in 1992*	*Projected Wealth at Age 62*	*Projected Wealth at Age 65*
Married			
1	$ 139,814	$ 169,416	$ 195,352
2	227,529	331,893	369,843
3	421,118	502,080	553,291
4	631,667	734,102	801,873
5	1,458,433	1,724,998	1,909,038
Nonmarried			
1	$ 33,094	$ 38,004	$ 41,905
2	73,986	83,549	91,408
3	134,602	163,658	179,562
4	253,469	306,548	335,424
5	689,344	810,585	882,090
Overall mean	$ 478,313	$ 566,431	$ 625,066
Housing	65,940	76,410	80,507
Financial	175,974	205,653	228,133
Social security	119,793	128,712	142,018
Pension	116,606	155,656	174,408
Median 10%	$ 325,157	$ 382,678	$ 420,537
Housing	59,746	71,097	75,047
Financial	66,530	71,004	71,175
Social security	133,606	143,864	160,824
Pension	65,275	96,713	113,491

Source: Authors' calculations using 1992 HRS data. All values in 1992 dollars and calculated using HRS sampling weights.

and housing and other financial wealth amounting to about $70,000 each. Examination of wealth patterns by marital status indicates that households headed by unmarried persons are substantially worse off than are their married counterparts. Married couples in the poorest quintile have four times more total wealth than do unmarried households ($140,000 versus $33,000 in present value). Indeed, wealth held by the *poorest* married quintile is equivalent to wealth held by unmarried people in the *middle* of their wealth distribution.

One reason that unmarried households might be anticipated to command less wealth *at retirement* is that they had lower "initial" levels when first queried in 1992. Another reason is that their asset composition is such that they can experience a lower growth trajectory for wealth until retirement age. As an example, we find that the poorest nonmarried groups are projected to only gain another $5,000–10,000 by retirement, while the poorest

married households anticipate wealth gains of some $30,000. At the top of the wealth distribution, wealth gains are expected to be proportionately larger for both the unmarried and married households.

Given the diversity in wealth levels across the HRS population, it should not be surprising that prescribed saving rates also vary across households on the verge of retirement. Saving needs, summarized by earnings and wealth, appear in Table 2 for both married and nonmarried households. Here we see that the poorest households have prescribed saving rates of over 30 percent per year, double the median saving shortfall of 16 percent. Conversely, the very richest segment of the population has more than sufficient assets to smooth consumption.[8]

A somewhat surprising finding evident from Table 2 is that households with the highest earnings levels are also those facing some of the largest saving shortfalls because many high-earner households have insufficient retirement assets. To illustrate, high-earner married couples would need to save close to one-quarter of their total annual incomes if they are to achieve consumption smoothing. We also see that replacement rates fall with earnings for married couples, because taxes and required savings rise. By contrast, this pattern does not hold for unmarried households: instead, prescribed saving rates fall across the top four earnings groups. This may be the result of greater pension wealth for this group, or it could reflect nonmarried persons' greater sensitivity to future retirement needs.

Why is it that, for married households, saving shortfalls become more serious as earnings rise but fall with wealth? One reason is that earnings and wealth are not particularly highly correlated — the correlation coefficient is only 0.4, indicating that many households with high incomes have relatively little wealth and vice versa. This produces the uneven topology of prescribed saving needs depicted in Figure 1.[9] In addition, we see that many households are not in need of undertaking additional saving — these are the households with large amounts of wealth relative to their earnings (the right front section of Figure 1). It should be noted that as wealth falls and earnings rise, prescribed saving rates rise. The increase is fairly sharp initially, and then levels off as earnings rise (wealth falls); the slope of the surface is the result of the countervailing forces of replacement rates falling as saving rates rise, yielding a natural cap for required saving rates.[10]

Next we explore how households who do face saving needs compare to those who do not. To do this, we first define a qualitative variable set to 1 if the household has unmet saving needs and 0 otherwise. Using a vector of control variables to be described shortly, we use a statistical technique (multinomial Probit) to explore the factors associated with the probability of having a shortfall. Subsequently we examine the extent of shortfalls for the subset of the population needing to save more. This second analysis uses a multivariate regression model, controlling for selectivity possibly associated with this two-step procedure.[11]

