



Gender and Risk-Taking in the Building of U.S. Retirement Wealth

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Abstract The growing weight being placed on self-directed retirement accounts within the United States retirement income policy framework, and the time inconsistency challenge of individuals, particularly women, tending to under-invest in retirement savings accounts motivated the current work. Using data from the United States Federal Reserve Board’s Survey of Consumer Finances, for a period spanning from 1989 to 2019, 11 cross-sections of data, the paper investigated the role of gender in United States retirement risk-taking investment strategies of single (never married) individuals. The analysis documented increasing trends in the risk-taking of both single women and single men but recorded differences in the risk-taking profiles of the two groups, with single men taking more risk than single women in their retirement wealth building in most cross-sections, with the gender risk-taking gap dropping, nonetheless, algebraically in magnitude from 1989 to 2019.

Keywords Gender · Sex · Retirement investment · Single-person households · Financial risk-taking · Survey of consumer finances

JEL Classification G11 · J16 · J26 · D81 · D91

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Introduction

In an era of self-directed retirement plans, in which individuals and households are called more and more to make their own saving and investment retirement decisions, building retirement wealth proves to be one of the biggest financial challenges of adult life. In the United States (U.S.), the focus of the current work, the May 2020 report on the economic well-being of households in 2019 (Board of Governors of the Federal Reserve System, 2020, p. 4) stated that, “About one fourth of non-retired adults does not have any retirement savings, 60 percent think their retirement savings are not on track, while nearly 6 in 10 non-retirees with self-directed retirement accounts express discomfort in making investment decisions with their accounts.”

Retirement decision-making is a complex process and is studied extensively across different demographic groups. The demographic of this article’s interest is that of gender. By gender, the paper refers to the individual’s gender, male or female. According to the 2021 Federal Reserve System report about the economic well-being of U.S. households (Board of Governors of the Federal Reserve System, 2022a, p. 81), “Among those non-retirees with self-directed savings,” males appear more “comfortable managing their retirement savings” compared to females.

This does not come as a surprise. It is interesting to note that, historically, public policies around retirement programs were originally established to address poverty in retirement, and in particular, retirement income and poverty across gender lines (Meyer, 1990, p. 554). In the extensive review of Embrey and Fox (1997, pp. 33–34), women appear to take fewer risks in their investment than men, and this behavior systematically holds them back in their retirement wealth accumulation.

The situation seems more worrisome for single women. Levine et al. (1999) found gender differences in anticipated retirement income by comparing unmarried men and unmarried women. While controlling for the position in the life cycle stage, and education, Schmidt and Sevak (2006) reported large differences in observed wealth in the U.S. between single-female headed households and married couples, as well as evidence that the wealth holdings of single females are significantly lower than those of single men. Fisher (2010) investigated gender differences in personal saving behaviors among single person households, and found that single women with low risk tolerance were less likely to save, and when they did save, were less likely to choose assets that have greater growth over time, leaving them financially unprepared for retirement. This paper does not attempt to deify financial risk. On the contrary, caution is needed with financial risk and the volatility of returns. However, the work espouses that retirement investment risk-taking contributes to long-run return. For instance, Choi et al. (2004, p. 83) demonstrated that even automatic enrollment to 401 k(s) “at least temporarily anchors participants at a low savings rate and in a conservative investment vehicle.”

Furthermore, as a point of differentiation, the current paper studies the role of gender in risk-taking retirement strategies using extensive data for a period spanning from 1989 to 2019. Adding the time dimension to the analysis, contributes a unique perspective to the ongoing research and policy discussion since an

analysis over time has not been conducted before. Further, the focus is on single (never married) individuals. The singles' sample selection secures the most direct test of gender differences as set in the gender literature, (i.e., in Embrey & Fox, 1997). The research question for this paper is: After controlling for a series of observable factors, what has happened to single women's and men's retirement risk-taking from 1989 to 2019?

To answer the question, the paper utilized U.S. retirement data from the Survey of Consumer Finances (Board of Governors of the Federal Reserve System (2022b) from 1989 to 2019 consisting of 11 cross sections of data. Econometrically, the study conducted difference-in-means tests across gender in each of the Survey of Consumer Finances (SCF) waves, and further pooled the 11 cross-sections incorporating a set of control and time variables into a regression framework. In addition, other factors affecting retirement investments are covered. Next, the SCF, as well as the SCF retirement assets in the analysis are presented, the regression framework is developed, followed by the empirical results, findings and a policy discussion including future directions of the research.

