# Determinants Of Financial Adequacy For Retirement

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*Data from the National Longitudinal Survey of Older Men are used to examine factors associated with financial adequacy for retirement. Bivariate and multivariate analyses show that being white, a longer planning horizon, planning to retire at age 65 or later, and owning assets are positively associated with the accumulation of financial resources adequate to maintain the preretirement level of consumption throughout the retirement years. The importance of planned retirement age to financial adequacy for retirement is confirmed.*
KEY WORDS: *income adequacy, life cycle model, National Longitudinal Survey, retirement needs, retirement planning*

The adequacy of financial resources available for retirement is an important factor influencing an individual's decision to retire. When contemplating retirement, the available financial resources are evaluated. If the financial resources accumulated for retirement are sufficient to meet the financial needs of retirement, an individual may choose to retire. Alternatively, if the accumulated financial resources are insufficient, retirement may be postponed to allow time to accumulate additional financial resources. If an individual retires with insufficient financial resources, the retiree may need to return to full time or part time employment, or to reduce the level of living during retirement. At the extreme, retirement by individuals with inadequate financial resources could burden our economic and social support systems.

The adequacy of financial resources for retirement has important implications for labor force behavior of individuals, timing of retirement, quality of life and financial security during the retirement years, and demands placed on society by retirees. These implications are particularly relevant in the context of the growing elderly population in the United States. In 1992, persons 65 years and over represented 13% of the U.S. population. By the year 2030, roughly one in five Americans will be age 65 or over (Treas, 1995). The increasing size of the elderly population heightens the importance of understanding factors which affect financial adequacy for retirement.

The purpose of this study is to assess the factors associated with the probability of having adequate financial resources for retirement. Adequacy of financial resources enables an individual to retire as planned and to maintain the desired level of living during retirement. In contrast, inadequacy of financial resources may necessitate postponement of retirement or reduction of the retirement level of living. A method is proposed for empirically measuring both financial resources available for retirement and retirement needs. A comparison of financial resources for retirement to retirement needs is then used to identify individuals with adequate financial resources for retirement (resources greater than or equal to needs) and those whose financial resources for retirement are inadequate. A unique feature of this research is the use of panel data which allows us to access financial adequacy at the planned date of retirement, which may or may not coincide with the actual date of retirement, since inadequacy of financial resources at the planned retirement date may result in postponement of the actual retirement date. With respect

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to individual well-being, well-being is likely to be enhanced when one is able to retire as planned. Variation in financial adequacy for retirement across demographic subgroups of the population is examined. Multivariate analysis is used to further examine factors associated with financial adequacy for retirement.

## Background

*Related Literature*

*Life Cycle Hypothesis* The standard life cycle hypothesis associated with Modigliani and Brumberg (1954) is commonly used to analyze household consumption and savings behavior including saving for retirement. The simplest exposition of the life cycle model assumes maximization of lifetime utility, consumption smoothing, and decision making under certainty. An individual is assumed to know with certainty the date of retirement, the date of death, and future income and prices, including interest rates. Consumption smoothing implies that an individual strives to maintain a relatively stable level of consumption. During periods when consumption expenditure exceeds income, the individual borrows to finance consumption. During periods when income exceeds consumption expenditure, the individual saves. Capital markets are perfect so borrowing and saving are both possible at the same interest rate.

Under these conditions, the individual chooses a level of consumption which allows accumulation of wealth during the working years. The level of wealth peaks at the retirement date. Spending from the accumulated wealth finances consumption during retirement, and the wealth is exhausted at death. With respect to financial adequacy, the simple life cycle model implies equality of the financial resources accumulated for retirement and the financial resources needed for retirement at the point of retirement.

*Empirical Analysis of Financial Adequacy for Retirement* Two categories of empirical research on financial adequacy for retirement are relevant to this study. The first category of empirical studies uses savings adequacy as an indicator of how well an individual is prepared for retirement at the point of retirement. The second category of empirical studies focuses on developing an objective measure to directly estimate the amount of financial resources needed for retirement. Both categories of research assume consumption smoothing. This assumption implies that the level of consumption in any given period is a good proxy of the individual's desired level of consumption.