TABLE 2: Saving Rate Shortfalls in the HRS by 1992 Wealth and Earnings

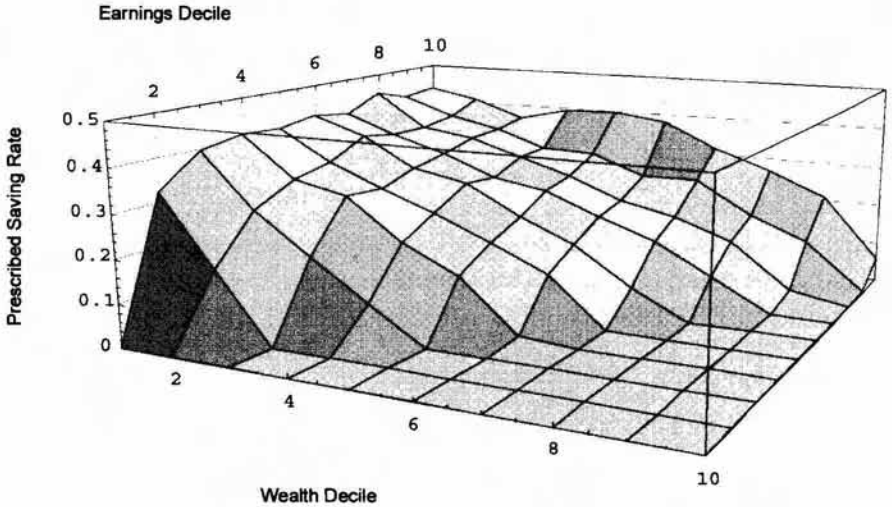
By Wealth Decile

Wealth Decile	*Median Household Net Worth*	*Saving Rate to Age 62 (%)*	*Replacement Rate (%)*
Married			
1	$ 144,600	31	53
2	276,600	22	62
3	418,400	17	66
4	622,500	06	80
5	1,117,800	−14	109
Nonmarried			
1	$ 36,800	36	52
2	61,900	34	52
3	132,500	24	62
4	247,200	12	75
5	510,000	−5	96
All	*$ 325,000*	*16*	*69*

By Earnings Decile

Earnings Decile	*Household Earnings*	*Saving Rate to Age 62 (%)*	*Replacement Rate (%)*
Married			
1	$ 10,400	−40	135
2	26,000	15	73
3	40,000	19	64
4	56,000	20	60
5	88,000	23	58
Nonmarried			
1	$ 5,000	−11	103
2	13,000	27	59
3	20,000	26	60
4	29,400	20	64
5	47,000	15	69
All	*$ 33,000*	*16*	*69*

Notes: See Table 1.



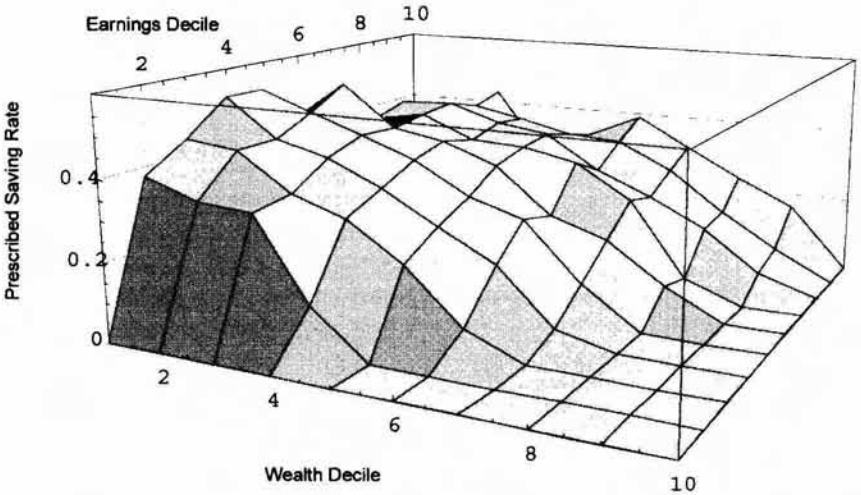


Figure 1. Prescribed saving rates for retirement at age 62 by marital status: married couples (top), single households (bottom). Source: Authors' calculations.

The saving shortfall outcomes are related to a set of control variables, which for ease of discussion, we cluster into three groups: a vector representing *conventional socioeconomic* factors (SES); a vector of *health status* controls (H); and a vector of factors we think of as *preference proxies* (P) indicating attitudes toward risk and the future. Since the saving and consumption patterns of married and nonmarried households may differ, we evaluate separate estimates for these two groups. In the case of married couples, both respondent and spouse variables are included in the analysis.

The SES variables are controls that most economists would agree would be likely to influence saving, namely a measure of lifetime earnings, education, census region, race, age, and family status (e.g., number of children and whether ever divorced, widowed, or married).[12] The specific lifetime earnings measure we employ is the respondent's average indexed monthly earnings (AIME), obtained from Social Security Administration records linked to the HRS file. In general, one might expect that more educated, older respondents with higher lifetime earnings would be less likely to face saving shortfalls; holding other things constant, households with children might have been able to save less. People who have experienced divorce and/or widowhood might also be anticipated to face greater shortfalls to the extent that these events often dissipate assets.

To capture respondents' health status, we include self-reports of respondents' difficulty performing any activities of daily living (ADL), smoking and drinking habits, depressive symptom scores, memory recall test scores, and self-assessments of their probability of living to age 75.[13] Many economic studies have used self-reported ADL and drinking/smoking variables, though here their anticipated effect on shortfall is not a priori clear. For example, ADL difficulty could suggest a level of disability that could affect a respondent's ability both to work and to save; smoking clearly lowers life expectancies; and moderate drinking may be beneficial to longevity. (Heavy drinkers would be expected to live less long.) Poor health can shorten both worklife and life expectancy, so we include control variables for people's self-assessed probability of living to age 75. This variable is anticipated to increase the chance of having a reported shortfall: thus someone who feels more likely to live to age 75 than the general population would find it reasonable to save more than average. Controlling on this, it is still possible that health problems could have ambiguous effects. That is, people in poorer health could have fewer assets because health problems are expensive to treat, but they may also have a smaller shortfall since poor health reduces earnings—and earnings are used to compute shortfalls. Once earnings are controlled, one might anticipate that poor health would increase the need for additional retirement saving. The depression and memory scores are included to determine whether shortfalls arise due to people's inability to cope with complex and long-term retirement planning computations.[14]