Factors that Impact Retirement Investments

Besides gender, which is the focus of the work, a factor frequently regarded as affecting retirement investment is that of financial literacy. Lusardi and Mitchell (2014, p. 6) defined financial literacy as "people's ability to process economic information and make informed decisions about planning, wealth accumulation, debt, and pensions." Lusardi and Mitchell (2011) reported a clear interrelationship between financial knowledge and planning. Individuals who displayed higher financial literacy were more likely to plan and plan successfully.

Another factor is that of risk tolerance, which Grable (2000, p. 625) determined as "the maximum amount of uncertainty that someone is willing to accept when making a financial decision." The premise is that investors who tolerate higher risk tend to obtain higher returns over the long run. Yao et al. (2004) documented that households with very low risk-tolerance were unlikely to invest in stocks, and thus had greater difficulty achieving adequate retirement assets.

Another factor is age. In the majority of findings, the life-cycle theory of asset allocation prevails with individuals becoming more risk averse as they reach retirement, given that older individuals have less time to recover losses than younger ones, or since the need for fixed income increases. Säve-Söderbergh (2012) reported a hump-shaped relationship between risk taking and age with the youngest and oldest investors taking less risk than middle-aged investors. Nonetheless, for Yuh and Hanna (1997) it was younger people, in the 21–30 group, who took more risks in their retirement than people in the 31–40 and 41–50 age groups. According to Yuh and Hanna (1997, p. 3), the rationale is that people in the latter groups "tend to have short-term goals such as housing or college education for their children" and this made them "more conservative in their retirement investments."

Lastly, behavioral factors have been gaining more and more ground in explaining retirement investments. Benartzi and Thaler (2001) investigated diversification

strategies in defined contribution savings plans, and found evidence that participants made decisions that seemed to be based on naive (or confused) notions of diversification. Agnew (2006) provided evidence that some individuals were prone to behavioral biases, including allocation biases and a participation bias in individuals' 401(k) investments. Lastly, Foster (2017) reported that a lack of trust in retirement providers and a myopic view of pensions might explain young people's systematic retirement under-saving.

Survey of Consumer Finances

As already mentioned, the database utilized in this paper is the SCF (Board of Governors of the Federal Reserve System, 2022b). The SCF is a triennial interview survey of a nationally representative sample of U.S. families, sponsored by the Board of Governors of the Federal Reserve System with the cooperation of the U.S. Department of the Treasury. The SCF sample is not an equal-probability design. Thus, it is noted beforehand that this paper's statistics, such as means and medians as well as more complex statistics related to regressions, are sample weighted. The weight used is given in the SCF variable *X42001* (or *X42,001* in the latest SCF versions). Moreover, the paper used information from the first implicate of the five available implicates of the public data set.

The SCF is well regarded in the literature. For instance, Bajtelsmit et al. (1999, p. 4) characterized SCF as "the best available source of individual household wealth data collected in the U.S." For this paper, the SCF provided an elaborate compilation of retirement assets not easily available. More specifically, by retirement assets (*ra*), the paper, in line with Bhutta et al. (2020, p. 33), refers to: "401(k), 403(b), thrift savings accounts from current or past jobs" and "other current job plans from which loans or withdrawals can be made", as well as to individual retirement accounts (IRAs), Roth accounts, and Keogh accounts.

Table 1 presents the weighted mean retirement assets of single women and single men for each wave from 1989 to 2019, as well as weighted difference-in-means tests. From Table 1, it is deduced that in 10 of 11 SCF waves, single men possessed a higher dollar value in retirement assets than single women. Further, the difference was significant at the 1% level for the 1998 and 2004 SCF waves. Moreover, the difference was significant at the 5% level for the 2019 SCF, and marginally significant (10% level) for the 1995 and 2007 SCF waves.

Subsequently, this paper attempted to build risky retirement assets (*rra*). First, information was sought in the only investment question available in the SCF. It is noted that this question has several variations from SCF wave to SCF wave. For instance, in the 1989 SCF (Board of Governors of the Federal Reserve System, 1999, p. 88), the investment question is as follows: "How is the money in (this/these) account(s) invested? Is most of it in CDs or other bank accounts, most of it in stocks, most of it in bonds or similar assets, or what?"