With respect to the first category of research, a variety of methods and data have been used to investigate savings adequacy. The results of these empirical studies have been mixed; some results suggest adequate levels of savings for retirement, while others suggest the levels of savings are inadequate. A study by Kotlikoff, Spivak and Summer (1982) used data from the 1969 to 1973 Retirement History Surveys and found adequate levels of savings. The annuitized value of financial assets at the point of retirement was used to estimate financial resources available for retirement. The annuitized value of current financial resources was used to estimate the preretirement consumption level. These two measures were then used to estimate the ratio of retirement resources to retirement needs. (A ratio of one would indicate resources equal to needs; ratios greater than one would indicate resources greater than needs, or financial adequacy). Nine-tenths of the sample had ratios greater than or equal to 0.8, and many had ratios of unity or higher. Based on the rule of thumb that approximately 70% of preretirement resources are needed to maintain consumption during retirement, the researchers concluded that savings levels were, on average, adequate.

Many of the studies which have concluded savings levels are adequate have, at the same time, illustrated the importance of income from Social Security and pensions to the financial status of the elderly. Diamond (1977) concluded that in the absence of Social Security, a substantial fraction of the population would be inadequately prepared for retirement. Kotlikoff et al (1982) found that nearly all the wealth possessed by the elderly was in Social Security, pensions and home equity. They concluded that in the absence of Social Security and pension income, consumption in old age relative to lifetime consumption would be about 40% lower on average (p. 1067).

Blinder, Gordon and Wise (1983) used the 1971 Retirement History Survey to indirectly measure savings adequacy. The proportion of lifetime wealth available for retirement was used to estimate financial resources available for retirement. The proportion of lifetime consumption which would occur during the retirement years was used to estimate retirement needs. These two measures were then used to estimate the ratio of retirement resources to retirement needs. The average ratio for the sample was .45, and the researchers concluded that savings levels were inadequate to meet retirement needs.

Hamermesh (1984) analyzed the spending patterns of retired households using the 1973 Retirement History Survey linked to Social Security records to obtain information on income. He computed the ratio of consumption to annuitized income to determine whether the elderly had sufficient income to sustain the current levels of consumption during retirement. (Ratios greater than one would indicate consumption needs in excess of available resources, or financial inadequacy.) He concluded that consumption on average was not sustainable; 54% of the retired households had consumption-to-income ratios of 1.1. Hamermesh also found that between 1973 and 1975, retired households reduced their real consumption by about 5 percent per year, evidence that the elderly respond to inadequate financial resources for retirement by reducing real consumption.

In the second area of related research, researchers have attempted to develop an objective measure to directly estimate the amount of financial resources needed for retirement. Empirical data has been used to estimate the percentage of preretirement gross income needed after retirement to maintain the preretirement level of living (replacement rate). Most of these empirical studies suggest that the percentage of preretirement gross income needed varies with income level.

Using the 1973 Consumer Expenditure Survey, Dexter (1984) incorporated taxes, savings rates, work-related expenditures and age-related changes in consumption to calculate replacement rates. Dexter's replacement rates decline consistently as income increases; estimates for married couples range from 82% for couples with preretirement income of $10,000, to 40% for couples with an income of $75,000. Palmer (1989) used the 1984 Consumer Expenditure Survey and, like Dexter, incorporated taxes, savings rates, work-related expenditures and age-related changes in consumption. Palmer's replacement rates which range from .66 to .82 decline with income up to the highest income category ($80,000) and then increase slightly.

*Conceptual Framework*
The conceptual framework for this study builds on the standard life-cycle hypothesis. Individuals are assumed to know the date at which they will retire and how long they will live, and to accumulate financial resources prior to retirement so that they will have sufficient resources to satisfy the financial needs of retirement. At the planned date of retirement, if the accumulated financial resources

are greater than or equal to the financial resources needed for retirement, the individual has adequate financial resources for retirement. On the other hand, if the accumulated financial resources do not exceed the financial resources needed for retirement, the individual has inadequate financial resources for retirement.

*Empirical Model*
To operationalize the conceptual model, it is necessary to first construct empirical measures of the accumulated financial resources and the needed financial resources for retirement. These two measures are then compared to determine whether the accumulated financial resources are adequate.

*Accumulated Financial Resources* Financial resources available for retirement are defined as the sum of the household's net worth and the present value of income streams from Social Security and other pension plans. Household net worth, as measured in this study, includes the value of home equity, other owned real estate, business assets, savings and checking accounts, savings bonds, money market accounts, stocks, bonds, mutual funds, and personal loans extended to others, less any liabilities. The present value of the income streams from Social Security and from defined benefit pension plans are calculated from information on the benefit level, the number of years spent in retirement, and the appropriate interest rates.[a] The present value of the income from defined contribution pension plans, assuming lump sum payments, equals the amount accumulated in the fund at the time of retirement.

