

# Are Americans Prepared For Retirement?

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*This study estimates the adequacy of retirement wealth of pre-retirement households using a 1995 national sample of households. Retirement wealth is projected using planned retirement age and portfolio allocation. Retirement needs are estimated from expenditure functions, and 52% of the households were adequately prepared. Households that spent less than income were much more likely to be adequately prepared for retirement than similar households that spent at least as much as income. Planned retirement age had a large effect on adequacy, but household income had a moderate independent effect on adequacy.*

**Key Words:** *Life cycle model, Retirement needs, Retirement planning, Retirement wealth adequacy, Survey of Consumer Finances*

Baby boomers will start retiring in 2001, marking the beginning of an accelerated rate of increase in the retired population in the U.S. In 1994, one out of eight Americans was age 65 or older, but by the year 2030, over one out of five persons is projected to be 65 years or older (U.S. Department of Commerce, 1996). While the number of older persons is rapidly growing, the financial situation for future retirees remains uncertain. Increases in the cost of living and in health care costs, cutbacks in medical coverage and other employee benefit plans, curtailments in Social Security benefits, and declining individual savings rates make it more likely that many will have to adjust to a decreased standard of living in their retirement years (Palmer, 1994).

When today's workers retire, their goals will be much like their preretirement goals--they will want a comfortable, happy life (Garman & Forge, 1994). These higher expectations raise the level of resources needed for retirement. However, the current savings behavior of many individuals and families might not provide economic security in retirement, let alone allow individuals and families to meet these higher expectations.

Reductions in Social Security benefits and the shift away from defined benefit pension plans place more responsibility for retirement planning upon the individual. Thus, a worker must carefully invest retirement saving to be able to maintain preretirement

consumption levels during retirement.

These demographic, economic, and fiscal factors highlight the importance of retirement planning and the development of realistic and rational investment strategies to provide a desired level of living during retirement. Attaining a financially secure retirement is an important goal both of American workers and policy makers since financial insecurity among a large retirement cohort could place heavy financial and emotional burdens on society.

The purpose of this study is to investigate the determinants of the likelihood of having adequate retirement wealth. Unique contributions of this research include use of household specific information on planned retirement age and portfolio allocation, projection of retirement wealth using asset specific growth rates, and estimation of retirement needs based on household expenditure functions.

## Background

### *Related Empirical Literature*

Adequacy of retirement wealth refers to the relationship of financial resources to financial needs after retirement. Determining what is available and what is needed for retirement is necessary to assess the adequacy of retirement wealth. Previous studies of retirement wealth adequacy have employed a variety of techniques to project the financial resources available for retirement, to

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estimate the level of retirement need, and to determine the adequacy of retirement wealth. The most commonly used method to estimate consumption needs in retirement is to specify percentages of preretirement income necessary to maintain a constant level of living throughout the retirement years. In general, the previous research suggests that pre-retired people are not adequately prepared financially for their retirement and thus need additional savings in order to maintain the pre-retirement level of living during retirement.

Moore and Mitchell (1997) examined the adequacy of asset holdings among people on the verge of retirement using the Health and Retirement Study (HRS). They projected asset growth, compared these projections with consumption needs in retirement, and assessed saving needs under the assumption of consumption smoothing over the lifetime. The retirement age was assumed to be ages 62 or 65. The authors concluded that the majority of older households will not be able to maintain current levels of consumption into retirement without increasing savings. In particular, the median HRS household would have more than \$380,000 in projected wealth by age 62, but would still have to save an additional 16% of earnings to maintain the pre-retirement consumption level for age 62 retirement. For retirement at age 65, assets were expected to be about \$420,000 and additional savings of 7% of earnings per year were required.

In a related study, Mitchell and Moore (1997) used the HRS data to examine the adequacy of retirement wealth for a household with characteristics similar to HRS median characteristics: a married couple household, husband and wife both age 56 in 1992, with an annual household income of \$46,000. Wealth accumulation was projected for the household assuming retirement at age 65, and a household portfolio of 60% bonds and 40% stocks. Household wealth was projected and compared to retirement needs calculated using replacement rates of 70% and 80%. Substantial shortfalls in retirement wealth accumulations were found (e.g., \$200,300 for a replacement rate of 80%, and \$119,600 for a replacement rate of 70%). The shortfalls reflect the additional wealth required to meet retirement needs. The authors concluded that the median American on the verge of retirement has accumulated too little wealth to support a comfortable retirement.

The studies by Moore and Mitchell (1997) and Mitchell and Moore (1997) have several limitations. They made uniform assumptions about each household, not allowing variation in retirement age, portfolio allocation patterns,

income, and retirement consumption needs across households. In addition, they used simple average real historical returns in the projection of retirement wealth, thus ignoring risks associated with investments.

Bernheim (1996) calculated *The Merrill Lynch Baby Boomer Retirement Index*. The index is the ratio of actual savings to savings needed to maintain the preretirement level of living during the retirement years. A computer simulation model determined the prescribed levels of household saving and then these prescriptions were compared with actual savings behavior. An Adequacy Index was developed based on actual savings as a percentage of prescribed savings for three cases: pessimistic, optimistic, and midpoint. The index indicates a significant shortfall in the retirement savings of the Baby Boom generation. The overall index at the midpoint (36%) indicates that the typical Baby Boom household needs to nearly triple its rate of saving to maintain the preretirement consumption level in the retirement years (Bernheim, 1996, p. 22).