By CDs, the reference was to certificates of deposit. Following this question, the respondents of the 1989 SCF were given the following options to select from:

Table 1 Weighted mean retirement assets & weighted difference-in-means tests of single women and single men from 1989 to 2019

SCF	Single Women	Single Men	Diff-in-Means	t-stat	p-value	Obs
1989	\$2,847	\$3,343	-496	-0.26	0.794	262
1992	4,818	3,995	823	0.61	0.543	453
1995	6,245	11,609	-5,364*	-1.72	0.085	561
1998	8,529	18,682	-10,153***	-2.80	0.005	561
2001	14,094	16,071	-1,977	-0.37	0.715	541
2004	8,492	22,824	-14,332***	-2.57	0.010	555
2007	19,061	31,329	-12,268*	-1.73	0.084	485
2010	15,024	56,382	-41,358	-1.52	0.128	345
2013	21,898	22,149	-251	-0.05	0.964	873
2016	27,880	31,698	-3,818	-0.41	0.683	909
2019	23,291	37,318	-14,027**	-2.21	0.027	923

Data sources: Survey of Consumer Finances (Board of Governors of the Federal Reserve System, 2022b)

*The difference-in-means is significantly different from zero at the 10% level

**The difference-in-means is significantly different from zero at the 5% level

***The difference-in-means is significantly different from zero at the 1% level

1 = CDs/bank accounts, money market; 2 = stocks, mutual funds; 3 = bonds/similar assets, T- bills, Treasury notes; 4 = combination of 1, 2, and 3, mixed/diversified, 5 = combination of 2 and 3; 6 = combination of 1 and 2; -7 = other; and 0 = inappropriate. Continuing with the SCF waves, the available options offered to the respondents increased, however, the qualitative character of the available responses remained.

To proxy riskiness in this framework, the paper consulted other approaches in the literature. In particular, the works by Yuh and Hanna (1997), Jianakoplos and Bernasek (1998), and Chang et al. (2018) were studied. All these authors worked with assigning riskiness weights to each option. For instance, for the 1989 SCF, for retirement assets invested in “stock; mutual funds”, Yuh and Hanna (1997, p. 8) assigned a riskiness weight of 1.0, while for retirement assets invested in CDs/bank accounts, money market or bonds/similar assets, T-bills, Treasury notes, a weight of 0.0 was assigned. Similarly, the authors assigned a riskiness weight riskiness of 0.33 to the retirement assets invested in the first combination, and a 0.5 weight to both the second and third combinations. All research sources consulted followed similar courses of action.

In this paper’s approach, weights were likewise assigned, quantifying a pool of risky retirement assets (*r_{ra}*) for each SCF wave. We acknowledge that this methodology is subject to a degree of arbitrariness but given the information available, we deem the approach rational, and in accordance with the theory of a diversified portfolio (Markowitz, 1952, p. 77). The paper’s assigned weights for each SCF wave are available upon request.

Lastly, the paper built the risky share of retirement plans or risky retirement ratio (*r_{rr}*), as defined by the ratio of total retirement assets (*r_a*) invested in risky retirement assets (*r_{ra}*). Table 2, presents the weighted mean *r_{rr}* of single women and men from 1989 to 2019. In nine SCF waves, single men had higher risky retirement ratios

Table 2 Weighted mean risky retirement ratios & weighted difference- in-means tests for single women and single men from 1989 to 2019

SCF	Single Women	Single Men	Diff-in-Means	t-stat	p-value	Obs
1989	0.52	0.37	0.15	1.24	0.220	58
1992	0.46	0.59	-0.13	-1.57	0.118	120
1995	0.52	0.59	-0.07	-1.04	0.301	157
1998	0.62	0.60	0.02	0.30	0.762	191
2001	0.63	0.79	-0.16***	-3.04	0.015	190
2004	0.45	0.59	-0.14**	-2.01	0.046	181
2007	0.38	0.56	-0.18	-1.59	0.114	169
2010	0.54	0.60	-0.06	-1.43	0.155	300
2013	0.50	0.57	-0.07*	-1.68	0.094	286
2016	0.53	0.62	-0.09***	-2.60	0.010	327
2019	0.59	0.59	0.00	-0.11	0.916	859

