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The Association Between Financial Risk and Retirement Satisfaction

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Abstract

A higher level of risky financial assets that a retiree holds may produce higher returns, resulting in utility gains. To test this hypothesis, a variable is constructed measuring retirees' ratio of risky assets to total assets (risk ratio). Next, the association between the risk ratio and retiree utility is examined using a retirement satisfaction variable from the 1992-2014 waves of the Health and Retirement Study. The findings suggest that increases in retirees' risk ratio is associated positively with increases in their retirement satisfaction. The results and ensuing discussion offer a new perspective for retiree asset management.

JEL classification: D8

Keywords: Financial planning; Retirement satisfaction; Risk aversion

Introduction

Financing consumption in advanced age is paramount when planning for the transition into retirement. In the absence of non-labor income sources, such as Social Security income, pension income, and annuity income, retirees utilize their saved assets to finance consumption. Saved assets can take varying forms of financial risk, and the traditional "time-horizon" approach to asset management suggests shifting from risky assets to less risky assets when transitioning into retirement. However, risky assets, such as equities, have historically

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provided higher returns when compared with their less-risky alternatives, such as bonds, money market accounts, and CDs. Risky assets have the potential for higher returns and may provide retirees with more income to finance their consumption in retirement, and more income to finance consumption in retirement may lead to a more satisfactory retirement experience.

Retirement satisfaction is affected by many different factors, including a retiree's financial situation (Bonin et al., 2007; Diener et al., 2010; Seccombe & Lee, 1986), marital status (Easterlin, 2003; Van Solinge, 2008), health status (Barfield & Morgan, 1978; Price & Balaswamy, 2009), and pre-retirement feelings about retirement (Elder, 1999; Kimmel, 1978). Planning for retirement, reading about retirement, and exposure to radio or television programs about retirement also are significant correlates of retirement satisfaction (Dorfman, 1989; Taylor-Carter, 1997).

Many studies have analyzed how risk preference affects utility (Bachmann et al., 2017; Hanna & Chen, 1997; Pratt, 1964; Pålsson, 1996). However, most of these studies assume homogeneity in their sample and do not consider the structural-grouping differences among the population, such as how their results would apply to a retired sample. Analyzing risk preferences and retiree utility minimizes human capital and employment considerations that researchers argue should be considered when measuring risk preferences. For example, individuals with higher levels of human capital are more likely to have higher risk tolerance (Shaw, 1996), suggesting that human capital investment is an inverse function of risk aversion. Thus, the potential for human capital development may affect risk preference, as fully retired individuals will not invest in their human capital for purposes of future labor income.

There are a variety of ways to measure risk preference. One approach is question-derived assessments. However, risk-preference questionnaires may not be reflective of actual investment behavior (Bouchey, 2004; Corter & Chen, 2006; Yook & Everett, 2003). Objective risk tolerance, or an individual's ratio of risky financial assets relative to either their net worth or assets, is another measure used in a variety of studies (Cordell, 2002; Hanna & Chen, 1997; Sung & Hanna, 1996). Relative risk is another measure of risk preference. Relative risk provides a coefficient of individuals' level of risk relative to their total wealth and may be a better measure when conducting a comparative analysis (Dyer & Sarin, 1982).

The goal of this study is to measure the effect of the risk ratio on retirement satisfaction levels. This research question will help shed light on the association between risky asset holdings in retirement, relative to total wealth, and retirement satisfaction. We posit that assets with higher risk also come with the potential for higher returns, and higher returns provide retirees with more income to finance their consumption in retirement. Therefore, we hypothesize that a higher level of risky assets, relative to total wealth, may lead to higher retirement satisfaction.

Data

Longitudinal data that are collected from The Health and Retirement Study (HRS) are used for hypothesis testing.[1] The HRS is a household survey conducted by the Institute for

Social Research at the University of Michigan. The RAND HRS 2014 Fat File (V2A) is used, which includes the 1992-2014 waves.[2]

The sample only includes individuals who are fully retired. To focus solely on retirees, the subset of HRS respondents who answer "retired" when asked, "Are you working now, temporarily laid off, unemployed and looking for work, disabled and unable to work, retired, a homemaker, or what?" Respondents who state anything other than "retired," as well as incomplete responses, are dropped from the analysis. Respondents who state that they are retired, yet still reported earned income, are also dropped from the sample. This is done to ensure that the sample is fully retired and that the only income that the sample receives is non-labor income. The presence of labor income would add complexities to the analysis that are difficult to control for given the data limitations within the HRS. For example, the riskiness of labor income varies based on factors such as occupation and tenure, and there are either limited or no data available to control for these differences among respondents within the HRS.