Bernheim's index does not give the proportion of households adequately prepared, as the index was calculated for large population subgroups within the Baby Boom generation rather than for individual households. Home equity was excluded from the calculation of assets available to finance consumption during retirement. Additionally, Bernheim's sample was restricted to respondents to the Merrill Lynch survey, a relatively small sample that has subsequently been found to be slightly wealthier than the population as a whole (Bernheim, 1996; Mitchell & Moore, 1997). Furthermore, the computer simulation model did not allow for uncertainty in an individual household's future economic prospects, and used simple optimistic assumptions to project the earnings level and retirement age. For example, the model assumed a retirement age of 65 for everyone, so that the true target saving rate for each household could be higher or lower.

Li (1996), Burns and Widdows (1990) and Burns and Widdows (1988) studied the adequacy of retirement resources by directly comparing accumulated financial resources with financial resources needed for retirement. Li (1996) used data from the National Longitudinal Survey of Older Men to compare needed financial resources and actual financial resources at the expected date of retirement for each household. When actual resources exceeded needed resources, the level of retirement resources was considered adequate. Financial resources available for retirement were defined as the

sum of the household's net worth and the present value of income streams from Social Security and other pension plans. Financial resources needed for retirement were estimated using Palmer's (1989) replacement rates, information on household preretirement income, and the number of years spent in retirement.

Li (1996) suggested that men born between 1907 and 1921 were not well prepared financially for retirement. Only 46% of the sample had accumulated retirement wealth at the expected retirement age that was adequate to maintain the pre-retirement consumption level during retirement. Retirement age was found to be an important factor affecting retirement wealth adequacy (Li, 1996, pp.94-96).

Burns and Widdows (1990) and Burns and Widdows (1988) estimated savings rates required to meet retirement needs using a framework developed by Duncan, Mitchell, and Morgan (1984). The Duncan, Mitchell, and Morgan (DMM) framework estimates the total assets that an individual will have accumulated at the date of retirement and compares this sum to what is needed to maintain a given consumption level during retirement. The needed savings rate is calculated as the proportion of current income one would need to save from the time of analysis until retirement to meet retirement goals. The asset accumulation at retirement includes Social Security benefits, pension benefits, housing equity, and other assets. Retirement needs are estimated by defining a percentage of current annual income (75%, 80%, and 90%) that would provide an even stream of consumption throughout life (Duncan, et al., 1984).

A modified DMM framework was applied to data from the 1983 Survey of Consumer Finances to estimate required savings rates needed to adequately fund baby boomers' retirement (Burns & Widdows, 1988) and to explore variation in required savings rates when three factors in the framework were redefined (Burns & Widdows, 1990). Burns and Widdows (1988) found retirement gaps, and increased savings ratios were required across all age and income groups. Burns and Widdows (1990) explored differences in required retirement savings rates when the operational definitions of three retirement analysis factors were varied. The authors concluded that results using the DMM framework are sensitive to the definitions used.

*Conceptual Framework*

Under a life cycle model, assets are accumulated during an individual's work life mainly to finance consumption after retirement when earned income is reduced. A generally accepted goal of retirement planning is to provide enough income in retirement to prevent the level of living from dropping much below the preretirement level (Schulz, 1992). Thus, retirement wealth can be defined as *adequate* if total retirement income is equal to or greater than total desired retirement consumption level (cf., Hatcher, 1997). Information on the preretirement level of living can be used to estimate the desired retirement level of living, assuming that individuals would like the same consumption level after retirement as before retirement.

Retirement wealth adequacy at the point of retirement (age R) can be defined as follows:

$$A_R + \sum_{t=1}^{T-R} B_t / (1+r)^t \geq \sum_{t=1}^{T-R} C_t / (1+r)^t$$

where

- A<sub>R</sub> = total asset accumulation upon retirement (age R),
- B<sub>t</sub> = pension income at age t,
- C<sub>t</sub> = consumption level at age t,
- R = retirement age, and
- T = age at death.

According to this equation, retirement wealth at the point of retirement is adequate if the sum of the accumulated assets plus the present value of pension income (including Social Security and annuities) is at least as large as the present value of retirement consumption.

**Empirical Model**

A household's retirement wealth was defined as adequate if the household could retire at the planned retirement age and maintain the level of preretirement consumption from the accumulated retirement resources, including accumulated assets and pension income. The value of the current asset portfolio at the planned retirement age was projected for pre-retired households using appropriate interest rates, and the present value of pension income was estimated using appropriate discount rates. The household's level of preretirement consumption was a proxy for the household's desired level of retirement consumption.

*Projection of Accumulated Retirement Resources*

There is no standard measure of retirement wealth in the literature. Empirical measures of wealth commonly

include the value of financial assets, but the treatment of nonfinancial assets, particularly the value of home equity, varies. Home equity accounts for the largest share of wealth for the elderly. Home equity can be converted to a more liquid form by selling the house or using market mechanisms such as second mortgages, home equity loans, and reverse mortgages. While most elderly people do not sell their homes in retirement or use reverse mortgages to finance retirement consumption, home equity represents an important potential resource. Furthermore, a homeowner will be better off in retirement than an otherwise similar renter, so inclusion of home equity results in more valid comparisons between owners and renters. Using a comprehensive measure of asset availability is particularly important when evaluating the resources held by the elderly that could be used to finance expenditures during retirement, including costs of long-term care (Mitchell & Moore, 1997; Andrews, 1993). This study used a comprehensive measure of retirement wealth that includes financial assets, nonfinancial assets including housing wealth, and retirement income from defined contribution plans, defined benefit plans and Social Security.