*Needed Financial Resources* Financial resources needed for retirement depend upon the level of consumption desired during retirement and the cost of maintaining this level of consumption throughout the years in retirement. Based on the life-time consumption smoothing assumption of the life-cycle hypothesis, the preretirement level of consumption is assumed to represent the level of consumption desired during retirement. Based on previous research, the cost of maintaining this consumption level in the retirement years is assumed to be less than the cost prior to retirement. This is due to changes in marginal tax rates, reductions in work related expenses, and age-related declines in selected expenditure categories. Palmer's (1989) estimates of the fraction of preretirement gross income needed to maintain the desired level of consumption during retirement (i.e. replacement rates) are used in this study. Palmer's replacement rates were selected because they

incorporated the impact of age-related changes in taxes, savings rates, and work-related and consumption expenditures and they were the most recent estimates empirically derived from consumption data. Our empirical measure of needed financial resources is calculated using Palmer's replacement rates, information on household preretirement income and the number of years spent in retirement.

## Methodology

*Data*

The data used for the analysis are from the National Longitudinal Survey of Older Men (NLS,) sponsored by the Bureau of Labor Statistics, United States Department of Labor, and collected by the Center for Human Resource Research at The Ohio State University (Center for Human Resource Research, 1994). Data collection began in 1966 with a sample of 5,020 men selected to be representative of all American men born between 1907 and 1921; the sample has been followed over time. The survey collects information on work experience, retirement planning, health status, insurance coverage, and use of leisure time, as well as demographic information. The longitudinal nature of the data as well as the information collected make these data especially suitable for this study.

The unit of analysis for the study is male preretirees who planned to retire between 1970 and 1990. To be included in the study an individual had to indicate in the initial 1966 interview at what age they planned to retire. In addition, an observation could not have missing information on earned income; home equity; business assets; other real estate assets; checking/savings accounts; savings bonds; stocks, bonds and mutual funds; personal loans extended to others; or debt.[b] The final sample consisted of 972 observations (1,549 observations were dropped because the individuals did not indicate at what age they planned to retire, and 2,499 observations were dropped due to missing data on one or more of the income and asset variables).

*Dependent Variable*

When data were initially collected in the NLS during the 1966 personal interview, individuals were asked at what age they planned to retire. We use the longitudinal nature of the data to measure the individual's accumulated financial resources and the individual's needed financial resources *at the point in time when the individual planned to retire*. If the accumulated financial resources are greater than or equal to the financial resources needed for retirement, the individual is categorized as having adequate financial resources for retirement. Otherwise, the individual is categorized as having inadequate financial resources for retirement. The dependent variable for the analysis is an indicator variable equal to one if the individual has adequate financial resources for retirement, and zero otherwise. A probit model is used in the multivariate analysis since the dependent variable is dichotomous. A probit analysis computes the probability of an event taking into account the binary nature of the dependent variable (Amemiya, 1981; Maddala, 1983).

*Independent Variables*

The independent variables in the model act as predictors of the dichotomous dependent variable. A positive (negative) coefficient indicates that the variable increases (decreases) the probability of having adequate financial resources for retirement.

*Income* Total household income is used as a predictor of financial adequacy based on an assumption of resource sharing within households. Income is measured as the average of total household income in two adjacent pre-retirement years, and is a continuous variable. Higher income, ceteris paribus, provides more discretionary income, increasing the likelihood of saving, thus increasing the probability of having adequate financial resources for retirement. Linear and quadratic income terms are used in the multivariate analysis to allow for a nonlinear effect. Income is expected to have a positive but nonlinear effect on the probability of having adequate financial resources for retirement.

*Age at Initial Interview* The individual's actual age when interviewed in 1966 is coded as: 45 years or older, but less than 50; 50 years or older but less than 55; and 55 years or older. Age at initial interview is important for two reasons. First, the labor market experiences of the three age cohorts is likely to differ. The youngest cohort (men between the ages of 45 and 50 in 1966) may have benefitted more from the post war economic expansion relative to the oldest cohort since the expansion came at a much earlier time in their work life. Second, while it is reasonable to believe that all individuals selected for inclusion in the NLS (ages 45 to 59) were beginning to prepare for retirement, all else equal, the younger the individual, the more years available for retirement preparation. As the years available to prepare for retirement increase the probability that adequate financial resources will have accumulated by the planned

retirement date should also increase.