Data sources: Survey of Consumer Finances (Board of Governors of the Federal Reserve System, 2022b)

*The difference-in-means is significantly different from zero at the 10% level

**The difference-in-means is significantly different from zero at the 5% level

***The difference-in-means is significantly different from zero at the 1% level

than single women. Furthermore, the differences in risky retirement shares were significant at the 1% level in the 2001 and 2016 SCF, at the 5% level in the 2004 SCF, marginally significant (10% level) in the 2013 SCF and very slightly beyond the 10% level in the 1992 SCF and the 2007 SCF. Thus, it could be stated that significant and marginally significant differences were documented in 4 (almost 6) of the 11 waves under study. Interestingly, in the latest 2019 SCF, female and male ratios converged. This might be random, but it could also be the beginning of a newer pattern, and it is worth continuing this investigation.

A Regression Framework in the SCF

Next, the paper used a regression model to explain rrr with the help of a series of factors. The suggested framework for every respondent k , is given in Eq. (1).

$$\begin{aligned}
 rrr_k = & \beta_0 + \beta_1 * \ln wealth_k + \beta_2 * kids_k + \beta_3 * homeowner_k \\
 & + \sum_{i=1}^{i=10} \gamma_i age_{ik} + \sum_{j=1}^{j=4} \delta_j race_{jk} + \sum_{q=1}^{q=4} \lambda_q tolerance_{qk} + u_k
 \end{aligned} \quad (1)$$

By *wealth*, the liquid net worth of the respondents was assumed, and the paper followed the methodology of Friend and Blume (1975, pp. 906–907), who presumed indivisibility and transactability of assets. The paper also followed the Federal Reserve System algorithm (Board of Governors of the Federal Reserve System, 2022b) for the net worth computation. For the rest of the explanatory variables, *kids* referred to the

number of people 18 years or younger in the household, and *homeowner* was a dummy variable indicating whether or not the respondent was homeowner. It is noted that the paper followed the SCF documentation (Bhutta et al., 2020, p. 8, footnote 13) since “a family was considered a homeowner if at least one person in the family owns at least some part of the family’s primary residence.”

Next, *age* was a set of dummy variables indicating into which of 10 age categories the respondent fell, and *race* was a set of dummy variables indicating into which of four race categories the respondent fell. Lastly, *tolerance* indicated which of four statements of financial risk came closest to the amount of financial risk that the respondent was willing to take when saving or making investments: 1. “take substantial financial risks expecting to earn substantial returns”, 2. “take above average financial risks expecting to earn above average returns”, 3. “take average financial risks expecting to earn average returns”, 4. “not willing to take any financial risks.”

In Tables 3 and 4, the weighted mean values of all the independent variables previously discussed for single women and single men, respectively, and for all the SCF waves from 1989 to 2019 are presented. A very interesting finding arose from the observation of the mean responses of the risk tolerance question. In particular, although the financial risk tolerance question was a hypothetical question, single women’s higher pre-disposition towards selecting “No Risk” as a response in their intended investments, and similarly, single men’s higher pre-disposition towards selecting “Above Average” and “Substantial Risk” options were noteworthy.

Next, given that the focus of the paper is on the time period analysis, the model of Eq. (1) was used in a pool created by combining the 11 waves from 1989 to 2019. Each wave was treated as a random sample. Thus, the resulting pool was treated as an independently pooled cross-section. Following Wooldridge, (2013, p. 449), this facilitated an increased sample size and more precise estimators and test statistics with more power. Further, to reflect the likelihood that the population may have different distributions in different time periods, the intercept in Eq. (1) was allowed to vary across each SCF period. To accomplish this, year dummy variables were included for all but one periods, with the earliest wave of 1989 serving as the base.

The analysis focused on the pattern of coefficients for the year dummy variables, since it could help answer whether, after controlling for a series of factors, risk-taking in retirement assets for women and men changed over time. Lastly, since *rrr* could only take values between zero and one, a maximum likelihood Tobit regression procedure was used for the estimations, which allowed for both an upper and lower bound.