To project the total wealth available for retirement, real rates of return were used for each asset. Historical rates of return and a lognormal model were used to project future real rates of return separately for stocks, bonds, money market instruments, business assets, and real estate assets. For each household, the value of financial assets, nonfinancial assets, and the total accumulation in defined contribution plans were projected at the planned retirement age using the appropriate average real rate of return from the lognormal forecasting model. The present value of defined benefit pension and Social Security wealth at the planned retirement age were calculated using a conservative discount rate.

#### *Measurement of Discount Rates*

*Discount rate for defined benefit pension wealth* The discount rate used to calculate defined benefit pension wealth varies across previous studies. Moore and Mitchell (1997) used a nominal rate of 6.3%, and Li (1996) used a nominal rate of 7%. In this study the geometric mean of the nominal rate of return for long-term corporate bonds (Ibbotson Associates, 1995, p. 38-39), 5.4%, was used.

*Discount rate for Social Security wealth* Because of the inflation protection feature of Social Security pensions, a real interest rate should be used for discounting. This study used the real discount rate used by the Social

Security Administration in long range projections, 2.3% (Moore & Mitchell, 1997).

#### *Estimation of Retirement Needs*

Households were assumed to desire to maintain the preretirement level of living during retirement. The household's level of preretirement consumption was used as a proxy for the household's desired level of retirement consumption.<sup>a</sup> Retirement needs were defined as the total wealth needed to provide the level of preretirement consumption during all years of retirement.

$$W_n = C * \{ [1 - (1+r_r)^{-d}] / r_r \}$$

where:

$W_n$  = total consumption needed in retirement (present value),

$C$  = annual consumption during retirement,

$r_r$  = (expected) real interest rate from retirement to death, and

$d$  = retirement period (the number of years from retirement age to death).<sup>b</sup>

A household expenditure function was used to predict annual consumption during retirement. The household expenditure function was estimated using data from the interview component of the 1993-1994 Consumer Expenditure Survey.<sup>c</sup> Household expenditure equations were estimated separately for households that spent less than income and households that did not.<sup>d</sup> The estimated parameters from the household expenditure equations were then used to predict the preretirement consumption level (e.g., annual consumption in the year preceding retirement) separately for households that overspent and households that did not. The predicted preretirement consumption level was used as a proxy for the desired level of retirement consumption.

The appropriate real interest rate ( $r_r$ ) for discounting total retirement needs should be based on a household's investment behavior. It is typically assumed that retired people invest very conservatively because of their low level of risk tolerance during retirement. In this study a real discount rate of 2.3% was used to calculate total retirement needs.

#### **Methodology**

The dataset used in this study for projecting retirement adequacy is the public use tape of the 1995 Survey of Consumer Finances (SCF) cross-section data.<sup>e</sup> Each household provided detailed information on their assets. This information was used to estimate retirement wealth. Total defined benefit pension wealth was estimated from the household's self-reported information on expected

defined benefit pension benefits. The 1995 SCF does not provide direct identification of Social Security coverage, however about 95% of jobs in the U.S. are covered. Most full-time workers in the U.S. are covered by Social Security or a comparable public pension plan. The sample in this study consisted of pre-retired households with at least one full-time worker, so all households were assumed to be covered by Social Security. Social Security wealth was calculated as the present value of benefits received during retirement. The annual Social Security benefit was estimated using current Social Security replacement ratios based on current age, planned retirement age, current earnings, and marital status (Social Security Administration, 1995). The replacement ratio represents the portion of preretirement salary that Social Security income will replace. Current replacement ratios will appropriately represent replacement ratios in the near future if real wages remain constant or grow at the rate of national average wages (TIAA-CREF, 1998) and no substantial changes are made in the system. The estimated annual Social Security benefit was adjusted for early retirement or delayed retirement as indicated by the planned retirement age.

#### *Historical Rate of Return Data*

Data for the historical rates of return are from the *Stocks, Bonds, Bills and Inflation Yearbook* published by Ibbotson Associates (1995). The 1995 Yearbook provides historical return data from January 1, 1926 until December 31, 1994 for six categories of financial assets: small capitalization stocks, large stocks (S&P 500), corporate bonds, intermediate government bonds, long term government bonds, and Treasury bills. For this study, a lognormal forecasting model was used to project future real accumulations separately for business assets (using the returns on small capitalization stocks,) stocks and the stock components of mutual funds (using the returns on large stocks,) bonds (using the returns on corporate bonds,) and money market instruments (using the returns on Treasury bills.) Real estate returns from 1947 to 1982 estimated by Ibbotson and Siegel (1984) were used to produce lognormal projections of future real rates of return for real estate assets. This real estate dataset is comparable to the historical return data in the Ibbotson Yearbook, and is the longest period of annual return data for real estate available. Information is available for residential real estate, farm real estate, business real estate, and composite real estate (average of the three categories). This study used the information on returns for composite real estate, since households in the sample own various types of real estate assets.

#### *Sample*

Households were included in the sample if the householder was age 35 to 70, worked full-time, and indicated the age at which s/he planned to stop full-time work. Additionally, the household had to have positive non-investment income and total annual household income above the poverty threshold.<sup>f</sup> A total of 1,387 households met the criteria.