Finally, we include three variables intended to reflect differences across people in terms of their preferences and attitudes toward risk and the future. A first attitudinal factor evaluates people's planning horizon, elicited by a question in the survey asking them over what horizon period they make "family savings and spending" decisions. A second attitudinal factor pertains to respondents' risk aversion: this measure is derived from a series of hypothetical questions posed during the interview regarding the respondent's willingness to accept a job that would pay more, on average, than his or her current job, but with a higher variance.[15] The responses form an ordered mutually exclusive set of four groups, where higher values indicate greater risk aversion. We control for the "most risk averse" group in our analysis.[16] The final variable we assess asks HRS participants if they had ever contacted the Social Security Administration to have their retirement benefits estimated. It is anticipated that those people who made such inquiries regarding future benefits would be most likely to be cognizant of retirement needs and to make more concerted efforts to meet retirement saving targets.

Relative Importance of Explanatory Factors

Results from the first-stage examination of the multiple factors associated with having a saving shortfall appear in Tables 3 and 4; these provide estimated Probit coefficients and standard errors for married versus unmarried households, separately.[17] Turning first to the married households, our results indicate that some but not all socioeconomic variables are strong predictors of the likelihood of a shortfall. That is, older people are less likely to have a shortfall; nonwhites are at substantially more risk. Having experienced widowhood decreases the likelihood of a shortfall for the primary respondent. The number of children associated with the household increases the likelihood of a shortfall. Earlier we saw that retirement saving needs rise with earnings; here we note that the likelihood of a shortfall is also positively related to lifetime earnings.[18] For spouses, the only significant socioeconomic variable is age, and the effect on the likelihood of a shortfall matches that of the respondent.

Turning now to the role of poor health, we find that it is not a significant determinant of the probability of having a saving shortfall among married households.[19] Smokers appear to undersave relative to the target, but those who consume alcohol are better prepared for retirement. This may be because moderate alcohol consumption has come to be seen as having a positive health effect, though we note that empirically only those taking 3 or more drinks per day have the smaller shortfall. Smokers may know they are less likely to survive than average and hence undersave, though this effect should be controlled for because we include respondents' subjective probabilities of survival to age 75. Interestingly, many of the included health status

TABLE 3: Any Shortfall (0,1) at Age 62 for Married Households (N=4,646)

	Primary Respondent	*Spouse*
Conventional socioeconomic variables[a]		
AIME/1,000	0.04**	0.03
	(0.01)	(0.02)
Less than high school degree	0.00	0.01
	(0.02)	(0.02)
College graduate	0.01	0.04
	(0.02)	(0.03)
Graduate school	0.03	−0.01
	(0.03)	(0.03)
Ever divorced	0.02	0.00
	(0.02)	(0.02)
Ever widowed	−0.10*	−0.02
	(0.04)	(0.04)
Total children	0.01*	—
	(0.00)	
Respondent is female	−0.02	—
	(0.03)	
Age	−0.02**	−0.02**
	(0.00)	(0.00)
Respondent is Black	0.07**	—
	(0.03)	
Respondent is Hispanic	0.12**	—
	(0.03)	
Health indicators[b]		
Difficulty with any ADL	−0.01	−0.01
	(0.03)	(0.03)
Subjective probability of living to 75	0.00	0.00
	(0.00)	(0.00)

variables are not statistically significant, including the ADL measure and respondents' depression and memory scores.

Still focusing on married persons, it is of interest to ask whether undersaving appears related to either spouse's self-reported attitude about risk aversion. The evidence suggests no statistically significant impact, and likewise respondents having a long financial planning horizon have the same likelihood of experiencing a shortfall as do others. Respondents who had contacted the Social Security Administration for benefit estimates did not appear to be any more or less likely to have a saving shortfall.[20]

Turning now to results for unmarried households, we note several similarities and a few important differences. Lifetime earnings and age have similar influences on the probability of a shortfall for both groups. By con-

TABLE 3: *Continued*

	Primary Respondent	*Spouse*
Depression score	0.00	0.00
	(0.00)	(0.00)
Depression score squared	−0.00	0.00
	(0.00)	(0.00)
Initial recall	−0.03	0.00
	(0.00)	(0.00)
Ever smoked cigarettes	0.03*	0.03*
	(0.02)	(0.02)
Alcohol consumed: 1–2 drinks/day	−0.01	−0.02
	(0.02)	(0.02)
Alcohol consumed: 3+ drinks/day	−0.07*	−0.01
	(0.04)	(0.04)
Preference proxies[c]		
Relative risk aversion: most risk averse	−0.02	0.03
	(0.02)	(0.02)
Long planning horizon	−0.02	−0.01
	(0.02)	(0.02)
Contacted SSA regarding SS benefits	0.01	0.02
	(0.02)	(0.02)