*Planned Retirement Age* In the initial personal interview in 1966, each individual was asked "At what age do you plan to retire?". Planned retirement age is coded as: plan to retire before age 60; plan to retire between ages 60 and 62; plan to retire between ages 62 and 65; plan to retire at age 65 or later. Planned retirement age is important for two reasons. First, the older the age at which the individual plans to retire, the more years he will have been in the labor force, thus increasing the probability of having adequate financial resources for retirement. Second, the types and amounts of retirement benefits available depend upon the age at which one retires. At age 60 full IRA benefits are available; at age 62 partial Social Security benefits are available; and at age 65 full Social Security benefits are available. For these reasons, the higher the planned retirement age, the higher the probability of having adequate financial resources for retirement.

*Assets and Liabilities* Eight dichotomous variables control for ownership of assets (home equity, business assets, other real estate, checking/savings account, savings bonds, stocks/bonds/mutual funds, personal loans to others, pension) and one dichotomous variable controls for holding debt. Each variable was coded one if the reported value of the respective asset was greater than zero. Ownership of each asset type is expected to have a positive effect on the probability of having adequate financial resources for retirement. Holding debt is expected to have a negative effect on the probability of having adequate financial resources for retirement.

*Health Status* The variable for health status was coded as one if the respondent's self-rated health in comparison to men of comparable age was good or fair. If the self-rating was poor, the variable was coded zero. Individuals in good health are more likely than those in poor health to accumulate resources through labor force participation. Therefore, good health is expected to have a positive effect on the probability of having adequate financial resources for retirement.

*Occupation* Occupation of the respondent based on the one-digit occupation code of the current or most recently held job, is coded as: professional/managerial, service, farmer, and other. Individuals employed in professional/managerial occupations are more likely to have good managerial skills thus increasing the probability of having adequate financial resources for

retirement.

*Education* Education measures the highest grade completed, and is coded as: did not graduate from high school, high school graduate, completed some college, college graduate or more. Education is likely to be positively correlated with planning skills, and thus is expected to increase the probability of having adequate financial resources for retirement.

*Marital Status* Marital status was coded as married or other which included never married, divorced, separated and widowed. Married individuals are more likely to be concerned about the financial stability of a family, and are thus expected to be more likely to have adequate financial resources for retirement.

*Race* Race was coded as white or non-white. On average, whites have higher net worth relative to non-whites, and are therefore expected to be more likely to have adequate financial resources for retirement.

**Findings and Discussion**
*Characteristics of the Sample*
The sample used in the analyses had 972 observations of which 451 (46.4%) had adequate financial resources for retirement (Table 1). Seventy-two percent of the sample was white, and nearly 60% of the sample had not graduated from high school. Over half (53.4%) the sample planned to retire at age 65 or older. Fifty-three percent of the sample self-rated their health as good or fair, and 85% of the sample was married. The most commonly owned assets were homes (78.2%) and checking/savings accounts (71.8%). Only 27.2% of the sample were covered by pension plans; and less than one-fifth of the sample owned stocks, bonds or mutual funds (22.8%) or held debt (19.1%).

*Bivariate Analysis*
Chi-square tests for independence were used to determine which between group differences in the probability of having adequate financial resources for retirement were statistically significant.[c] Statistically significant differences are indicated with a ^in Table 1. People who were white, in self-reported good health, high school graduates, employed as professionals/ managers or farmers, younger at the time of the first interview (under age 55 years), asset owners (with the exception of savings bonds), lived in households with total income under $22,000, and who planned to retire at age 65 or later were more likely to have adequate

financial resources for retirement. People who were not high school graduates, were employed in service occupations, were older at the time of the first interview (age 55 and over), planned to retire before age 65, lived in households with total income of at least $22,000, and held debt were less likely to have adequate financial resources for retirement. These bivariate associations look at two-way association and do not control for other factors associated with financial adequacy for retirement.

*Multivariate Analysis*

To control for other factors associated with financial adequacy for retirement, a multivariate analysis was conducted using a probit model (Table 2). The dependent variable for the analysis was an indicator variable equal to one if the individual had adequate financial resources for retirement, and zero otherwise. The McFadden R-square for the probit equation was .40 indicating that 40% of the variation in the dependent variable was explained by the estimated model (Amemiya, 1981; Maddala, 1983). Eighteen of the 25 independent variables were statistically significant at a p-value of .05 or less.