The age cutoffs were necessary since income and portfolio projections were used to examine retirement wealth adequacy. Portfolio projections were simulated based on the household's current portfolio and financial situation. Households with householders younger than 35 are more likely to have fluctuations in income or relatively few assets, making it difficult to accurately project the portfolios. Additionally, younger workers in the early stages of their careers are more likely to drop out of the work force for education, or to change jobs frequently, making it difficult to obtain reasonable estimates of defined benefit pension and Social Security benefits (Kennickell & Sundén, 1997). The higher age cutoff point (age 70) was chosen since 70 is the oldest age at which the Delayed Retirement Credit (DRC) is available (Social Security Administration, 1995).

Retirement was defined in this study as the point when an individual has discontinued full-time work. All households in the sample had a pre-retired householder. To assess adequacy of retirement wealth, it is necessary to know when the householder plans to retire, i.e., to stop full-time work. Households were excluded from the study if information on the age at which the householder planned to stop working full-time was not available. Households with zero or negative non-investment income and households in poverty were also excluded since financial insecurity hinders the ability to prepare for future retirement. Inclusion of the households that were more likely to experience transitory income fluctuations and therefore be less likely to have begun saving for retirement would have produced downward bias in the estimates of retirement wealth adequacy.

#### *Empirical Measure of Retirement Wealth Adequacy*

For each household, projected total retirement wealth was compared to estimated total retirement consumption needs. If retirement wealth was greater than or equal to retirement needs, the household was categorized as having adequate retirement wealth, otherwise, it was categorized as having inadequate retirement wealth.

### *Correlates of Retirement Wealth Adequacy*

Four categories of variables were explored: demographic, financial, saving/investment decision, and attitude/expectation variables. These variables were analyzed as correlates of retirement wealth adequacy in bivariate analyses and as determinants of retirement wealth adequacy in a multivariate analysis.

### *Demographic Characteristics*

Demographic characteristics included age, educational attainment, marital status, and race/ethnicity of the householder. Current age of the householder was measured with three dummy variables: 35 to 44 years of age, 45 to 54 years of age, and 55 years and over. Educational attainment of the householder was measured with four dummy variables: less than high school (no high school diploma), high school graduation, some college (no four year degree), and college graduation or more. Marital status was measured with three dummy variables: couple if the householder was married or living with a partner, single male if the householder was male and single (separated, divorced, widowed, never married), and single female if householder was female and single. Race/ethnicity of the householder was measured with four dummy variables: non-Hispanic White, non-Hispanic Black, non-Hispanic *other* races, and Hispanic. The *other* races included American Indian, Eskimo, Aleut, Asian, and others. The SCF public use tape did not separate the *other* category for confidentiality reasons.

### *Financial Characteristics*

Financial characteristics included annual household income, ownership of defined benefit or defined contribution plans, and housing tenure status. Annual household income was measured with the SCF variable *household normal income* to avoid transitory variations in current income.<sup>g</sup> For instance, some households had unusually high or low income in 1994 compared to the income in a normal year. Thus, use of normal income eliminates the effect of transitory variation in current income. Ownership of a defined benefit or defined contribution plan was used rather than the value of the plan, since having a large amount in a pension fund would typically be closely related to retirement adequacy, the focus of this study. Ownership of a defined benefit plan was measured with a dummy variable equal to 1 if the householder or spouse had a defined benefit plan, and 0 otherwise. Similarly, ownership of a defined contribution plan was measured with a dummy variable equal to 1 if the householder or spouse had any defined contribution plans including Keogh accounts, and

individual retirement accounts; and 0 otherwise. A household's current housing tenure status was measured with three dummy variables: own home free from mortgage, own home with mortgage, and rent home.

### *Saving/ Investment Decision Variables*

The variables related to saving and investment decisions included the planned retirement age of the householder, the proportion of current non-housing assets held in stock, saving goals, and spending behavior of the household. The planned retirement age of the householder was measured with three dummy variables: retire at age 61 or earlier, retire between age 62 and 65, and retire at age 66 or later. The proportion of current non-housing assets held in stock was measured with four dummy variables: 0%,  $0% < \text{stock} < 13.5\%$ ,  $13.5\% \leq \text{stock} < 36.5\%$ , and  $\text{stock} \geq 36.5\%$ . The variable for saving goals was measured with a dummy variable equal to 1 if the household had retirement as one of their top three saving goals and 0 otherwise. Household spending behavior was measured with a dummy variable equal to 1 if the household's spending was greater than or equal to income over the past year, and 0 otherwise.

### *Attitude/ Expectation Variables*

The variables related to attitudes and expectations included anticipated life expectancy of the householder, the household's risk tolerance, and the household's expectations of the adequacy of retirement pension income and of household income growth. Anticipated life expectancy of the householder was a continuous variable created by subtracting current age from the self-reported anticipated age of death. The household's risk tolerance was measured with a dummy variable coded as 1 if the household was willing to take substantial or above average financial risk when investing, and 0 otherwise. The household's expectation regarding the adequacy of retirement pension income was measured with a dummy variable equal to 1 if the household expected to have enough pension to maintain living standards, and 0 otherwise.<sup>h</sup> The household's expectation regarding household income growth was measured with a dummy variable equal to 1 if the household expected total family income to go up more than prices over the next year, and 0 otherwise.