Source: Authors' calculations using 1992 HRS data.
Notes:
* Significant at the 5 percent level.
** Significant at the 1 percent level.
— Not applicable.
[a] Probit regressions include census region dummy variables and a missing spouse indicator not reported. Categorical variables respondent white and high school degree omitted.
[b] Probit regressions include flag for missing cognitive score not reported. Categorical variable alcohol group 1 omitted.
[c] Probit regressions include a flag variable for missing risk aversion not reported. Categorical variables less risk averse and shorter financial planning horizon omitted.

trast, singles' education plays a much bigger role—higher education has a strong beneficial effect in reducing nonmarried persons' chance of having a retirement shortfall. Also nonmarried respondents who experienced a divorce are more likely to experience a shortfall. Nonmarried women are at greater shortfall risk than their male counterparts, even after controlling for other factors including lifetime earnings; this is primarily because women live longer in retirement and their assets must be spread over additional years. After controlling for all these human capital and family structure characteristics, race and ethnicity have no influence on the likelihood of a shortfall for the nonmarried population.

As with the married households, we also find that health and preference variables contain little explanatory power in explaining shortfalls among

TABLE 4: Any Shortfall (0,1) at Age 62 for Nonmarried Households (N=1,655)

	Primary Respondent
Conventional socioeconomic variables[a]	
AIME/1,000	0.05**
	(0.02)
Less than high school degree	0.09**
	(0.03)
College graduate	−0.08*
	(0.04)
Graduate school	−0.09*
	(0.04)
Ever divorced	0.11**
	(0.03)
Ever widowed	−0.04
	(0.03)
Total children	0.00
	(0.01)
Respondent is female	0.09**
	(0.03)
Age	−0.01**
	(0.00)
Respondent is Black	0.06
	(0.03)
Respondent is Hispanic	0.05
	(0.05)
Health indicators[b]	
Difficulty with any ADL	−0.12**
	(0.05)
Subjective probability of living to 75	0.00
	(0.00)
Depression score	0.00
	(0.01)
Depression score squared	0.00
	(0.00)
Initial recall	0.01
	(0.01)
Ever smoked cigarettes	−0.03
	(0.02)
Alcohol consumed: 1–2 drinks/day	0.00
	(0.03)
Alcohol consumed: 3+ drinks/day	−0.07
	(0.06)
Preference proxies[c]	
Relative risk aversion: most risk averse	0.01
	(0.02)
Long planning horizon	−0.02
	(0.02)
Contacted SSA regarding SS benefits	−0.04
	(0.03)

Notes: See Table 3.

nonmarried households. The single factor that is statistically significant has a rather surprising effect—namely, ADL difficulty—where people reporting an ADL difficulty were less likely to experience a shortfall. Other factors, including risk aversion and reported financial planning horizon, were not statistically significant.

Next we turn to the subset of people confronting a saving shortfall—or alternatively, those for whom we have identified a positive prescribed saving rate. Here the goal is to understand what affects the magnitude of prescribed saving rates conditional on having a shortfall, an analysis that appears in Tables 5 and 6.[21]

Focusing first on the married group, we find once again that the SES variables are highly correlated with married households' saving needs. Conditional on having a shortfall, each additional $1,000 of lifetime earnings dictates roughly a 2 percent reduction in the prescribed saving rate. In other words, for married households, having higher lifetime earnings increases the likelihood of having a shortfall, but those with higher lifetime earnings do not need to save as much to reach their retirement target. Education also matters: having a graduate degree cuts prescribed saving rates by one percent for the respondent and two percent for the spouse. Divorce raises prescribed saving rates by 2 percent. Interestingly, the ages of spouses work in opposite directions: older primary respondents need more saving (approximately 0.1 percent per year) but older spouses require less (−0.2 percent per year). This is probably due to the fact that an older primary respondent has less time remaining until retirement, while having an older spouse indicates fewer future years of expected consumption in retirement. Nonwhite married households with a shortfall have larger prescribed saving rates than their white counterparts.

Among the married group, having poor health is not particularly useful as a predictor of saving rate shortfalls: none of the included health variables (for respondent or spouse) have a statistically significant impact on prescribed saving rates. Only one of the preference variables proves important: respondents indicating they have a longer planning horizon (relative to the omitted category of under five years) are in better shape financially with smaller saving rate shortfalls.

Turning now to the nonmarried having prescribed saving needs, many fewer factors are important in explaining observed shortfalls. In fact, only two of the socioeconomic variables are significant (AIME and age), though their magnitudes are quite large relative to married respondents. An additional $1,000 in AIME decreases the prescribed saving rate by 5 percent, and age increases it by 1 percent per year.