Many of the results from the bivariate analysis were confirmed in the multivariate analysis. Planned retirement age, owning assets (with the exception of savings bonds), and being white were all positively related to the probability of having adequate financial resources for retirement. Age at first interview, holding debt and employment in service occupations (relative to farming) were negatively associated with financial adequacy for retirement. In the multivariate analysis, self-reported good health, education, and employment in a professional/managerial occupation were not significantly associated with the probability of having adequate financial resources for retirement. The estimated coefficients on the linear and quadratic income terms were both statistically significant, indicating a nonlinear relationship between total household income and the probability of having adequate financial resources for retirement.

*Discussion*

For the whole sample, 46.4% of the individuals had adequate financial resources for retirement. The importance of planned retirement age is particularly strong in the bivariate results (Table 1). Only 9% of persons who planned to retire before age 60 had adequate financial resources compared to 33% of persons who planned to retire between ages 60 and 62, 52% of persons

who planned to retire between ages 62 and 65, and 62% of persons who planned to retire at age 65 or later. This is likely due to the reality that types and amounts of retirements benefits available depend upon the age at which one retires. At age 60 full IRA benefits are available; partial and full Social Security benefits are available at age 62 and age 65, respectively. The importance of planned retirement age is confirmed in the multivariate analysis. The probability of having adequate financial resources can be calculated for an individual, and will depend on the estimated coefficients in the probit model and the characteristics of the individual. To illustrate the impact of planned retirement age, the representative individual was defined to be a white, married, male high school graduate, in good health, employed in a professional/managerial occupation, who was a home owner, had a checking or savings account and a pension, and was age 45 to 50 at the initial interview. Total household income was set equal to the sample average. If an individual with these characteristics plans to retire at age 65 or later, the estimated probability that he will have adequate financial resources is 96%. The estimated probability is lower if he plans to retire between ages 62 and 65 (88%) or ages 60 to 62 (84%). However, if this same individual plans to retire before age 60, the estimated probability drops to 59%.

Both the bivariate and multivariate results confirm that income is an important factor associated with financial adequacy for retirement. However, the direction of the relationship is opposite that which was expected. In the bivariate results, over 50% of persons living in households with total income less than $22,000 had adequate financial resources compared to only 40% of persons living in households with total income of

Table 1

Sample characteristics and probability of financial adequacy for retirement

| | Frequency | Percent[a] | Percent[b] Adequate | Inadequate |
|---|---|---|---|---|
| Total | 972 | 100.0 | 46.4 | 53.6 |
| Total household income ^ | | | | |
| less than $13,500 | 241 | 24.8 | 54.4 | 45.6 |
| $13,500-$22,000 | 232 | 23.9 | 52.2 | 47.8 |
| $22,000-$34,000 | 265 | 27.3 | 40.4 | 59.6 |
| $34,000 or more | 234 | 24.0 | 39.3 | 60.7 |
| Age at first interview ^ | | | | |
| 45#age<50 | 249 | 25.6 | 53.4 | 46.6 |
| 50#age<55 | 380 | 39.1 | 52.1 | 47.9 |
| 55#age | 343 | 35.3 | 35.0 | 65.0 |
| Planned retirement age ^ | | | | |
| <60 | 122 | 12.6 | 9.0 | 91.0 |
| 60#age<62 | 146 | 15.0 | 32.9 | 67.1 |
| 62#age<65 | 185 | 19.0 | 37.8 | 62.2 |
| 65#age | 519 | 53.4 | 62.0 | 38.0 |
| Asset ownership | | | | |