Empirical Results

Tobit Regression I

For the purposes of the data analysis, Stata/SE 17.0 was used. Table 5 presents the regression results after running the Tobit model separately for single women and for single men. Regarding the Tobit specification, it is noteworthy that the conditional mean of the dependent variable is: $\Phi(x\hat{\beta}/\hat{\sigma})x\hat{\beta} + \hat{\sigma}\varphi(x\hat{\beta}/\hat{\sigma})$ as described by Greene (2003, Chapter 19, p. 849). Thus, the marginal effects of the explanatory

Table 3 Weighted descriptive statistics for single women 1989–2019

	1989	1992	1995	1998	2001	2004	2007	2010	2013	2016	2019
<i>wealth</i>	14,111	21,330	22,155	29,553	41,852	37,174	111,368	48,565	43,137	45,919	83,762
<i>kids</i>	0.64	0.60	0.64	0.63	0.78	0.64	0.72	0.67	0.68	0.73	0.63
<i>homeowner</i>	0.15	0.31	0.26	0.29	0.31	0.31	0.28	0.32	0.35	0.28	0.26
<i>age</i>											
≤ 25	0.38	0.23	0.23	0.29	0.23	0.25	0.27	0.26	0.21	0.20	0.21
26–30	0.20	0.20	0.20	0.19	0.20	0.19	0.19	0.20	0.19	0.17	0.18
31–35	0.14	0.16	0.16	0.14	0.15	0.11	0.15	0.14	0.15	0.14	0.16
36–40	0.10	0.14	0.15	0.11	0.12	0.14	0.10	0.09	0.10	0.12	0.11
41–45	0.08	0.08	0.09	0.11	0.10	0.12	0.10	0.07	0.09	0.09	0.10
46–50	0.05	0.07	0.07	0.06	0.11	0.05	0.07	0.10	0.07	0.06	0.07
51–55	0.01	0.04	0.04	0.04	0.05	0.08	0.04	0.07	0.08	0.10	0.06
56–60	0.03	0.03	0.01	0.03	0.02	0.03	0.03	0.04	0.05	0.07	0.06
61–65	0.01	0.01	0.01	0.01	0.00	0.02	0.03	0.03	0.04	0.04	0.03
> 65	0.01	0.03	0.03	0.02	0.04	0.02	0.01	0.01	0.02	0.01	0.02
<i>race</i>											
white	0.48	0.51	0.53	0.59	0.50	0.51	0.47	0.45	0.47	0.40	0.46
black	0.37	0.33	0.38	0.29	0.35	0.37	0.36	0.33	0.35	0.40	0.39
hispanic	0.08	0.11	0.05	0.07	0.10	0.10	0.13	0.18	0.13	0.14	0.11
other	0.06	0.06	0.03	0.04	0.05	0.02	0.03	0.04	0.05	0.06	0.04
<i>tolerance</i>											
substantial	0.04	0.04	0.05	0.04	0.05	0.03	0.01	0.03	0.04	0.04	0.03
above average	0.09	0.07	0.13	0.15	0.15	0.13	0.16	0.10	0.16	0.14	0.11
average	0.39	0.34	0.35	0.36	0.35	0.33	0.33	0.34	0.33	0.40	0.43
no risk	0.45	0.55	0.48	0.44	0.45	0.51	0.49	0.53	0.47	0.42	0.43
observations	120	224	238	268	287	288	233	475	431	452	417

Data sources: Survey of Consumer Finances (Board of Governors of the Federal Reserve System, 2022b)