Health measures, which did not explain married household behavior, are more important for nonmarried households. Specifically, respondents with a higher measured level of cognition have lower prescribed saving rates, while smokers have higher prescribed rates than do nonsmokers. As with

TABLE 5: Extent of Saving Shortfall at Age 62 for Married Households

	Primary Respondent	*Spouse*
Conventional socioeconomic variables[a]		
AIME/1,000	−0.02**	−0.01
	(0.00)	(0.01)
Less than high school degree	0.01	0.01
	(0.01)	(0.01)
College graduate	0.01	0.01
	(0.01)	(0.01)
Graduate school	−0.02*	−0.02*
	(0.01)	(0.01)
Ever divorced	0.01	0.02**
	(0.01)	(0.01)
Ever widowed	−0.02	0.00
	(0.01)	(0.01)
Total children	0.00	—
	(0.00)	
Respondent is female	−0.01	—
	(0.01)	
Age	0.001*	−0.002**
	(0.00)	(0.00)
Respondent is Black	0.02*	—
	(0.01)	
Respondent is Hispanic	0.03**	—
	(0.01)	
Health indicators[b]		
Difficulty with any ADL	0.01	0.00
	(0.01)	(0.01)
Subjective probability of living to 75	0.00	0.00
	(0.00)	(0.00)
Depression score	0.00	0.00
	(0.00)	(0.00)
Depression score squared	0.00	0.00
	(0.00)	(0.00)
Initial recall	0.00	0.00
	(0.00)	(0.00)
Ever smoked cigarettes	0.00	0.00
	(0.00)	(0.01)
Alcohol consumed: 1–2 drinks/day	−0.01	0.01
	(0.01)	(0.01)
Alcohol consumed: 3+ drinks/day	0.00	0.02
	(0.01)	(0.01)
Preference proxies[c]		
Relative risk aversion: most risk averse	0.00	−0.01
	(0.01)	(0.01)
Long planning horizon	−0.01*	0.00
	(0.00)	(0.01)
Contacted SSA regarding SS benefits	0.00	0.00
	(0.01)	(0.01)
Inverse Mills ratio	−0.02	—
	(0.02)	

Notes: See Table 3.

TABLE 6: Extent of Saving Shortfall at Age 62 for Nonmarried Households

	Primary Respondent
Conventional socioeconomic variables[a]	
AIME/1,000	−0.05**
	(0.01)
Less than high school degree	0.00
	(0.01)
College graduate	0.01
	(0.01)
Graduate school	0.00
	(0.01)
Ever divorced	0.00
	(0.01)
Ever widowed	−0.02
	(0.01)
Total children	0.00
	(0.00)
Respondent is female	−0.02
	(0.01)
Age	0.01**
	(0.00)
Respondent is Black	−0.01
	(0.01)
Respondent is Hispanic	−0.01
	(0.02)
Health indicators[b]	
Difficulty with any ADL	0.01
	(0.02)
Subjective probability of living to 75	0.00
	(0.00)
Depression score	0.00
	(0.00)
Depression score squared	0.00
	(0.00)
Initial recall	−0.03*
	(0.00)
Ever smoked cigarettes	0.04**
	(0.01)
Alcohol consumed: 1–2 drinks/day	−0.01
	(0.01)
Alcohol consumed: 3+ drinks/day	0.01
	(0.02)
Preference proxies[c]	
Relative risk aversion: most risk averse	−0.01
	(0.01)
Long planning horizon	−0.02**
	(0.01)
Contacted SSA regarding SS benefits	−0.01
	(0.01)
Inverse Mills ratio	−0.07**
	(0.02)

Notes: See Table 3.

Married Unmarried

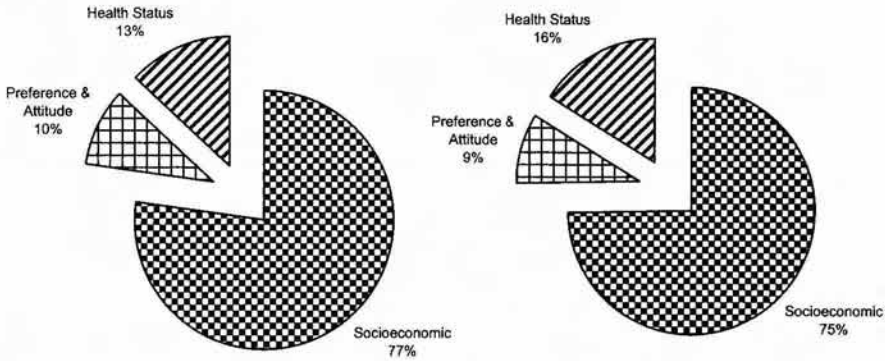


Figure 2. Explained variance in prescribed saving rates by current marital status: married (left), nonmarried (right). Source: Authors' calculations.

the married group, the only significant preference variable is long financial planning horizon: those with a longer planning horizon appeared to do a better job saving for retirement.[22]

An alternative way to describe empirical patterns uses an analysis of variance (ANOVA) to summarize the relative contribution of each of the clusters of variables in explaining observed patterns. Our results appear in Figure 2 disaggregated by marital status. Among married households, we find that SES factors account for 77 percent, health 13 percent, and preference proxies only 10 percent of explained variance. For nonmarried households, SES factors again play the largest role (75 percent), followed by health (16 percent) and preference proxies (9 percent). In short, the socioeconomic factors explain most of what can be explained in the data. This suggests that people's saving shortfalls are primarily driven by socioeconomic factors; of these, the most important quantitatively are education and AIME, with marital history and ethnicity also being significant. Nevertheless, poor health and preferences have a stronger effect among the unmarried, which is of interest inasmuch as this group is likely to be most vulnerable to poverty in old age.[23]

A further ANOVA breakdown appears in Figure 3, illustrating how respondent and spouse characteristics contribute to explaining saving shortfall patterns. Our estimates indicate that spousal factors account for about half of the total variance attributable to SES factors. In particular, saving shortfalls are less prevalent when spouses are more educated. Spouse effects are also important among the health and preference variables, though respondent preference variables explain almost twice the variance in prescribed rates compared to spousal preference variables.