## **Findings and Discussion**

### *Descriptive Statistics*

Sample characteristics and results from bivariate analysis of each variable are provided in Table 1. About 52% of the households in the sample had adequate wealth for retirement at the planned retirement age. Only 36% of

the households owned defined benefit pension plans, and about 65% owned defined contribution pension plans. About 40% of the households held 13.5% or more of their non-housing assets in stock. Over half (55%) of the householders planned to retire between age 62 and 65, and 35% of the households had retirement as a major saving goal. About half of the households (51%) said their spending was at least as high as income last year, and the majority did not expect future real income growth (83%). About one fourth of the householders (25%) expected to live an additional 42 years or more, and another fourth (24%) expected to live an additional 24 years or less. About 21% of the households were willing to take high financial risk to earn high returns and 48% expected enough pension in retirement.

#### *Bivariate Analysis*

Chi-square tests were used to identify characteristics that were significantly different between households with and without adequate retirement wealth, not controlling for other factors. All variables with the exception of *expect income growth* were statistically different between households with and without adequate retirement wealth ( $p \leq .001$ ). Older households (51 years and older), more educated (college graduate or more), and couples were more likely to have adequate retirement wealth than households with younger, less educated, single householders. Households with White Non-Hispanic householders were more likely to have adequate retirement wealth than households with a householder from a racial/ethnic minority group. Having high income (normal income of \$45,000 or more), defined benefit plans, defined contribution plans, and at least some non-housing assets in stocks were all positively associated with adequacy of retirement wealth. Higher percentages of households had adequate retirement wealth when the householder planned to retire at age 62 or later, expected to live an additional 32 to 42 years, had retirement as a saving goal, spent less than income, was willing to take high financial risk, and expected pension income to be adequate.

#### *Determinants of Retirement Wealth Adequacy*

To control for other factors associated with retirement wealth adequacy, a multivariate logistic regression analysis was performed to identify factors associated with retirement wealth adequacy (Table 2). The dependent variable was an indicator variable equal to one if the household had adequate retirement wealth, and 0 otherwise. Twelve of the 28 explanatory variables were statistically significant ( $p \leq 0.05$ ).

None of the demographic characteristics were statistically significant when controlling for the financial characteristics, saving/investment decision variables, and attitude/expectation variables. All of the financial characteristics variables were significantly associated with the probability of having adequate retirement resources. Normal income, ownership of defined benefit plans, and ownership of defined contribution plans were all positively related to the probability of having adequate retirement resources. Households that owned with a mortgage or rented were less likely than otherwise similar households that owned without a mortgage to have adequate retirement resources.

All of the saving/investment decision variables, with the exception of having retirement as a saving goal, were significantly associated with the probability of having adequate retirement wealth. Planned retirement age and the proportion of non-housing assets held in stock were positively related to the probability of having adequate retirement wealth. Households with spending greater than or equal to income were only 11% as likely as otherwise similar households that spent less than income to have adequate retirement wealth.<sup>i</sup> Among the attitude/expectation variables only one of the life expectancy variables was statistically significant. Compared to households with a householder who expected to live more than 42 additional years, households with a householder who expected to live an additional 24 to 32 years were less likely to have adequate retirement wealth.

#### *Discussion*

Income was significantly related to retirement wealth adequacy in both the bivariate and multivariate analyses. In the bivariate results, the probability of having adequate retirement wealth increased consistently with income. In the multivariate results, the log of income was positively associated with adequacy, indicating that the probability of having adequate retirement wealth increases with income but at a decreasing rate. This nonlinear effect is consistent with high income households being likely to accumulate more wealth while also having higher consumption needs relative to lower income households. Ownership of defined benefit and defined contribution pension plans had positive and significant effects on retirement wealth adequacy even when other independent variables were controlled. Pension ownership increases retirement income, thus increasing the probability of having adequate retirement wealth. This result is consistent with previous studies (Li, Montalto &

**Table 1**  
Sample characteristics and proportion of households with adequate retirement wealth by characteristics

Variables		%	% adequate
Total		100.00	51.99
Age †	35-40	27.98	46.56
	41-45	23.66	49.04
	46-50	20.19	50.83
	51-55	14.04	54.16
	56-60	9.97	64.94
	61-65	3.25	69.12
	66 and over	0.91	85.04
Education †	less than high school grad.	9.81	39.25
	high school graduate	29.72	48.35
	some college	26.47	48.85
	college or more	34.00	61.30
Marital status †	couple	69.94	56.06
	unmarried male	9.67	47.29
	unmarried female	20.39	40.26
Race/ Ethnicity †	White, NonHispanic	81.19	54.81
	Black, NonHispanic	10.19	39.11
	Hispanic	4.16	34.53
	Other, NonHispanic	4.46	46.35
Normal income †	\$0<inc≤\$32,000	24.59	38.54
	32,000<inc≤45,000	25.59	44.36
	45,000<inc≤71,000	24.73	56.94
	>71,000	25.09	68.09
Ownership of DB plan †	yes	36.02	64.75
	no	63.98	44.81
Ownership of DC plan †	yes	64.67	62.77
	no	35.33	32.26
Housing tenure †	own without mortgage	16.57	66.70
	own with mortgage	62.80	53.75
	rent	20.63	34.82
Proportion of stocks †	0%	41.58	35.66
	0%<stock<13.5%	18.31	62.28
	13.5≤stock<36.5	20.13	60.26
	stock≥36.5%	19.98	68.22
Planned retirement age †	61 or earlier	34.59	44.27
	62 - 65	55.17	53.78
	66 or later	10.23	68.45
Have retirement as a saving goal †	yes	35.35	66.41
	no	64.65	44.11
Spending>income †	yes	50.69	26.43
	no	49.31	78.27
Subjective life expectancy †	live≤24 years	24.38	51.81
	24<live≤32	24.19	48.69
	32<live≤42	26.06	55.42
	live>42	25.37	51.79
Take high financial risk †	yes	20.82	57.17
	no	79.18	50.63
Expect enough pension †	yes	48.17	58.98
	no	51.83	45.50
Expect income growth	yes	16.92	49.41
	no	83.08	52.52