Utility is measured as a retiree's level of retirement satisfaction. Retirement satisfaction is measured using the following question: "All in all, would you say that your retirement has turned out to be very satisfying, moderately satisfying, or not at all satisfying?" Using a Likert method, the observations are coded as 1 (*not at all satisfied* - 3,520), 2 (*moderately satisfied* - 20,234), and 3 (*very satisfied* - 35,640). The average satisfaction score is 2.54. This implies that "very satisfied" individuals were more likely to be found in the data and therefore selection bias might influence the results. The sample size is 17,672 and there are 59,404 observations.

The risk ratio variable

The risk ratio (RR) variable is constructed by dividing retirees' stock assets by their total wealth:

$$RR_{it} = \frac{TSEA_i}{\Sigma_{i=0}^{n}\left[(TSEA_i) + (TBEA_i) + (TCA_i) + \mathrm{E}(HE_i)\right]}$$

Where

$TSEA_i$ = Total Stock Equity Assets.

$TBEA_i$ = Total Bond Assets.

TCA_i = Total Market and Non-Market Cash Assets.

$\mathrm{E}(HE_i)$ = Summation of all residences – all mortgage liabilities.

Total stock equity assets (TSEA) are considered risky assets, which include the net value of stocks, mutual funds, and investment trusts. Total bond assets (TBEA) include the net value of bonds and bond funds. The market and non-market cash assets (TCA) include the net value of CDs, government savings bonds, T-bills, checking accounts, savings accounts and money market accounts.

Home equity is included as a riskless asset in the denominator. The results may be sensitive to the treatment of whether or not home equity is included as a riskless or risky asset (Hanna et al., 2001; Pålsson, 1996). Home equity is treated as a riskless asset for the reasons noted by Bellante and Green (2004). They suggest that home equity is riskless because the older segments of the U.S. population are more likely to own their homes and carry very little debt. Therefore, the low leverage levels provide a barrier to the effects of home-equity value fluctuations. It should be noted that housing debt has been increasing slightly among older Americans (Lusardi et al., 2018) since Bellante and Green's (2004) study. Additionally, home equity provides a hedge against systemic inflationary risks.

Human capital is a substantial part of an individual's wealth (Schultz, 1961). As noted in Hanna and Chen's (1997) study, human capital should be analyzed as a part of the total wealth portfolio when developing objective risk measures, such as the RR variable. However, human capital estimates are difficult to assess, with many of the methods under heavy academic scrutiny (Chenet al., 2004; Fitz-Enz, 2000; Mulligan & Sala-i-Martin, 2000). Because retirees are analyzed, it is assumed that they will not use their human capital for income nor invest in their human capital. Human capital, therefore, is assumed to have a value of zero for the retirees in the sample.

Retirees may consider their non-labor income sources when deciding on the level of risk of their saved assets. Thus, arguments could be made for the inclusion of the net present value (NPV) of pension, annuity, social security, and other non-labor incomes in the RR total-wealth denominator. The RR variable does not include the NPV of non-labor incomes because non-labor income is controlled for in the quantitative analysis.

Other variables

Dummy variables are created and coded with a value of "1" if the respondent is White, married, or male. A "0" is coded otherwise. Continuous variables are created to measure the retirees' age, non-labor income (income), non-housing wealth (wealth), and years of education. Nominal values are used for income and wealth. A categorical variable measuring health status also is created. The health status variable can take the following values: 1 (poor), 2 (fair), 3 (good), 4 (very good), and 5 (excellent).

Table 1 provides the descriptive statistics of the sample. The average RR is 0.09. The average age of the retirees in the sample is 73. The average income and wealth of the retirees are $49,720 and $187,068, respectively. Respondents in our sample are wealthier than average and, therefore, have more resources for consumption, which may be a possible explanation for why the mean retirement satisfaction score is 2.54 out of 3. Therefore, selection bias may be present. The sample includes 87.81% White retirees, 45.74% male retirees, and 61.11% of the retirees are married.

