Investment Portfolios and Human Wealth

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The optimal proportion of a household's investment portfolio that should be in risky assets such as stocks depends on what proportion of total wealth, including human wealth, the investment portfolio represents. This article estimates the total wealth of households in the U.S. Survey of Consumer Finances, and finds that financial assets represent less than 2% of the total wealth of most households. Only the elderly are likely to have investment portfolios representing a high proportion of total wealth.
KEY WORDS: *household portfolios, investment, risk, wealth, stocks, Survey of Consumer Finance*

It is well known that higher rates of return may be obtained on investments by accepting greater risk. The best normative approach to analyzing risky choices is to view utility as a function of wealth. In evaluating choices under uncertainty, utility can be modeled as a function of wealth (Hanna, 1988). Wealth represents potential consumption for the rest of a consumer's life. Therefore, wealth should be defined to include both net worth and the present value of non-investment income, as both can be used for future consumption. This is consistent with Malkiel's (1990) suggestion that the portion of the portfolio for stocks should decrease as a person ages. As a person ages, human wealth (the present value of non-investment income) will decrease, and typically, net worth will increase. Therefore, the relationship between a household's investment portfolio should be considered.

Even a risk averse investor can increase expected utility by taking chances with a portion of his or her assets (Hanna, 1988). Hanna and Chen (1995) showed that all households should hold stocks if the time horizon is five years or more, and all of the investment portfolio should be in stocks if the portfolio represents less than 10% of total wealth, including human wealth. Their result is similar to Arrow's statement (1971, p. 100) that "... for small amounts at risk, the utility function is approximately linear, and risk aversion disappears." If the investment portfolio represents 10% of a household's wealth, then a 20% loss in the portfolio represents only a 2% loss in the household's total wealth.

Friend and Blume (1975) incorporated nonmarketable assets (human wealth) in the form of capitalized labor income until age 65 into a second measure of wealth, total resources, which is the sum of net worth and nonmarketable (human wealth) assets. In addition to the capitalized value of labor income to the age at which the respondent expected to retire, the capitalized values of social security income, pension income, and transfer payments were included in the measure of nonmarketable wealth (Friend & Blume, 1975).

Graham and Webb (1979) measured human wealth by calculating the present value of future earnings for the male population for 1969 using summary census data for 1950 and 1970 and detailed cross-sectional census data available in the Public Use Sample of the 1970 Census. They implemented this approach by equating expected returns with market earnings derived from cross-sectional earnings data for out-of-school males adjusted by growth rates that vary with levels of education. Both cross-sectional and time-series wealth profiles confirmed the notion that education is positively associated with wealth at all ages (Graham & Webb, 1979).

How important are investment portfolios of households in relation to net worth and human wealth? This paper presents the distribution of the ratio of financial assets to

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total wealth using an estimate of the human wealth of a national sample of households in the United States. The results show that financial assets, and therefore investment portfolios represent a very small portion of total wealth for most U.S. households. Therefore, based on Hanna and Chen's (1995) results, most households in the U.S. should have investment portfolios consisting entirely of stocks, especially in retirement funds.

Methods

Description of Data and Sample
The data used for the analysis are from a public use tape of the 1983 and 1986 Survey of Consumer Finances (SCF). The 1986 data are used only to estimate the average of 1982, 1983, 1984, and 1985 total household income. The Survey Research Center (SRC) of the University of Michigan conducted interviews for the 1983 Survey of Consumer Finances between February and August of 1983. The survey sample consists of 3,824 randomly selected U.S. households and a supplemental sample of 438 high-income households drawn from federal income tax files. The supplemental high-income sample provides better representation of the upper tail of the wealth distribution than that provided by most other surveys. In the summer of 1986, a limited telephone reinterview was conducted for 2,822 of the 1983 SCF respondents (Avery & Elliehausen, 1988).

Imputation
The problems of missing or inconsistent information make analysis of the raw data difficult and, depending on the pattern of errors, may bias conclusions. In order to eliminate these kinds of problems, a series of consistency checks and imputation procedures were developed at the Federal Reserve Board to clean the raw data and to estimate values for the missing data (Avery et al., 1984b). From the high-income sample, missing values for all observations were imputed. From the area probability sample, only 159 of the original 3,824 observations were discarded due to missing dollar amounts for all income and assets. Finally, all missing values for the remaining 3,665 observations were imputed (Avery & Elliehausen, 1986).