Table 4 Weighted descriptive statistics for single men 1989–2019

	1989	1992	1995	1998	2001	2004	2007	2010	2013	2016	2019
<i>wealth</i>	63,689	51,690	76,476	87,423	99,579	127,896	113,250	111,214	125,581	202,362	110,361
<i>kids</i>	0.00	0.00	0.06	0.07	0.03	0.06	0.11	0.06	0.06	0.06	0.10
<i>homeowner</i>	0.28	0.25	0.31	0.28	0.29	0.38	0.39	0.37	0.31	0.30	0.32
<i>age</i>											
≤ 25	0.31	0.27	0.25	0.28	0.31	0.30	0.26	0.26	0.29	0.27	0.20
26–30	0.26	0.27	0.26	0.18	0.19	0.17	0.16	0.24	0.18	0.18	0.19
31–35	0.11	0.15	0.18	0.14	0.13	0.14	0.09	0.19	0.12	0.17	0.14
36–40	0.16	0.11	0.11	0.12	0.10	0.12	0.10	0.13	0.06	0.07	0.12
41–45	0.06	0.07	0.09	0.14	0.12	0.08	0.13	0.10	0.09	0.08	0.07
46–50	0.02	0.04	0.06	0.05	0.05	0.08	0.12	0.12	0.09	0.06	0.05
51–55	0.05	0.03	0.01	0.05	0.04	0.06	0.07	0.08	0.06	0.06	0.09
56–60	0.01	0.02	0.01	0.03	0.03	0.02	0.05	0.06	0.07	0.07	0.07
61–65	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.04	0.03	0.02	0.03
> 65	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.02	0.02	0.02	0.04
<i>race</i>											
white	0.73	0.71	0.75	0.80	0.74	0.68	0.64	0.68	0.65	0.60	0.58
black	0.14	0.14	0.14	0.12	0.12	0.16	0.16	0.14	0.15	0.15	0.20
hispanic	0.05	0.09	0.05	0.04	0.08	0.11	0.12	0.12	0.14	0.14	0.15
other	0.08	0.06	0.06	0.03	0.06	0.05	0.07	0.06	0.06	0.11	0.09
<i>tolerance</i>											
substantial	0.11	0.07	0.07	0.09	0.11	0.08	0.05	0.08	0.04	0.08	0.08
above average	0.16	0.18	0.23	0.26	0.26	0.23	0.24	0.20	0.22	0.26	0.29
average	0.41	0.47	0.41	0.40	0.40	0.39	0.38	0.35	0.39	0.34	0.38
no risk	0.32	0.28	0.29	0.25	0.22	0.30	0.33	0.37	0.35	0.32	0.26
observations	121	205	216	254	215	245	223	415	386	403	442

Data sources: Survey of Consumer Finances (Board of Governors of the Federal Reserve System, 2022b)

variables (both continuous and discrete) required some adjustment in their computation. To account for this, the paper followed Cameron et al. (2010, p. 529).

Next, a Wald test adjusted for the use of sample weights was used to examine whether the estimated equations between single women and single men were significantly different. The adjusted Wald test revealed that the estimated equations for single women and single men were significantly different ($\chi^2(28) = 41.90$ and $\text{Prob} > \chi^2 = 0.030$).

From Table 5, it was deduced that for single women, the signs of the coefficients for the year dummy variables showed mixed results, since in six out of ten SCF waves, an increase in female retirement risk-taking was observed in comparison with the base year of 1989, while in four out of ten SCF waves, a decrease in female retirement risk-taking was observed with respect to the base year. It was noteworthy that arithmetically, particularly for the SCF waves showing a decrease in female retirement risk-taking the coefficients were very small and insignificant.

It is stressed that since the analysis controlled for a series of factors, the coefficients on $y95$, $y98$, $y01$, $y10$, $y16$, and $y19$ represented increases in risk-taking in retirement strategies for single women for reasons that were not captured in the explanatory variables. Also, all year dummy variables were individually insignificant, but jointly significant. For single men, the results revealed a clearer pattern. The coefficients on the year dummy variables, showed a consistently positive trend in retirement risk-taking over time. Further, almost all year dummy variables were highly significant ($p < 0.05$ or $p < 0.01$), both individually and jointly.

With respect to *wealth*, other things being equal, the effect of additional wealth on retirement risk-taking was positive for single women but negative for single men. However, the numerical affect was very close to zero and insignificant for both groups. With respect to *kids*, the presence of one dependent increased retirement risk-taking in single women but the effect was not significant. On the contrary, the presence of one dependent, holding all other factors fixed, significantly decreased retirement risk-taking in single men.

With respect to *homeownership*, being a homeowner, holding everything else constant, increased retirement risk-taking for both groups. Nonetheless, the corresponding effect was marginally significant (10% level) for single men and insignificant for single women. With respect to *race*, other things being equal, black single women took fewer retirement risks than white single women, but the effect was not significant. Black single men took fewer retirement risks than white single men, but the effect in this group was marginally significant (10% level). With respect to *age*, for both single women and single men, all age groups took lower retirement investment risk than the base group of less than 25. This result seemed in accordance with those researchers who argued that it was younger investors who were more prone to retirement risk-taking than the older investors (e.g., Yuh & Hanna, 1997, p. 3).