Table 2 provides a further breakdown of the descriptive statistics by retirement satisfaction levels. There is a positive relation between the RR variable and retirement satisfaction. Retirees being "not at all" satisfied, "moderately" satisfied, and "very" satisfied with their retirements have average risk ratios of 0.05, 0.07, and 0.11, respectively. Additionally, there

Table 1 Descriptive statistics of sample

	Mean	Standard error	Min	Max
Risk ratio	0.0905	0.1801	0	0.9999
Satisfaction	2.5405	0.6060	1	3
Age	73.4445	9.2105	50	106.6667
Education	12.6939	2.8713	8	17
White	0.8781	0.3271	0	1
Male	0.4574	0.4982	0	1
Health	3.0764	1.0948	1	5
Married	0.6111	0.4875	0	1
Income	$49,720	$85,822	$0	$7,307,860
Wealth	$187,068	$643,298	$0	$42,300,000

Note: N = 59,404 observations from 17,672 retirees.

is a positive relation between being "very satisfied" and higher levels of health, income, and wealth.

Method

To test the hypothesis, a random-effects ordered probit model is estimated on the unbalanced panel:

$$SAT_{it}^{*} = \beta_{0i} + \beta_1 RR_{it} + \beta_j DV_{it} + \alpha_i + e_{it}$$

$$\mathrm{SAT_{it}} = 1 \text{ if } SAT_{it}^{*} < \mu_1 \ (Not\ at\ all\ satisfied)$$

$$\mathrm{SAT_{it}} = 2 \text{ if } \mu_1 \leq SAT_{it}^{*} < \mu_2 \ (Moderately\ satisfied)$$

$$\mathrm{SAT_{it}} = 3 \text{ if } SAT_{it}^{*} \geq \mu_2 \ (Very\ satisfied)$$

where SAT_{it}^{*} is a latent measure of retiree i's satisfaction in wave t. The unknown thresholds, μ_1 and μ_2, are to be estimated.

Table 2 Summary of data by satisfaction measures

	"Not at all satisfied"	"Moderately satisfied"	"Very satisfied"
Respondents	3,530	20,234	35,640
Risk ratio	0.05	0.07	0.11
Health	2.10	2.78	3.34
Years of education	11.70	12.27	13.03
Age	69.90	73.61	73.70
White	0.81	0.86	0.90
Male	0.43	0.44	0.47
Married	0.51	0.55	0.66
Income	$32,926	$42,133	$55,689
Wealth	$69,911	$132,131	$229,867

Note: N = 59,404 observations from 17,672 retirees.

β_0 represents the y-intercept of the model. The intercept value for individual i is expressed as $\beta_{0i} = \beta_0 + e_i$, where i = 1,. . .,N and E(e_i) = 0 and Var(= σ_e^2). Below is the assumption concerning the composite error component:

$$e_i \sim N\left(0,\sigma_e^2\right)$$

$$E(e_i e_t) = 0 \text{ for } i \neq t$$

An ordered probit model is used due to the non-linear nature of the dependent variable. To the authors' knowledge, a reliable computation for a fixed-effects ordered probit model does not currently exist. Thus, a random effects model is utilized. If a fixed-effects estimator becomes available, future research should reconsider this study's findings to better understand how the with-in subject variation of the RR variable is associated with retirement satisfaction.

RR_{it} represents the risk ratio variable, RR, and β_1 is the coefficient associated with RR_{it}. It is expected that RR_{it} will result in a positive coefficient for the "very satisfied" category and a negative coefficient for the "moderately satisfied" and "not at all satisfied" categories. A positive coefficient for the very satisfied category would suggest that retirees are more likely to respond very satisfied if the risk of their saved assets is increased. A Granger Causality Test is utilized to test for reverse causality between SAT_{it}^* and RR_{it} (Granger, 1969). The results of the test suggest that there are no statistically significant reverse causality issues.

The matrix DV_{it} contains all of the demographic variables used as control variables in the model, including White, married, male, health, age, income, wealth, and years of education. β_j is the vector of coefficients related to the matrix DV_{it}. It is expected that higher levels of income, wealth, education, health, and being married will result in positive coefficients for the very satisfied category.

α_i is the unknown intercept for each retiree i. Average marginal effects provide the magnitudes for each of the effects on observed retirement satisfaction. The error term is assumed to follow a standard normal distribution.