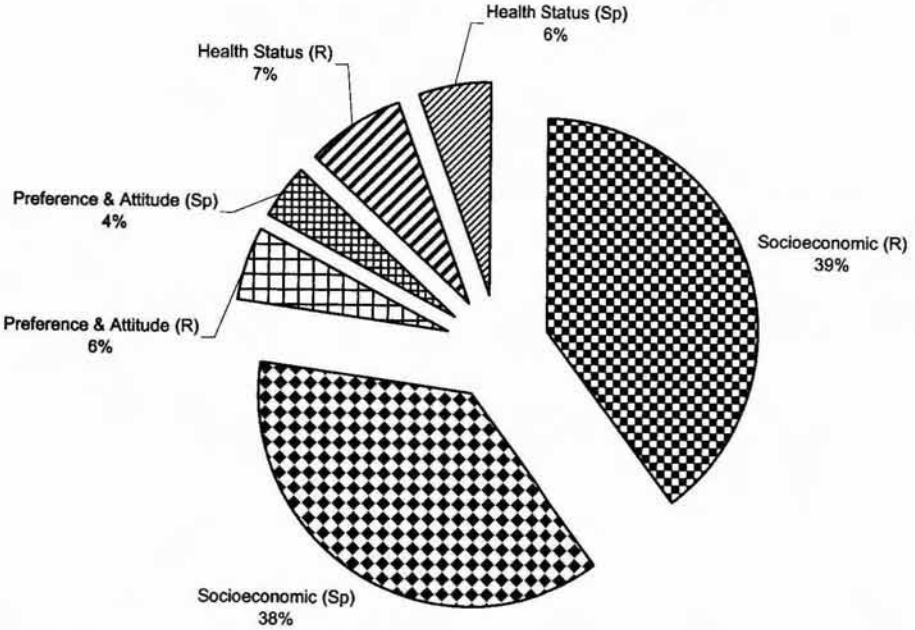


Figure 3. Explained variance in prescribed saving rates for married couples by respondent ans spouse attributes. Source: Authors' calculations.

Conclusions

Our research represents a step toward understanding why so many older Americans face retirement saving shortfalls. Using retirement wealth shortfalls in the HRS, we have shown that the probability of having a saving shortfall, as well as the size of the saving rate needed to make up the deficit, is related to factors that economists conventionally employ when explaining saving patterns. These include respondents' and spouses' educational attainment, lifetime earnings, marital and children status, and ethnicity. Overall, socioeconomic variables are key in explaining variation in saving rates needed for retirement; health and preference proxies are also crucial, together accounting for 20–25 percent of explained variance.

We find it interesting that several other factors—including depression, memory problems, and earlier-than-predicted mortality—appear not to explain saving shortfalls. Some health-related factors do have explanatory power, including alcohol consumption (associated with improved proximity to the saving target) and smoking (taking respondents farther from their

goals). We also find modest effects from ADL difficulty and cognition scores, though these effects are limited to the unmarried sample. Only one of the preference proxies used helps us understand which people undersave and why: that is, households with longer financial planning horizons have lower prescribed savings rates.

Finally, the analysis indicates that in understanding married couples' wealth situation, it is useful to take into account economic, health, and preference proxies for *both* respondents and spouses. Spousal effects account for about half of the explained variance in saving shortfall patterns for married households.

Appendix

In this Appendix we describe data construction methods used to derive the key wealth and saving shortfall variables used in this chapter. The retirement wealth measures we use for 1992 as well as retirement at age 62 and 65 follow Moore and Mitchell (this volume). Prescribed saving and replacement rates are also calculated as on Moore and Mitchell; the process is an iterative one that uses 1) projected assets at an assumed retirement date, 2) projected earnings just prior to retirement, and 3) an annuity factor that makes allowance for the age and sex characteristics of the household.

In addition to the wealth and saving measures described elsewhere, we also obtain several additional variables from the HRS survey for use in this analysis. For example, respondents are asked to indicate their likelihood of living to age 75 using a scale of 0 to 10. Individuals who report higher values believe that the probability they will survive to age 75 is high, while low values suggest pessimism regarding survival to 75. Participants are also asked a number of directed questions about their willingness to exchange their current wage income for a wage that has a gamble associated with it. For example, the first question gives the option of an alternative with a 50 percent chance of doubling income, but a 50 percent chance that it will reduce income by one-third. Participants answering that they would take the risk are offered a choice where the lesser of the two outcomes is worse (a reduction of one-half) and those answering that they would not take the risk are given a gamble where the lesser outcome is a loss of one-fifth. The four categories can be used to rank risk aversion from most risk averse (category 4) to least risk averse (category 1). We then identify those in the most risk averse group with a dichotomous variable.