Table 5 Weighted tobit regression results run separately for single women and single men in pooled data from 1989 to 2019

Dependent Variable: <i>rrr</i>		
	Single Women	Single Men
<i>ln(wealth)</i>	0.004	-0.013
<i>kids</i>	0.014	-0.209*** ^a
<i>homeownership</i>	0.034	0.082*
<i>age</i> (Base Group: less than 25)		
26–30	-0.076	-0.125*
31–35	-0.034	-0.097*
36–40	-0.072	-0.188*** ^a
41–45	-0.117*	-0.259***
46–50	-0.099*	-0.094
51–55	-0.159*	-0.177*
56–60	-0.159*	-0.125
61–65	-0.287**	-0.087
Over 65	-0.318**	-0.554***
<i>race</i> (Base Group: white)		
black	-0.039	-0.119*
hispanic	0.064	0.093
other	-0.023***	0.127* ^a
<i>tolerance</i> (Base Group: substantial risk)		
above average risk	-0.027	-0.077
average risk	-0.118	-0.254***
no risk	-0.309***	-0.436***
Time Variables		
<i>y92</i>	-0.020	0.427*** ^a
<i>y95</i>	0.040	0.424*** ^a
<i>y98</i>	0.206	0.381***
<i>y01</i>	0.174	0.672*** ^a
<i>y04</i>	-0.022	0.326*** ^a
<i>y07</i>	-0.037	0.256*
<i>y10</i>	0.075	0.352***
<i>y13</i>	-0.002	0.321***
<i>y16</i>	0.052	0.370***
<i>y19</i>	0.144	0.356***
constant	0.691***	0.757***
sigma hat	0.509	0.544
Observations	1,081	1,142

Data sources: Survey of Consumer Finances (Board of Governors of the Federal Reserve System, 2022b)

*Significantly different from zero at the 10% significance level

**Significantly different from zero at the 5% significance level

***Significantly different from zero at the 1% significance level

Table 6 Weighted tobit regression results run jointly for single women and single men in pooled data from 1989 to 2019

Dependent Variable: <i>rrr</i>	
	Single Women & Single Men
<i>ln(wealth)</i>	-0.009
<i>kids</i>	-0.022
<i>homeownership</i>	0.033
<i>age</i> (Base Group: less than 25)	
26–30	-0.061
31–35	-0.023
36–40	-0.089*
41–45	-0.146***
46–50	-0.064
51–55	-0.102*
56–60	-0.064
61–65	-0.095
Over 65	-0.305***
<i>race</i> (Base Group: white)	
black	-0.048
hispanic	0.053
other	-0.004
<i>tolerance</i> (Base Group: substantial risk)	
above average risk	-0.026
average risk	-0.160***
no risk	-0.354***
<i>female</i>	0.145
Time Variables	
<i>y92</i>	0.354***
<i>y95</i>	0.303***
<i>y98</i>	0.368**
<i>y01</i>	0.577***
<i>y04</i>	0.269***
<i>y07</i>	0.200*
<i>y10</i>	0.309***
<i>y13</i>	0.274***
<i>y16</i>	0.309***
<i>y19</i>	0.316***
Interactions	
<i>female*y92</i>	-0.364**
<i>female*y95</i>	-0.187
<i>female*y98</i>	-0.095
<i>female*y01</i>	-0.319*
<i>female*y04</i>	-0.233

Table 6 (Continued)

Dependent Variable: <i>rrr</i>	
<i>female</i> *y07	-0.182
<i>female</i> *y10	-0.160
<i>female</i> *y13	-0.207
<i>female</i> *y16	-0.217
<i>female</i> *y19	-0.107
constant	0.643***
sigma hat	0.521
Observations	2,223

Data sources: Survey of Consumer Finances (Board of Governors of the Federal Reserve System, 2022b)

*Significantly different from zero at the 10% significance level

**Significantly different from zero at the 5% significance level

***Significantly different from zero at the 1% significance level

Tobit Regression II

Table 6 presents the regression results after running the Tobit regression jointly for single women and single men in the pooled SCF data from 1989 to 2019. Here the dummy variable *female* was included to capture the gender effect, and at the same time, *female* was interacted with each time variable. By adding the interactions *female**y92, *female**y95, ..., the relationship between *rrr* and *female* was allowed to vary in each year.