Results

The average marginal effects from the random-effects ordered probit regression are reported in Table 3. As the RR_{it} variable increases from 0 to 1, the results suggest that the probability of retirees being very satisfied with their retirement increases by 0.0762. As the RR variable increases from 0 to 1, the results suggest that the probability of retirees being moderately satisfied and not at all satisfied with their retirement decreases by 0.0523 and 0.0239, respectively.

One consideration to note is that a higher RR means that a retiree has a higher percentage of assets held in stocks. Thus, stock returns may be endogenous in the estimated model. To adjust for the potential impact that stock assets may have on the results, annualized nominal

Table 3 Average marginal effects of the risk ratio on retirement satisfaction

	"Not at all"	"Moderately satisfied"	"Very satisfied"
Risk ratio	−0.0239* (0.0038)	−0.0523* (0.0084)	0.0762* (0.0122)
Health (poor as base outcome)			
Fair	−0.0633* (0.0036)	−0.0624* (0.0030)	0.1257* (0.0063)
Good	−0.0959* (0.0036)	−0.1263* (0.0036)	0.2222* (0.0065)
Very good	−0.1181* (0.0037)	−0.1963* (0.0045)	0.3145* (0.0071)
Excellent	−0.1275* (0.0038)	−0.2385* (0.0065)	0.3661* (0.0089)
Male (Female as base outcome)	0.0002 (0.0018)	0.0005 (0.0038)	−0.0007 (0.0056)
White (non-White as base outcome)	−0.0121* (0.0024)	−0.0529* (0.0052)	0.0387* (0.0076)
Married (non-married as base outcome)	−0.0242* (0.0016)	−0.0529* (0.0033)	0.0772* (0.0048)
Education	−0.0042* (0.0003)	−0.0092* (0.0006)	0.0133* (0.0009)
Age	−0.0012* (0.0000)	−0.0026* (0.0001)	0.0039* (0.0002)
Income (10k)	−0.0003* (0.0000)	−0.0006* (0.0001)	0.0009* (0.0002)
Wealth (10k)	−0.0001* (0.0000)	−0.0002* (0.0001)	0.0003* (0.0002)

Note: Significance is defined as follows: *significant at the one-percent level. Wealth and income means and standard errors reported in $10,000s. $N = 59{,}404$ observations from 17,672 retirees.

S&P 500 returns are included in a new model. The HRS data are biannual and therefore the S&P 500 data are biannual for each wave of the survey (refer to Table 4). The returns analyzed include both the returns generated from asset price changes and dividends.

A sensitivity analysis is conducted by including the series of S&P 500 returns as a variable in the random-effects regression. The average marginal effects are reported in Table 5. The results indicate that as the RR_{it} variable increases from 0 to 1, the probability of retirees being very satisfied with their retirement increases by 0.0223. As the RR_{it} variable increases from 0 to 1, the results suggest that the probability of retirees being moderately satisfied and not at all satisfied with their retirement decreases by 0.0135 and 0.0093, respectively. Although these results are still statistically significant, the new model has reduced the magnitude of the RR_{it} variable. It is important to note that satisfied individuals were more likely to be in the sample, and this possible selection bias might influence the results.

Table 4 S&P 500 returns

Wave (year)	S&P 500 return
Wave 1 (1992)	7.62
Wave 2 (1994)	1.32
Wave 3 (1996)	22.96
Wave 4 (1998)	28.58
Wave 5 (2000)	−9.10
Wave 6 (2002)	−22.10
Wave 7 (2004)	10.88
Wave 8 (2006)	15.79
Wave 9 (2008)	−37.00
Wave 10 (2010)	15.06
Wave 11 (2012)	16.00
Wave 12 (2014)	13.69

Note: Returns include both price changes and dividends generated the S&P 500 Index for the year analyzed.