Sample Weight
The construction of weighting variables was necessary because of nonrandomness from inclusion of the high-income supplement drawn from Federal Income Tax files. In this study, the recommended full sample weight (B3016) is used. (Avery & Elliehausen, 1988).

The income adjustment is very slight for those area probability sample observations with incomes below $50,000. The observations from the area probability sample in the higher income strata have a more significant reduction in their weight. The high-income sample weight is given only for the high-income sample and gives relative sampling weights within that sample as computed by the IRS and the Office of Tax Analysis. The weight used in this study applies to the cleaned area probability sample and uses the 1983 post-stratification weight. It was constructed by post-stratification to the 1982 IRS tables using extended income (Avery & Elliehausen, 1988).

Sample
In this study, both the high-income sample (438 cases) and the area probability "cleaned" sample (3665 cases) are included. Native Americans were deleted from the sample because the sample size is too small (9 cases) to use for meaningful analysis. After deleting missing and invalid values, total sample size for this study is 2,691 households.

Measurement of Variables

Financial Assets: The total dollar amount of financial assets is the sum of checking accounts, money market accounts, saving accounts, IRAs, Keoghs, CDs, saving bonds, bonds, stock and mutual fund holdings and trust accounts owned by household.

Income: Average value of total household income of 1982, 1983, 1984, and 1985. All income values are adjusted using the Consumer Price Index (CPI) and are expressed in 1986 dollars before computing the average.

Composition of Total Income:
Total income was composed of income in wages and salary; income from a professional practice, business, or farm; income from non-taxable investments such as IRAs or municipal bonds; taxable interest income; dividend income; net gains from the sale of stocks/bonds or real estate; rent, trust income, or royalties from another investment; workers or unemployment compensation income; child support, alimony, inheritance, gifts, financial support; ADC, AFDC, food stamps, SSI, welfare, other public assistance; retirement, annuity, pension, disability, survivor benefits; and other income.

Wealth: In this study, wealth is defined as the sum of net worth and human wealth. Net worth is the value of assets minus liabilities. Human wealth is calculated as a present value of cumulative life time non-investment income (formula: Cissel, Cissel & Flaspohler, 1990).

Wealth = Net Worth + Human Wealth   (1)
Net Worth = Assets - Liabilities   (2)

Liabilities: Total real estate debt (house mortgage plus other property mortgages) + total other debt (consumer debt plus other debt.)

Assets: Total paper assets (sum of stocks and mutual funds, bonds, checking and savings accounts, IRA and Keogh accounts, money market accounts and CDs, profit sharing and thrift accounts, cash value of life insurance, and other financial assets, plus total real assets (sum of the current market value of the home, other properties, businesses, and vehicles.)

Human Wealth
For people who were not retired yet or whose expected retirement age is accurately reported or who have positive value of gross present value of social security and pensions,

$$HW = [NI*\{1-(1+r)^{(-a)}\}/r]+PP+PS \qquad (3)$$
where
NI: non-investment income until retirement
a: period between current age and expected retirement age (working years)
PP: gross present value of pensions (estimated by SCF)
PS: gross present value of Social security (estimated by SCF)
r: real interest rate

For people who were already retired or whose expected retirement age is uncertain,
$$HW = PP+PS \qquad (4)$$

For people who were not retired and who have no gross present value of Social Security and pensions,
$$HW = NI*\{1-(1+r)^{-b}\}/r \qquad (5)$$
where b: life expectancy

The real interest was estimated using the nominal rate of 10.85% (the rate on 1983 long-term U.S. government bond rate) and inflation rate of 4%, which are the rates used by SCF. Therefore, the real interest rate for the analysis is 6.59% which is ((1.1085/1.04)-1). No

information is reported as to whether the SCF used different life expectancy by race or sex (Avery & Elliehausen, 1988).

Non-Investment Income: Sum of income in wages and salary; income from a professional practice, business, or farm; workers or unemployment compensation income; ADC, AFDC, food stamps, SSI, welfare, other public assistance; disability, survivor benefits; and other income.