With regards to the gender effect results, in 1989 (the base year), other things being equal, a single woman took 14.5% more retirement risk than a single man. Nonetheless, the coefficient for *female* was insignificant. For the SCF waves after 1989, the *gender***time* interaction terms were analyzed. Thus, for instance, in 1992, the gap in retirement risk-taking was (0.145—0.364) or -0.219 or -21.9%, that is, holding all other factors constant, being a single women led to taking 21.9% less retirement risk than a single man with respect to the base year of 1989. Similarly calculated, a gender gap of +5% in 1998, -17.4% in 2001, -8.8% in 2004, -3.7% in 2007, -1.5% in 2010, -6.2% in 2013, -7.2% in 2016, and +3.8% in 2019 were recorded. The interaction terms were statistically significant in 1992 and marginally significant (10% level) in 2001, but insignificant in the other SCF waves.

To reiterate, every wave was treated as a random sample. Thus, the computed retirement risk-taking gender gap in every wave was dependent on the macro and micro economic environment of each period. Nonetheless, for the analysis with regards to the base year of 1989, it was deduced that in eight out of 10 SCF waves, being female led to lower retirement risk-taking than being male. Lastly, it is noteworthy that, over time, the gender gap dropped algebraically in magnitude.

Conclusion: Policies & Future Directions

This final part of the paper concludes with a more general discussion highlighting policies in the literature that may lead to an increase in individuals' and households'

retirement savings and investment, regardless of gender. As Thaler and Benartzi (2004, p. 165) commented, saving for retirement requires self-control. Further, households are prone to mistakes, and especially some low-saving households would especially welcome aid in making saving decisions. Thus, the use of prescriptive savings programs committing individuals to allocations towards retirement savings can significantly increase retirement wealth. Moreover, Benartzi and Thaler (2013) recommended four essential ingredients to any comprehensive plan to facilitate adequate retirement saving: availability, automatic enrollment, automatic investment, and automatic escalation.

Other researchers studied the effect of informational interventions. For instance, Goldin et al. (2017) studied how variation in the choice environment, e.g. by nudging individuals towards higher or lower contribution rates, could affect retirement savings decisions. For other researchers, comprehension becomes central. Borrowing concepts from domains such as educational psychology, several researchers tested whether retirement products could be simplified and comprehension could be improved.

Clark et al. (2019) found that among workers participating in a retirement plan, individuals who received an informational flyer increased their contributions in the months following the intervention relative to the control group. Lastly, McGowan and Lunn (2020) studied the influence of explanatory diagrams on people's understanding of how pensions work, and they found that although diagrams did not necessarily improve comprehension of pension products, they nonetheless supported decision-making by facilitating causal thinking.

Finally, financial literacy proves pivotal. Lusardi and Mitchell (2023, p. 148) reported findings that in the U.S., 30–40% of wealth inequality near retirement could be accounted for by financial literacy. Accordingly, they concluded that “financial literacy matters”, and it matters a great deal. Almenberg and Dreber (2015) showed that when controlling for basic financial literacy, the estimated gender gap in stock market participation diminished. In the same spirit, Van Rooij et al. (2011) showed that financial literacy affected financial decision-making, and that those with high literacy were more likely to invest in stocks.

Consequently, targeting financial education to specific groups of the population that are more ailing and less sophisticated proves imperative. For sure, building education takes time. However, a continuing education pattern, helping both women and men to first identify their saving and retirement needs, second to make informed investment decisions, and third to monitor their effort, could prove beneficial.

Regarding future directions of the current research, an interesting pattern to explore would be to account for household income in the regression framework and the analysis. There is extensive literature available (Sullivan & Meschede, 2016; Tamborini & Kim, 2020) that documents that there is a material income gap on the basis of gender and race that could be expected to affect both retirement assets, and subsequently retirement risk-taking. Therefore, significant differences in gender and race with respect to risky retirement ratios could be more related to labor market failures, for instance wage discrimination, and occupational segregation within the context of a Blinder-Oaxaca decomposition. Thus, the current research could extend policy implications to address income inequality. In particular, acknowledging a reasonable correlation between wealth and income, the analysis could use first, wealth

versus income variables, followed by wealth and income variables, and/or wealth versus the income ratio (that is wealth divided by income) to also take into account potential considerations of heteroscedasticity.

Data Availability All data and materials are available upon request.

Code of Data Availability Coding is also available upon request. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

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