| | | | | |
|---|---|---|---|---|
| **Home** ^ | | | | |
| Yes | 760 | 78.2 | 50.8 | 49.2 |
| No | 212 | 21.8 | 30.7 | 69.3 |
| **Business assets** ^ | | | | |
| Yes | 52 | 5.3 | 59.6 | 40.4 |
| No | 920 | 94.7 | 45.7 | 54.3 |
| **Other real estate** ^ | | | | |
| Yes | 208 | 21.4 | 57.2 | 42.8 |
| No | 764 | 78.6 | 43.5 | 56.5 |
| **Checking or savings account** ^ | | | | |
| Yes | 698 | 71.8 | 51.7 | 48.3 |
| No | 274 | 28.2 | 32.8 | 67.2 |
| **Savings bonds** | | | | |
| Yes | 196 | 20.2 | 44.9 | 55.1 |
| No | 776 | 79.8 | 46.8 | 53.2 |
| **Stocks, bonds or mutual funds** ^ | | | | |
| Yes | 222 | 22.8 | 60.4 | 39.6 |
| No | 750 | 77.2 | 42.3 | 57.7 |
| **Personal loans to others** ^ | | | | |
| Yes | 84 | 8.6 | 67.9 | 32.1 |
| No | 888 | 91.4 | 44.4 | 55.6 |
| **Pension** ^ | | | | |
| Yes | 264 | 27.2 | 80.3 | 19.7 |
| No | 708 | 72.8 | 33.8 | 66.2 |
| **Debt (non-housing or non-business)** ^ | | | | |
| Yes | 186 | 19.1 | 35.5 | 64.5 |
| No | 786 | 80.9 | 49.0 | 51.0 |
| **Occupation** ^ | | | | |
| Prof/Managerial | 199 | 20.5 | 59.8 | 40.2 |
| Service | 379 | 39.0 | 38.0 | 62.0 |
| Farmer | 92 | 10.7 | 59.8 | 40.2 |
| Other | 302 | 29.8 | 44.8 | 55.2 |
| **Education** ^ | | | | |
| Did not grad. HS | 574 | 59.1 | 42.0 | 58.0 |
| High school grad | 231 | 23.8 | 56.3 | 43.7 |
| Some college | 84 | 8.6 | 41.7 | 58.3 |
| Coll grad or more | 83 | 8.5 | 54.2 | 45.8 |
| **Good health** ^ | | | | |
| Yes | 511 | 52.6 | 53.4 | 46.6 |
| No | 461 | 47.4 | 38.6 | 61.4 |
| **Married** | | | | |
| Yes | 827 | 85.1 | 46.8 | 53.2 |
| No | 145 | 14.9 | 44.1 | 55.9 |
| **Race** ^ | | | | |
| White | 703 | 72.3 | 51.4 | 48.6 |
| Nonwhite | 269 | 27.7 | 33.5 | 66.5 |

^Chi-square test for independence was statistically significant, p<.05
[a] Column percents sum to 100   [b] Row percents sum to 100

$22,000 or more. The results of the multivariate analysis confirm the expected nonlinear relationship between income and the probability of financial adequacy, and provide more information about the nature of the relationship. The relationship between income and the probability of financial adequacy is negative for total household income below $70,360[d], after which the probability of having adequate financial resources for retirement increases with income. This result is due to the association of income with both the measure of *accumulated* financial resources and *needed* financial resources used to derive the measure of financial adequacy for retirement used in this research. Total household income is positively associated with accumulated financial resources since higher income, ceteris paribus, provides more discretionary income,

increasing the likelihood of saving. Total household income is also positively associated with needed financial resources since, in this research, needed financial resources are measured as a fraction of pre-retirement gross income. (The replacement rates used in this research vary with the level of household income, ranging from .66 to .82. The replacement rates decline with income up to income of $80,000 and then increase slightly.)

The empirical results suggest that for households with income below $70,360 the relative effect of increases in income on needed financial resources is larger than the relative effect of increases in income on accumulated financial resources, thus decreasing the probability of financial adequacy for retirement. For households with income of $70,360 or more, increases in income raise accumulated financial resources by more than the increase in needed financial resources, thus increasing the probability of financial adequacy for retirement.

Of all the asset ownership variables, pension ownership had the largest effect on the probability of having adequate financial resources for retirement.[e] Ownership of business assets had the second largest effect, although much smaller than the effect of pension ownership, followed by ownership of stocks/bonds/mutual funds, and home ownership.