Table 5 Average marginal effects of the risk ratio on retirement satisfaction including S&P 500 returns

	"Not at all"	"Moderately satisfied"	"Very satisfied"
Risk ratio	−0.0092* (0.0021)	−0.0135* (0.0032)	0.0223* (0.0053)
Health (poor as base outcome)			
Fair	−0.0694* (0.0034)	−0.0461* (0.0020)	0.1116* (0.0051)
Good	−0.1100* (0.0034)	−0.1037* (0.0027)	0.2137* (0.0054)
Very good	−0.1372* (0.0035)	−0.1676* (0.0037)	0.3048* (0.0061)
Excellent	−0.1492* (0.0037)	−0.2077* (0.0059)	0.3569* (0.0083)
Male (female as base outcome)	0.0008 (0.0021)	0.0013 (0.0029)	−0.0022 (0.0052)
White (non-White as base outcome)	−0.0277* (0.0026)	−0.0410* (0.0038)	0.0687* (0.0064)
Married (non-married as base outcome)	−0.0307* (0.0018)	−0.0455* (0.0026)	0.0762* (0.0044)
Education	−0.0050* (0.0003)	−0.0075* (0.0005)	0.0125* (0.0008)
Age	−0.0022* (0.0001)	−0.0032* (0.0001)	0.0054* (0.0002)
Income (10k)	−0.0006* (0.0001)	−0.0008* (0.0002)	0.0014* (0.0003)
Wealth (10k)	−0.0001* (0.0000)	−0.0002* (0.0000)	0.0003* (0.0001)
S&P 500 returns	0.0002* (0.0000)	−0.0003* (0.0000)	−0.0004* (0.0000)

Note: Probit model with random effects. Significance is defined as follows: *significant at the one-percent level. Wealth and income means and standard errors reported in $10,000s. $N = 59,404$ observations from 17,672 retirees.

Conclusions

The only financial resources available to fully-retired individuals are from saved assets and income from sources such as annuities, pensions, and government transfers. Aside from reentering the labor force, retirees have few options to increase their income in retirement. One-way retirees can increase income is from the management of their saved assets. For example, one option available to retirees is to convert their saved assets into non-labor income. Retirees often facilitate this by annuitizing their saved assets. However, this option may not be an optimal solution for retirees with bequest motives. In addition, illiquidity brought about by annuitization may decrease a retiree's ability to afford larger unexpected expenses, such as the occurrence of a health shock.

Increasing financial risk is potentially another option to increase retiree income. However, traditional asset management approaches advocate for the opposite, suggesting that retirees decrease financial risk in retirement. Most of these arguments are rooted in the traditional time-horizon asset management approach. This approach suggests that when a goal, such as retirement, approaches, individuals should transition their financially risky assets into less-financially risky assets. During the pre-retirement stage of the lifecycle, individuals should reduce risk in response to a decline in human capital. Because human capital resembles a "bond-like" asset, increasing bond exposure as an investor approaches retirement is a theoretically sound decision. The rationale behind glide paths within target date or lifecycle funds fits within this theoretical framework, as these funds reduce equity exposure and increase bond exposure as an individual approaches a retirement date.

Once a retiree exits the labor market, and the present value of future earnings from labor is zero, human capital is no longer a significant asset within a holistic portfolio, and a future reduction in portfolio risk may not be warranted from a theoretical standpoint. Absent human capital, there is not a strong theoretical rationale for the reduction of risk during the

retirement stage of the lifecycle. Instead, retirees should decide how much variation in asset returns and consumption they are willing to accept for a given level of risk. If retirees reduce the ratio of stocks held relative to total financial assets, it may decrease retirement satisfaction. On the other hand, assuming a retiree is willing to accept the risk of higher return variation, increasing the ratio of stocks in a portfolio may increase income for consumption and enhance satisfaction in retirement.

It is important to note that there is a potential downside to increasing portfolio risk for a retiree to achieve higher future returns. Higher portfolio risk should theoretically increase asset return variation, which may lead to greater uncertainty about consumption outcomes in the future. Enhancing portfolio risk may be a satisfactory investment solution if a retiree is willing to accept the possibility of higher consumption uncertainty in exchange for the potential for higher returns. However, if a retiree is not willing to bear additional portfolio risk for greater return potential in the future, then an increase in portfolio risk may not be appropriate. It is important for retirees, and their financial planners, to consider risk tolerance when making investment decisions. In this study, we only consider objective risk preferences in our analyses. Future studies should explore whether controlling for subjective risk preferences alters the association between stockholding and retirement satisfaction.

Notes

1 Health and Retirement Study, (RAND HRS 2014 Fat File (V2A)) public use dataset. Produced and distributed by the University of Michigan with funding from the National Institute on Aging (grant number NIA U01AG009740). Ann Arbor, MI, (2018).
2 RAND HRS 2014 Fat File (V2A). Produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (2018).

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