Non-investment income was measured by the average of 1982, 1983, 1984, and 1985 of non-investment incomes. Since non-investment incomes of 1983, 1984 and 1985 were not available, each year's non-investment income was estimated by each year's total income multiplied by proportion of non-investment income to total income of 1982. It was assumed that the household's real non-investment income until retirement would be the same as the average annual income from 1982 to 1985.

Life Expectancy
Life expectancy was determined by age, gender, marital status of the householder and race. Asians and non-black Hispanics were assumed to have the same life expectancy as Whites (American Council of Life Insurance, 1986). For unmarried householders, estimates of individual life expectancy by gender, age and race were used (Statistical Abstract of the United States, 1992). For married couples, the approximate joint life expectancy was calculated by adding 5 years to the life expectancy of the household head[3].

Investment Assets: Rather than identifying specific assets as investment assets, it was assumed that the portion of financial assets in excess of three months of average income (1982-1985) represented investment assets, or the investment portfolio.

Results
Sample Distribution
Table 1 shows the sample distribution of variables that were involved in estimating wealth. Except for age, life expectancy, and age of expected death, the mean values are higher than median values. The mean of life

[3] This method was based on the fact that the State Teachers Retirement System of Ohio sets the pension of a joint annuity (with 100% pension going to a surviving spouse) at approximately the same level as a single pension for a recipient 5 years younger.

expectancy, 35 years, is a reasonable value according to the mean value of expected death (81 years) and mean of age (46 years). A person at the mean value of age, 46 years old at the time of interview, would expect to die at the age of 81 years, so the value of life expectancy would equal 35 years (Table 1).

The median level of financial assets (Table 1), $6,500, is relatively low, especially considering it include retirement savings. The 75th percentile level for financial assets, $27,370, represents the dollar level for which 75% of the households fall below. Thus, 75% of the households had less than $27,370 in financial assets. The median level of net worth was $48,100, but 25% of the households had a level of net worth of $11,840 or less. The median level of human wealth was $177,150. The median level of total wealth (net worth plus human wealth) was $276,100. (It is in general *not* the case that the sum of medians equal the median of the sum, as the median will represent different households, so no addition or division should be attempted for different variables in Table 1).

The median level of the ratio of financial assets to total wealth was 1.3%, thus, for half of the households, financial assets represented less than 1.3% of total wealth (Table 1). The 75th percentile of this ratio was 5.7%, thus, for 75% of the households, financial assets represented less than 5.7% of total wealth. The 90th percentile of this ratio was 17.4%. Therefore, only for a small proportion of U.S. households did financial assets represent a high percent of total wealth.

This conclusion is even stronger if *investment portfolios* as a percent of total wealth are considered. Investment assets were defined as the amount by which financial assets exceeded three months of income. The ratio of investment assets to total wealth was 3% at the 75th percentile. Thus, for a large majority of households, what might be considered the investment portfolio represents a tiny percent of total wealth.

The elderly are more likely than the general population to have financial assets representing a high proportion of total wealth. Table 2 shows the distribution of total wealth and the ratios of financial assets and investments assets to total wealth for households headed by someone age 65 or older. The median level of wealth was $183,790. The median level of the ratio of financial assets to total wealth was 7.0%, compared to 1.3% for all households. The 75th percentile for the ratio was 19.8% for the elderly, compared to 5.7% for all households. The 90th percentile for the ratio was 40.2% for the elderly, compared to 17.4% for all households.

The median level of the ratio of investment assets to total wealth was 5.1%, compared to 0.0% for all households. The 75th percentile of this ratio was 17.2%, compared to 3.0% for all households. The 90th percentile for the ratio was 37.4% for the elderly, compared to 13.8% for all households.

Conclusions

Summary
A conservative estimate of human wealth was used to calculate total wealth of households. The ratio of financial assets to total wealth is small for most U.S. households. Fluctuations in financial wealth represent very small differences in the total wealth of most households. Therefore, investments in stocks may be rational for almost all non-elderly households, to the extent they can commit money to retirement and other long term goals (Hanna & Chen, 1995).

Relatively few households have enough financial assets to merit active management of investments. Only 10% of all households have $73,700 or more of financial assets. Therefore, the need for financial education is obvious.