† Chi-square test for independence was statistically significant,  $p \leq 0.001$ . Source: 1995 Survey of Consumer Finances, combined data set, N=6,935 (1,387 in each implicate)

Geistfeld, 1996; Kotlikoff, Spivak & Summers, 1982). Home ownership without a mortgage increased the probability of having adequate retirement wealth. Home equity represents an important potential resource available to finance expenditures during retirement.

The proportion of non-housing assets held in stock had a positive and significant effect on the probability of having adequate retirement wealth, but the relationship was not a simple linear one (the coefficients do not consistently increase in magnitude). While owning stock as a part of the investment portfolio increases the probability of retirement wealth adequacy, interactions between stock holdings and other variables such as retirement age or investment horizon could be examined to better understand the relationship between stock ownership and adequacy of retirement wealth. The logistic results provide some evidence that householders who expected to live longer were more likely to have adequate retirement wealth than householders with a shorter life expectancy, however this relationship was not a simple linear one and merits further exploration.

The two most important factors related to retirement wealth adequacy in this analysis were planned retirement age of the householder and spending behavior. Planned retirement age had a particularly large effect on retirement wealth adequacy in both the bivariate and multivariate results. In the bivariate results, only 44% of the households with a householder who planned to retire at age 61 or earlier had adequate retirement wealth compared to 68% of those with a householder who planned to retire at age 66 or later. Even after controlling for other factors, planned retirement age had a positive effect on the probability of having adequate retirement wealth. In particular, the effect of delaying retirement until age 66 or later was very large. Planned retirement at a later age provides more years to accumulate retirement wealth and increases the probability of receiving full benefits from Social Security and pension plans, which increase the probability of having adequate retirement wealth. Households that spent less than their income were much more likely to have adequate retirement wealth than otherwise similar households that spent at least as much as income. Spending more than income decreases the likelihood of saving for retirement which reduces the probability of having adequate retirement wealth. Additionally, high levels of preretirement spending increase the level of retirement needs, also reducing the probability of having adequate retirement wealth.



**Table 2**  
Logistic analysis of retirement wealth adequacy

Variables	Coeff.	p-value	Sig.
Intercept	-3.1346	0.0338	*
<i>Demographic Characteristics</i>			
Age (reference category: 55 and over)			
35-44	-0.5215	0.1192	
45-54	-0.5480	0.0792	
Education (reference category: less than high school grad.)			
high school grad.	0.1613	0.6543	
some college	0.1326	0.7392	
college and more	0.1807	0.6360	
Marital Status (reference category: couple)			
unmarried male	0.3155	0.2711	
unmarried female	-0.2319	0.3382	
Race/ Ethnicity (reference category: White)			
Black	-0.4626	0.1784	
Hispanic	-0.7922	0.1087	
Other (including Asian Am)	-0.5199	0.1611	
<i>Financial Characteristics</i>			
Log of normal income	0.3620	0.0048	**
DB ownership	0.7556	0.0001	***
DC ownership	0.6654	0.0026	**
Housing Tenure Status (reference category: own without mortgage)			
rent	-1.0205	0.0007	***
own with mortgage	-0.6372	0.0082	**
<i>Saving/ Investment Decision Variables</i>			
Retirement Age (reference category: retire 61 or earlier)			
retire 62-65	0.6644	0.0001	***
retire 66 or later	2.0016	0.0000	***
Stock Shares(of assets excluding housing asset). (reference:0%)			
0% < stock < 13.5%	1.0592	0.0000	***
13.5% ≤ stock < 36.5%	0.7750	0.0030	**
stock ≥ 36.5%	1.0188	0.0002	***
Retirement as a saving goal	0.1629	0.3813	
Spending ≥ income	-2.1758	0.0000	***
<i>Attitude/ Expectation Variables</i>			
Subjective Life Expectancy (reference: expect to live > 42)			
expect to live ≤ 24 years	-0.4847	0.0660	
24 < expect to live ≤ 32	-0.5175	0.0355	*
32 < expect to live ≤ 42	-0.2214	0.3593	
High risk taking	0.2233	0.2444	
Expect enough pension	0.2353	0.1609	
Expect income growth	-0.2105	0.4123	

F = 19.0690, P-value = 0.0000, Pseudo R-square = 0.5069 to 0.5442, Concordant rate = 87.6% to 89.0%, Combined data set, Number of observations in each implicate = 1,387

\*: P-value ≤ 0.05, \*\*: P-value ≤ 0.01, \*\*\*: P-value ≤ 0.001 (unweighted; RII technique)

Some of the bivariate results were not confirmed in the logistic analysis. First, educational attainment had a relatively large effect in the bivariate analysis but was not statistically significant when other variables were controlled. Second, the probability of having adequate retirement wealth consistently increased with age in the bivariate analysis, while the age categories were not significant in the logistic analysis controlling for other variables. Education and age are likely to be highly correlated with income, pension ownership, home ownership, and portfolio allocation. It appears that once these financial and saving/investment decision variables are controlled, age and education do not have independent effects on the probability of retirement wealth adequacy.