Table 2
Probit Analysis of Financial Adequacy for Retirement

| Variable | Estimated Coefficient | p-value |
|---|---|---|
| Intercept | -2.0519 | 0.0001 |
| Income | -7.43E-5 | 0.0001 |
| Income squared | 5.28E-10 | 0.0001 |
| Age at first interview (reference: age 55 or older) | | |
| 45#age<50 | 0.9969 | 0.0001 |
| 50#age<55 | 0.2525 | 0.0002 |
| Planned retirement age (reference: less than age 60) | | |
| 60#age<62 | 1.0247 | 0.0002 |
| 62#age<65 | 1.3124 | 0.0001 |
| 65#age | 2.1164 | 0.0001 |
| Asset ownership | | |
| Home | 0.6834 | 0.0001 |
| Business equity | 0.7154 | 0.0030 |
| Other real estate | 0.3778 | 0.0104 |
| Checking or savings account | 0.4358 | 0.0037 |
| Savings bonds | -0.0692 | 0.6580 |
| Stocks, bonds or mutual funds | 0.7112 | 0.0001 |
| Personal loans to others | 0.4734 | 0.0347 |
| Pension plan | 1.1502 | 0.0001 |
| Debt | -0.3621 | 0.0179 |
| Occupation (reference: farmer) | | |
| Professional/Managerial | 0.0147 | 0.9499 |
| Service | -0.5506 | 0.0052 |
| Other | -0.4813 | 0.0171 |
| Education (reference: did not graduate from high school) | | |
| High school graduate | 0.0350 | 0.8198 |
| Some college | -0.1412 | 0.5433 |
| College graduate or more | -0.0981 | 0.7018 |
| Good health | 0.1381 | 0.2333 |
| Married | -0.0433 | 0.7932 |
| White | 0.3865 | 0.0091 |
| | | |
| Log Likelihood (N=972) | -403.3534 | |

With respect to occupation, nearly 60% of persons employed in professional/managerial occupations and in farming occupations had adequate financial resources compared to much smaller percentages of persons employed in service occupations (38%) and all other occupations (45%). The multivariate analyses confirm that persons employed in service occupations and persons employed in occupations other than professional/managerial and farming, are less likely than persons employed in farming (the reference category) to have adequate financial resources. There was no statistically significant difference between persons employed in professional/managerial occupations and persons employed in farming occupations in the probability of adequate financial resources. One explanation for the positive relationship between employment in farming and the probability of having adequate financial resources for retirement is the ownership by farmers of assets in the form of land and expensive farming equipment which would increase the

measure of accumulated financial resources in this research, thus increasing the probability of having adequate financial resources for retirement.

Some of the bivariate results were not confirmed in the multivariate analysis. For example, in the bivariate results persons in good health were more likely than persons in poor health to have adequate financial resources (53% versus 39%). However when other variables were controlled in the multivariate analysis, there were no significant differences by health status. With respect to education, a lower percentage of persons who had not graduated from high school (42%) and a higher percentage of persons who were high school graduates (56%) had adequate financial resources. When other variables were controlled in the multivariate analysis, education was not statistically significant. This result was surprising. One possible explanation may be that high school completion was not very common for this cohort (less than 40% of the sample had graduated from high school), and therefore the level of education may be picking up the effect of access to education, and may not be a good indicator of cognitive skills.

### Conclusions

The analysis suggests that men born between 1907 and 1921 were not well prepared financially to retire when they reached their planned retirement age. Only 46% of the sample had accumulated financial resources adequate to maintain their preretirement consumption level at the age by which they had planned to retire.

The multivariate results show that total household income, asset ownership, respondent's age at first interview, and expected retirement age are all significant factors affecting the probability of having adequate financial resources for retirement. The relationship between total household income and financial adequacy for retirement is "U-shaped". When total household income is less than $70,360, increases in income decrease the probability of financial adequacy for retirement. At levels of total household income above $70,360, the effect of income becomes positive. Asset ownership increases the probability of having adequate financial resources for retirement.

The empirical research confirms the importance of planned retirement age to financial adequacy for retirement. Individuals who plan to retire at age 65 or later are much more likely to accumulate adequate financial resources for retirement. Retiring at an older

age increases the number of years over which to accumulate labor market income, decreases the number of years spent in retirement, and affects, in very important ways, the types and amounts of retirement benefits available. The number of years available for retirement preparation (as measured by age at first interview when planned retirement age is controlled) also increases the probability of financial adequacy for retirement. A longer planning horizon for retirement allows more years over which to accumulate labor market income, more years over which owned assets can increase in value, and more years to engage in various retirement planning behaviors.

## Implications

This study provides evidence that a relatively large segment of the population is not accumulating resources which will be adequate to provide for consumption needs during retirement. The problem appears to be more severe among individuals who plan to retire before age 65. Inadequacy of financial resources may lead to decreases in the level of living or extent of financial security during retirement, or may necessitate re-entry to the labor force. Preretirees need to carefully and aggressively plan for their retirement. Financial planners and retirement counselors can help preretirees realistically assess their financial needs for retirement and develop financial strategies to yield adequate financial resources for retirement.