In order to ascertain respondents' mental condition, ISR interviewers recite a list of twenty nouns to the respondent, asking him or her to recall as many words from that list as possible. This sum represents the "initial memory" variable we use in the analysis (Wallace and Herzog 1995). Respondents are also asked a set of questions measuring depressive symptoms,

taken from the Center for Epidemiology Studies Depression Scale (CES-D). For questions that relate to depressive symptoms (e.g., "I felt everything I did was an effort"), respondents rate how often they had these symptoms over the past week using a four-category scale to measure "intensity." The sum of the responses to these 11 questions is the depression score used in the analysis, where higher depression scores imply a higher level of depressive symptoms.

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Notes

1. We build on Moore and Mitchell (this volume, MM), Mitchell, Olson, and Steinmeier (this volume, MOS), and Gustman et al. (this volume) in these calculations.

2. These estimates use the Social Security Administration's intermediate economic and demographic assumptions. See the Appendix for further discussion.

3. See the Appendix for more discussion of data creation issues.

4. Age 62.5 is the modal retirement age currently, where retirement is defined as the age at which people apply for social security benefits.

5. Palmer (1991, 1993) analyzes replacement rates using the Consumer Expenditure Survey; this research is reviewed and alternative approaches offered by McGill et al. (1996).

6. This iterative approach to solving for the household's saving shortfall is described in MM.

7. Descriptive statistics on the HRS sample under study in this chapter are given in Appendix Tables 1, 2 along with variable definitions. Appendix Table 3 summarizes the 1992 wealth distribution derived for the HRS sample with a simple multivariate regression model similar to that of Smith (1995). We find that our empirical results for factors associated with wealth levels in the HRS are quite consistent with the prior study.

8. In fact this group could begin consuming assets by an amount worth 5–14 percent of annual income if all that was of interest was consumption-smoothing. Clearly other goals, including the passing on of assets via bequests, are also viable for this segment of the population.

9. The figures present the median prescribed saving rates in wealth-earnings deciles by marital status. Sample medians mask the fact that variation remains in each decile pair grouping but they do provide a representation of average conditional behavior.

10. The surface is smoother for married than for unmarried households, due to a larger sample size for the former group.

11. The method is a standard Heckit procedure with the selection correction term (inverse Mills ratio) included among second stage regressors; standard errors are corrected using the appropriate joint estimation technique (Greene 1997).

12. Variable definitions appear in the Appendix.

13. A detailed description of HRS health measures can be found in Wallace and Herzog (1995).

14. Etner et al. (1997) find that depression reduces employment among the broader population; it has not been established whether this effect is important in the saving and retirement decision.

15. Barsky et al. (1997) use the risk aversion measure to analyze risk-taking behavior (stock ownership, cigarette smoking, drinking, etc.) in the HRS. They find that the risk aversion measure is correlated with these "risky" behaviors.

16. We use a dichotomous variable "most risk averse" where the omitted category is the remaining three "less risk averse" groups.

17. In addition to the controls mentioned above, flags are incorporated for missing values of variables and the mean of all nonmissing responses was used as a replacement. Most values of these flags are not statistically significant and hence are not individually reported in Tables 3–6.

18. We recognize that current household earnings affect prescribed saving needs in a complex way. For one thing, families with higher earnings will have a higher need for wealth in retirement to sustain their higher consumption patterns when young. This generates a mechanical (positive) link between earnings and saving needs. However having higher earnings levels at any given date probably also indicates that a household has a higher "ability to save" over its remaining years in the labor force, a result that may produce an inverse link between earnings and saving needs on the verge of retirement. Having higher earnings also is likely to be associated with (unmeasured) high tastes for work, such that these respondents are less likely to retire early. Such workers might have measured saving shortfalls, which in fact they could make up by retiring later. Since it is not clear whether current earnings determines shortfalls or vice versa, we use a "lifetime" earnings measure (AIME) in our estimates rather than current earnings. Though AIME and current earnings are positively correlated, the degree of correlation is rather small, only 0.35.

19. Using the HRS, Smith (1997) shows that poor health is associated with lower wealth *levels*, a finding we confirm in Appendix 2 using our own set of explanatory factors in the HRS sample. By contrast, our goal in Table 3 is to show how saving *shortfall* measures are related to respondent and spouse variables. Our results thus show that health conditions as measured here play only a minor role in predicting which households should increase their saving rates in order to meet retirement consumption needs.

20. One explanation for the statistical insignificance of the health and preference measures is that they may be correlated, confounding our estimates. To determine how important this might be to our results, we also explored how results changed on SES variables if we deleted all health and preference controls from the canonical specifications in Tables 3 and 4. We then added a single health or preference variable at a time and reestimated the new specification, comparing the coefficient value of the lone health/preference variable in the new specification with the same coefficient in the canonical set. The results indicate that coefficients on included variables in both sets of models are similar, so that correlation among health variables probably does not alter our results.

21. The statistically significant coefficient on the inverse Mills ratio indicates that failing to correct for selectivity would produce biased estimates of covariate effects.

22. In sensitivity analysis not reported in the tables in detail, we sequentially varied the assumed retirement age and also the truncation point for determining which households have a saving shortfall to see what impact this had on results reported in the text. Qualitative conclusions are unchanged.