If the stocks and other financial assets fluctuate substantially, there may be little impact on the total wealth of most U.S. households. A stock market decrease of 20% may represent a loss of only less than 1% for 75% of households, and less than 0.2% for most households.

Table 1
Distribution of Wealth, Financial Assets, Ratio of Financial Assets to Wealth, and Related Variables

Variables	mean	Percentiles				
		10%	25%	50%	75%	90%
Average Annual Income, 1982-1985	33,716	7,975	15,060	25,850	40,000	57,900
Non-Investment Income, 1982-1985	26,285	5,905	11,395	20,640	32,550	46,700
Financial Assets	38,171	125	975	6,500	27,370	73,700
Net Worth	147,875	1,495	11,840	48,100	117,200	279,500
Human Wealth	251,664	38,100	75,850	177,150	358,400	538,500
Total Wealth (Including Human Wealth)	399,395	68,600	143,650	276,100	481,500	725,500
Ratio of Financial Assets to Total Wealth	0.0644	0.0004	0.0024	0.0133	0.0569	0.1740
Ratio of Investment Assets* to Total Wealth	0.0489	0.0000	0.0000	0.0000	0.0301	0.1375
Age (years)	46	26	34	46	61	70
Life Expectancy (years)	35	16	23	36	46	52
Age of Expected Death (years)	81	76	80	81	83	86

*Investment assets defined as amount of financial assets beyond 3 months income (average of 4 years)
All figures reported are weighted; n=2,691

Table 2
Distribution of Wealth, Financial Assets and Ratio of Financial Assets to Wealth, for Households with Reference Person Age 65 and Over

Variables	mean	Percentiles				
		10%	25%	50%	75%	90%
Total Wealth (Including Human Wealth)	366,892	49,325	98,900	183,790	336,800	632,400
Ratio of Financial Assets to Total Wealth	0.1401	0.0005	0.0104	0.0701	0.1975	0.4016
Ratio of Investment Assets* to Total Wealth	0.1224	0.0000	0.0000	0.0512	0.1715	0.3735

*Investment assets defined as amount of financial assets beyond 3 months income (average of 4 years)

Implications for Future Research

This analysis should be repeated for more recent Surveys of Consumer Finance. Estimates of human wealth based on only one year of household income data should be made cautiously, however, as some households may have abnormally low income in a particular year. Some method of calculating future household income would improve the estimate of human wealth. In this article, household income was assumed to remain at the real level of the average annual income of 1982-1985, until the planned retirement age.

The appropriate interest rate to use to estimate human wealth is the real cost of capital for each household. For some households, the after-tax real rate of return on financial assets may be very low (e.g., 2%), and thus the real interest rate (6.59%) used to estimate human wealth may have produced an underestimate, perhaps by 50%

for some young households. For households with low levels of financial assets, the real interest rate on credit may be the appropriate interest rate to use. For some households with poor credit ratings, an interest rate of 30% or more might be appropriate for estimating human wealth, which would imply that the 6.59% rate used in this study would produce a substantial overestimate of human wealth.

It might be appropriate to use different interest rates for calculating the present value of non-investment income. In particular, using a different rate depending on the portfolio composition of the household might be appropriate. For instance, for a household with financial assets amounting to a month's income or more, the estimated after-tax real rate of return on the assets might be the best rate to use. For a household with very low or negative levels of net worth, the real interest rate on a

credit card might the correct rate to use. If this method were used, the estimates of human wealth would tend to be lower for young households and higher for older households.

The estimates of human wealth and total wealth presented in this article are conservative, because of the high interest rate used to calculate present value, and also because future income was assumed to remain constant in real terms until retirement. Therefore, actual human wealth of households is higher than the estimates presented, and the bias is higher for younger households than for older households. This bias strengthens the major conclusion: because financial assets represent such a small portion of total wealth for most non-elderly households, investments for long-term goals such as retirement should be primarily in stocks.

Implications for Investing

For households who rent and desire to buy a home, investing in stocks would probably be inappropriate for that saving goal, because the time horizon may be short. For households who have low levels of liquid assets, and therefore, are not prepared for emergencies (e.g., Chang & Huston, 1995), even investing in stocks for a retirement account may present problems. However, for households who can be confident that they will not need the funds in a retirement account for at least 5 years, investing all or most of their retirement fund contributions in stocks may be rational.

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