### Implications for Preretirees

Retirement from the labor force is an aspiration for most individuals today, but isn't usually realistic until a certain level of financial resources have been accumulated. In order to have financial security and enjoy the desired level of living throughout the retirement years, an adequate amount of financial resources must be available. Preretirees need to assess both the financial needs of retirement and the financial resources available for retirement. The financial needs of retirement will depend upon both the desired level of consumption during retirement and the number of years that will be spent in retirement. Individuals need to realistically estimate the number of years they will spend in retirement in the context of increasing life expectancy in the U.S.

The financial resources available for retirement include net worth as well as the income stream from retirement accounts, including Social Security and pension funds. The type and amount of financial resources available

from retirement accounts depends upon the age at which an individual retires. The availability of full benefits from both individual retirement accounts and Social Security depends upon age. Individuals who choose to retire early reduce the income stream from these sources.

### Implications for Financial Planners and Counselors

Successful retirement planning requires assessing both the financial needs of retirement and the financial resources available for retirement. Individual preretirees may initially find this task overwhelming. Financial planners and retirement counselors can put the task into perspective, helping preretirees work through each step of the process. Information on replacement rates and life expectancy can be used to help preretirees realistically assess their financial needs for retirement. Once retirement savings goals have been set, preretirees can be assisted in developing financial strategies to yield the needed resources for retirement.

Financial planners and retirement counselors can stress the importance of the age at which one retires; the availability of full benefits from both individual retirement accounts and Social Security are conditional on age. Individuals who opt to retire early reduce the income stream from these sources. Individuals who plan to retire early should be assisted in assessing their retirement needs and in evaluating the available financial resources relative to retirement needs.

This study also suggests that certain sub-groups of the population -- persons who are nonwhite, employed in service occupations, and who hold non-housing or non-business debt -- are less likely to accumulate adequate financial resources for retirement. We need to improve our understanding of why these sub-groups are at greater risk of inadequate preparation for retirement. The problem is likely to be more complicated than a simple lack of awareness of the importance of retirement planning (Malroutu & Xian, 1995). Carefully designed retirement planning assistance should be targeted at these "at-risk" populations. Pre-retirees need to *realistically* assess the time they will spend in retirement, their retirement needs, and the resources (Social Security, pension income and private savings) they are accumulating for retirement. The importance of aggressively planning for retirement, and starting the planning process early need to be emphasized.

## Endnotes

a *Information on the benefit level is included in the data set. The*

*number of years spent in retirement is estimated for each individual from information in the data set on the individual's planned retirement age and age-specific estimates of male life expectancy. The age-specific estimates of male life expectancy are taken from life tables which are routinely used in financial decision making, such as life insurance planning (U. S. Bureau of the Census, 1995). Since Social Security benefits are inflation indexed, the appropriate interest rate is the real interest rate. The appropriate interest rate for defined benefit pension plans is the nominal interest rate in order to account for the effect of inflation on the real purchasing power of the benefit.*

b *In survey data, missing values present a challenge; a researcher can throw out observations with missing data and preserve only complete observations, or impute values for the missing data and retain a larger proportion of the observations. In deleting observations, one is making an implicit assumption that those observations with missing data have the same variable distribution as those without missing data. In contrast, imputation utilizes the available information in the data set to generate estimates of the missing values. In this study imputation via regression equations is used to generate estimates of missing values for income from Social Security and pension accounts. (For more detail on the imputation procedure used refer to Li, 1996). However, imputation by regression could not effectively be used for missing values on the amount of earned income; home equity; business assets; other real estate assets; checking/savings accounts; savings bonds; stocks, bonds and mutual funds; personal loans extended to others; and debt. Observations with missing data for these variables were excluded from the analysis.*

c *The chi-square test statistic is constructed as $\Sigma\ (O_i - E_i)^2/E_i$ where $O_i$ and $E_i$ refer to the observed frequency and expected frequency, respectively for a given cell. When the chi-square test for a set of variables (i.e. education) was significant, pairwise tests for each category within the set were used to determine which differences were statistically significant. Test statistics for these chi-square tests are available from the authors.*

d *The level of income at which the income effect becomes positive is calculated by solving the following equation: -0.0000743 + 2 \* 0.000000000526 \* Income = 0 (using the estimated coefficients on the linear and quadratic income terms reported in Table 2). The solution to this equations is an income level of $70,360.*

e *The estimated coefficients in a Probit model must be transformed before their magnitude is interpreted. However, since the asset ownership variables are each a dichotomous variable, the relative magnitude of the coefficients on these variables can be compared.*

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