23. For a discussion of nonmarried people's particular vulnerability to old-age poverty, see Levine, Mitchell, and Moore (this volume).

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APPENDIX TABLE 1: Means and Standard Deviations—Married Respondents (N=5,234)

	Respondent		*Spouse*	
Conventional socioeconomic variables[a]				
Earnings ($)	27,650	45,747	15,777	20,201
Less than high school degree (%)	0.22	0.41	0.25	0.43
College graduate (%)	0.12	0.33	0.09	0.29
Graduate school (%)	0.10	0.30	0.06	0.23
Ever divorced (%)	0.26	0.44	0.22	0.42
Ever widowed (%)	0.04	0.19	0.04	0.19
Total children (#)	3.35	2.06	—	—
Respondent is female	0.37	0.48	—	—
Age	56.19	5.49	54.81	6.28
Respondent is Black (%)	0.07	0.26	0.07	0.25
Respondent is Hispanic (%)	0.07	0.25	0.07	0.25
Health indicators[b]				
Difficulty with any ADL	0.09	0.29	0.09	0.27
Subjective probability of living to 75	0.65	0.28	0.66	0.26
Depression score	4.29	4.05	4.51	4.21
Initial recall score	7.61	2.50	7.84	2.51
Ever smoked cigarettes (%)	0.66	0.48	0.60	0.48
Alcohol consumed: none	0.35	0.48	0.38	0.49
Alcohol consumed: 1–2 drinks/day	0.60	0.49	0.55	0.50
Alcohol consumed: 3+ drinks/day	0.06	0.23	0.05	0.21
Preference proxies[c]				
Relative risk aversion: less risk averse	0.38	0.50	0.46	0.49
Relative risk aversion: most risk averse	0.62	0.49	0.54	0.50
Planning horizon: < 5 years	0.61	0.48	0.67	0.48
Planning horizon: 5+ years	0.39	0.49	0.33	0.47
Contacted SSA regarding SS benefits (%)	0.25	0.43	0.16	0.36
Wealth variables				
Saving rate shortfall at age 62 (%) (n=3,155)	0.24	0.12	—	—
Saving rate shortfall at age 65 (%) (n=2,824)	0.18	0.11	—	—
Current period total wealth ($)	589,760	649,982	—	—

Notes: See Table 3.

APPENDIX TABLE 2: Means and Standard Deviations — Unmarried Respondents (N=2,373)

	Mean	*Standard Deviation*
Conventional socioeconomic variables[a]		
Earnings	18,215	26,877
Less than high school degree	0.31	0.46
College graduate	0.09	0.28
Graduate school	0.08	0.27
Ever divorced	0.64	0.48
Ever widowed	0.28	0.45
Total children	2.60	2.10
Respondent is female	0.68	0.47
Age	55.95	3.27
Respondent is Black	0.18	0.39
Respondent is Hispanic	0.09	0.28
Health indicators[b]		
Difficulty with any ADL	0.14	0.35
Subjective probability of living to 75	0.14	0.31
Depression score	6.49	5.63
Initial recall score	7.27	2.70
Ever smoked cigarettes	0.67	0.47
Alcohol consumed: none	0.40	0.49
Alcohol consumed: 1–2 drinks/day	0.54	0.50
Alcohol consumed: 3+ drinks/day	0.06	0.23
Preference proxies[c]		
Relative risk aversion: less risk averse	0.38	0.50
Relative risk aversion: most risk averse	0.62	0.49
Planning horizon: < 5 years	0.68	0.45
Planning horizon: 5+ years	0.32	0.47
Contacted SSA regarding SS benefits (%)	0.17	0.37
Wealth variables		
Saving rate shortfall at age 62 (%) (N=1,198)	0.26	0.14
Saving rate shortfall at age 65 (%) (N=936)	0.20	0.11
Current period total wealth	238,793	374,629

Notes: See Table 3.

APPENDIX TABLE 3: Wealth Level Regression: Full Sample

	Coefficient	*Standard Error*
Conventional socioeconomic variables[a]		
Household income category 2	38904.85**	14055.21
Household income category 3	89890.63**	16954.62
Household income category 4	176310.7**	19863.14
Household income category 5	522416.5**	33803.07
Less than high school degree	−43300.39**	14810.53
College graduate	103631.7**	28732.31
Graduate school	207372.8**	36357.02
Married couple / partnered	145671.6**	17165.84
Ever divorced	−80121.58**	14860.13
Ever widowed	−17636.31	14054.36
Respondent is Black	−95180.33**	11137.88
Respondent is Hispanic	−132231.6**	23911.22
Health indicators[b]		
Categorical health: excellent	102057.3**	21363.15
Categorical health: very good	84463.51**	19755.65
Categorical health: good	65989.85**	16546.74
Categorical health: fair	62191.03**	16045.98
Relative mortality optimism	2612.305**	2088.487
Preference proxies[c]*s*		
Planning horizon: 1 year	−31245.51	20895.16
Planning horizon: a few years	15297.14	17217.03
Planning horizon: 5–10 years	16311.26	19307.04
Planning horizon: 10+ years	118679.2**	35307.86

Notes: See Table 3.