*Scenarios*

To provide some idea of the magnitude of the effects of planned retirement age and spending behavior, predicted probabilities of having adequate wealth at retirement were calculated for several scenarios (Table 3). In Scenario A, the predicted probability of having adequate retirement wealth was calculated for a household with a normal income of \$20,000 per year without a retirement plan, with no stocks, and who did not have retirement as a savings goal. The combined effect of spending behavior and planned retirement age is striking, as those who did not save money and planned to retire before age 62 had only a 2% predicted probability of having adequate retirement wealth, compared to a 54% predicted probability of adequacy for those who spent less than income and planned to retire after age 65. (The predicted probabilities are 1 to 14 percentage points higher for similar households with annual incomes of \$120,000 per year, but in the worst case combination, income makes little difference.)

**Table 3**  
Predicted Probability<sup>j</sup> of Adequacy for Hypothetical Scenarios, by Planned Retirement Age and Spending

*Scenario A*

	spending ≥ income	spending < income
retire < 62	2%	14%
retire 62-65	3%	24%
retire ≥ 66	12%	54%

*Scenario: age=45-54, education=college, race=non-Hispanic White, married couple, normal income =*

*\$20,000/year, does not own defined benefit or defined contribution retirement plan, rents home, stock share=0, does not have retirement as a saving goal, expects to live 25 to 34 years more, would not take high risks with investments, does not expect pension to be enough, does not expect income growth.*

**Scenario B**

	<b>spending ≥ income</b>	<b>spending &lt; income</b>
retire < 62	22%	72%
retire 62-65	36%	83%
retire ≥ 66	68%	95%

*Scenario B: age=45-54, education=college, race=non-Hispanic White, married couple, normal income = \$20,000/year, does not have defined benefit plan but does own defined contribution plan, owns home with mortgage, stock share=36.5% or more, has retirement as a saving goal, expects to live 43 years more, would not take high risks with investments, does not expect pension to be enough, does not expect income growth.*

In Scenario B in Table 3, the probability of having adequate retirement wealth was calculated for a household with a normal income of \$20,000 per year, with a defined contribution plan, with a stock share equal to 37%, who expected a long life, and who had retirement as a savings goal. Those who did not save money and planned to retire before age 62 had only a 22% predicted probability of having adequate retirement wealth, compared to a 95% predicted probability of adequacy for those who spent less than income and planned to retire after age 65.

**Conclusions**

This study suggests that a substantial proportion of households, will not have adequate wealth to retire as planned. About 48% of the sample will not accumulate adequate retirement resources to maintain their preretirement level of living in retirement. The percentage of households with inadequate retirement wealth would be even higher if the trend of increasing life expectancy were considered in the measure of retirement consumption needs. Since average life expectancy has increased over time, future retirees need to be prepared to support their consumption over increasingly longer periods of retirement.

The logistic analysis reveals that household income,

ownership of defined benefit and defined contribution plans, housing tenure status, planned retirement age, proportion of non-housing assets held in stock, household spending behavior, and anticipated life expectancy are important determinants of retirement wealth adequacy. In particular, planned retirement age and household spending behavior were confirmed as strong factors affecting the probability of having adequate retirement wealth. Households with a householder who planned to retire at age 66 or later were much more likely to have adequate retirement wealth at the planned retirement age than households with a householder who planned to retire at age 61 or earlier. Retirement at an older age increases the number of years to accumulate retirement resources and decreases the number of years in retirement. In addition, retirement age is directly related to pension availability and the level of pension benefits. Spending less than income significantly increased the probability of having adequate retirement wealth. Spending less than income implies saving, and thus increases the opportunity to save for retirement. Overspending decreases the wealth accumulations for retirement and increases estimated retirement consumption needs. The proportion of non-housing assets held in stocks was also a significant factor affecting the probability of having adequate retirement wealth. Compared to households with no stock among their assets, households with some stocks were more likely to have adequate retirement wealth at the planned retirement. Research improving our understanding of the relationship between stock holdings and retirement wealth adequacy is needed.

**Implications**

This study provides additional evidence that a substantial number of pre-retired households will not be able to maintain current levels of consumption into retirement given current portfolio allocations. If these households want to retire at the planned retirement age they need to 1) increase their savings or invest more aggressively to enable them to maintain the preretirement consumption level in their retirement years, or 2) maintain their current savings and investing but be willing to accept a retirement level of living that is lower than the preretirement level, or 3) reenter the labor force on a full-time or part-time basis to supplement retirement income and increase the retirement level of living. If these options are not feasible or acceptable, then these households need to delay the timing of retirement to increase the number of preretirement years over which to accumulate retirement wealth, reduce the number of years spent in retirement, and possibly increase pension

benefit levels. Since increasing the level of savings may not be feasible for households with limited income and assets, they may have to reduce their retirement level of living, or supplement retirement income with earnings.

*Implications for Educators, Counselors, and Planners*

Many findings of this study can be used by financial educators, counselors, and planners to increase the probability that clients will have adequate retirement wealth. Planned retirement age is positively related to the adequacy of retirement wealth. Financial educators, counselors, and planners should assist clients in choosing realistic retirement ages by evaluating retirement resources and estimating retirement needs. In particular, clients who plan to retire at relatively young ages (earlier than the age of 62) should be helped in developing reasonable saving plans.

Spending less than income significantly increases the probability of having adequate retirement wealth. Overspending may be due to many factors--from heavy spending on housing and durables to fluctuating income patterns of the major wage earners in the households (Jayathirtha & Fox, 1996). Although overspending of young, highly-educated households might be rational given future income growth, persistent overspending puts households at greater risk of inadequate preparation for retirement. Clients need to understand both the short-term and long-term risks associated with persistent overspending.

Pension ownership significantly increased the probability of having adequate retirement wealth. A factor commonly associated with inadequate retirement resources is financial illiteracy. Financial education programs for workers can increase awareness of available pension programs, encourage and facilitate participation, and assist workers in assessing the adequacy of their retirement savings.

Stock ownership increases the probability of having adequate retirement wealth at the planned retirement age. Aggressive investment or saving strategies should be encouraged especially for individuals who have longer investment horizons (the number of years until retirement). Moreover, asset allocation decisions within retirement saving programs have become more important for individual investors with the increase in 401(k) and related retirement saving programs and the decrease in defined benefit plans since the 1980s. Evidence of higher rates of return for stocks in the long run should be

used to encourage stock investment within retirement savings programs.

**Endnotes**

- a. *Many empirical studies report that total consumption gradually drops after retirement. However, the reduced consumption level of retirees may not fully reflect their desired level of living in retirement because it is not clear whether the lower consumption level of retired households is caused by preferences or by inadequate retirement savings.*
- b. *Actuarial Annuity Tables published by the Internal Revenue Service in 1998 were used to determine life expectancy by gender and retirement age. Ordinary single life annuities were used for single people and ordinary joint life and survivor annuities were used for married couples (Internal Revenue Service, 1998, Table I, II).*
- c. *The Consumer Expenditure Survey is conducted by the U.S. Bureau of the Census for the U.S. Bureau of Labor Statistics (U.S. Bureau of Labor Statistics, 1996) and is the most comprehensive source of detailed information on expenditures for goods and services by households in the U.S. For this study only households which were interviewed in four consecutive quarters (excluding the initial bounding interview) between the second quarter of 1993 and the fourth quarter of 1994 were retained. For each household, data on the four consecutive quarters of expenditure were summed to obtain actual annual household expenditures. All dollar values were adjusted to 1994 dollars.*
- d. *Several statistical procedures were used to determine the appropriate empirical model for estimating household consumption expenditure. A Chow test was used to compare separate regressions for households that did and did not spend less than income to a regression on the pooled sample of households. The Chow-test rejected the pooled model at the 1% level of significance, indicating that the two separate regressions provide a better fit than the regression on the pooled sample. A Box-Cox test was used to determine the best functional form for the expenditure equation. From the results of the Box-Cox test, the double-log model was selected:  

$$\text{Log}(C_i) = f [\text{Log}(\text{Income}_i), Z_i]$$
 where  $Z_i$  is a vector of household characteristics excluding the income variable. These regression tables are available from the authors. For more information on these procedures, see Yuh (1998).*
- e. *The Survey of Consumer Finances (SCF) is a triennial survey sponsored by the Federal Reserve with the cooperation of the Department of the Treasury. The 1995 SCF was conducted by the National Opinion Research Center (NORC) at the University of Chicago between July and December 1995. The purpose of the SCF is to provide comprehensive, detailed information on the financial characteristics of U.S. households. A total of 4,299 families were interviewed in the 1995 SCF. The 1995 SCF has five complete data sets called "implicates" as a result of multiple imputation to handle missing data. This study used repeated-imputation inference (RII) techniques to combine the five different data sets to make valid inferences. For more descriptive information about the SCF refer to Kennickell, Starr-McCluer, & Sundén (1997). Montalto & Sung (1996) discuss the use of repeated-imputation inference techniques in the Survey of Consumer Finances. Montalto and Yuh (1998) discuss the estimation of nonlinear models with multiply imputed data.*
- f. *The 1994 poverty thresholds by size of family and number of*

related children under 18 years published by the Bureau of the Census of the U.S. Department of Commerce were used to exclude households with income below the poverty thresholds (U.S. Bureau of the Census, 1996, Table A-2, p. A-4).

- g. Households surveyed in the Survey of Consumer Finances were asked if the total 1994 income was unusually high or low compared to what would be expected in a "normal" year. Households that responded "yes" to this question were then asked what total income would have been if it had been a normal year. Thus for households that had a normal year in 1994, total 1994 income is used as the measure of annual household income; for households that did not have a normal year in 1994, the self-reported "normal income" is used as the measure of annual household income. In order to reduce heteroskedasticity, the natural logarithm of the normal income was used instead of the dollar amount.
- h. The pension adequacy variable represents the respondent's subjective assessment of the adequacy of the pensions expected, and may seem to be similar to the objective adequacy variable used as a dependent variable in this study. Malroux and Xiao (1995) analyzed a similar subjective adequacy variable as a dependent variable in a seemingly similar analysis to this article's logit. However, as Table 1 in this article shows, only 59% of those who thought their pension would be adequate were assessed as objectively adequate.
- i. The odds ratio for the dichotomous spending variable is calculated as  $e^{\beta}$ , where  $\beta$  is the coefficient on the overspending variable.
- j. An adjustment was made to the intercept term so that the predicted probability was equal to the sample mean probability at the mean values of all of the independent variables, including the mean of income.

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