Gender, Marriage, and Portfolio choice: Role of income risk

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January 15, 2022

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Abstract

This paper examines the source of gender and marital status differences in portfolio choices across US households. Using the Panel Study of Income Dynamics (PSID) and the Survey of Consumer Finances (SCF), we find evidence that single female-headed households are least likely to invest in risky assets, followed by single male-headed households. Further, married households are most likely to invest in risky assets. Towards explaining these differences in portfolio allocations, we further document that (i) women face a higher individual income risk relative to men, and (ii) two-earner married households hold a higher fraction in risky assets than single-earner married households, indicating a role for spousal insurance. To quantitatively investigate the importance of these channels, we develop a two-asset incomplete market life-cycle model with heterogeneous agents. Preliminary results show that the higher income risk faced by women results in a lower share of risky investments compared to men throughout the life-cycle.

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1 Introduction

It has been well documented that men and women exhibit differences in terms of their financial decisions (Huang & Kisgen, 2013; Hardies, Breesch, & Branson, 2013; Neelakantan, 2010; Sunden & Surette, 1998). Further, large wealth differences exist between married, single male and single female households (Schmidt & Sevak, 2006; Borella, De Nardi, & Yang, 2018). This paper explores the role of gender as well as marital status in risky portfolio decisions. We find empirical evidence that single households[1] invest a lower fraction of their wealth in risky assets, as compared to married households. Further, among single households, women undertake risky investments less relative to men. We investigate whether these differences in portfolio choices can be explained by the differential income risk that men and women face over their lifetime as opposed to differences in risk preferences. Further, we assess the role of spousal insurance in impacting risk-taking behavior for married households relative to single households.

Portfolio choices directly impact wealth. Since risky investments are usually associated with higher returns on average, difference in risk-taking behavior can translate into persistent wealth gaps across households. Schmidt and Sevak (2006) find evidence that at all points of the wealth distribution, the net worth of married households is significantly higher than single households [2], and among single households, the net worth was higher for men relative to women. Similarly Borella et al. (2018) find evidence that the gap in average assets held by single female, single male, and married households increases over the life-cycle.

As family structures keep rapidly evolving in the US (Doepke & Tertilt, 2016), household differences in investment behavior by gender and marital status can have significant aggregate consequences through its impact on wealth. Wealth is an important indicator of household well-being. As discussed by Wolff (1998), wealth provides direct financial income, and can be converted to cash or liquidity to fulfill consumption needs even in the absence of income. Further, family wealth directly impacts access to education (F. T. Pfeffer, 2018), which subsequently leads to persistent gaps in lifetime earnings, and further wealth accumulation (Bartscher, Kuhn, & Schularick, 2020). Bartscher, Kuhn, Schularick, and Wachtel (2021) and Benhabib, Bisin, and Zhu (2011) discuss the role of wealth in the transmission of fiscal and monetary policy. This motivates us to investigate the extent and sources of risky portfolio holdings along the gender

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[1]Our definition of single includes household heads who have never been married, are divorced, separated or are widowed.

[2]In 2001, the average net worth of married households on average was $262929, single male households was $119861 and that for female households was $112547.

and marital status dimension.

In this paper, we use the Panel Study of Income Dynamics (PSID) and the Survey of Consumer Finances (SCF) to study the investment decisions made by single male, single female, and married households. We use two alternative definitions of risky assets, as elaborated further in Section 2.2. In the first, we restrict our attention to financial wealth, wherein risky assets include only stocks. In the second, we look at total wealth (except housing), and risky assets include stocks, business net worth, net worth of real estate excluding primary residence and Individual Retirement Accounts (IRAs).

Figure 1: Risky Asset Share in PSID

Figure 1 shows the average fraction of risky assets in wealth for married, single male and single female households using the two definitions in the PSID. The blue and red bars correspond to the risky asset share definition using financial assets and total wealth excluding housing respectively. "SF" and "SM" denotes single female-headed and male-headed household respectively. The figure highlights that married households hold a riskier portfolio than single males who in turn hold more than single females. Single males invest 18% and 8% more than single females for risky asset share in financial wealth and net wealth respectively. Married households hold 81% and 64% (48% and 51%) higher fraction in risky asset share than single female-headed (single male-headed) households for the two definitions respectively.

Figure 2: Risky Asset Share in SCF

Figure 2 shows the average fraction of risky assets in wealth for married, single male and single female households using the two definitions in the SCF. We again find the same ranking across gender and marital status dimensions for risky wealth shares. The quantitative differences across the datasets are similar and they are economically quite large.

The figures above display the mean risky asset share without controlling for any observable characteristics. We use a linear regression model to validate whether the relative ordering across the marital status and gender dimension is maintained even after controlling for observable characteristics such as, income, wealth, family size, age, education, etc. We find that married households hold 32% and 24% higher risky portfolio in total wealth without housing than single men and women respectively in the PSID. We find similar numerical results in the SCF and only considering risky investments in financial wealth instead of net wealth. We also find our results to be robust to controlling for unobservable household characteristics through last period risky asset share in the PSID, and accounting for self-reported measures of financial knowledge and risky appetite in the SCF. We also find the same ranking across households while considering two-sided censored Tobit regressions rather than an OLS regression specification. Bertocchi, Brunetti, and Torricelli (2011) look at Italian data and find that male-headed married households participate more in risky assets than male-headed single households and similarly,

female-headed married households invest more in risky assets than female-headed single households. They arrive at this result by performing two separate regressions so, cannot compare across the groups. But to the best of our knowledge, ours is the first paper to document a joint ranking over married, single men and single women in risky asset holdings even after controlling for observable and unobservable traits.

While portfolio choice differences by gender has received considerable attention in the literature, most of it has been attributed to the fact that women are more risk averse as compared to men, as a result of which they are less likely to undergo risky investments (Addoum, Kung, & Gonzalo, 2016; Neelakantan & Chang, 2010; Jianakoplos & Bernasek, 1998). But, spousal insurance has been shown to play an important role in household consumption smoothing (Bardóczy, 2020; Blundell, Pistaferri, & Saporta-Eksten, 2016). We provide evidence in the data that households with both spouses working invest more in risky assets than at most single spouse working. Thus, two-earner households may have the ability to take on higher risk as compared to a single earner household due to the presence of this additional source of insurance. Further, as highlighted by Catherine (2016), individual income risk can be an important determinant of household portfolio allocation. We document from the data that the variance in permanent income is higher for women as compared to men and this difference is statistically significant. This might be an explanation for the gender asymmetry that we observe in investment behavior.

To quantitatively assess the role of income risk and spousal insurance, we develop an incomplete market life-cycle model with heterogeneous agents and allow for two asset choices (safe and risky). In this model, individuals are risk averse and differ with respect to gender, age, marital status, permanent income, transitory shock to income, and wealth levels, and endogenously determine their consumption, investment in the risky asset, and investment in the safe asset over their lifetime. For married households, we use a unitary framework, where agents make joint decisions. We use the panel structure of the PSID to estimate the income process separately for men and women and incorporate that in our quantitative analysis. Preliminary results from the model suggest that even though we assume that men and women do not differ with respect to their preference for risk, a higher risk in the permanent income for women translates into a lower investment in risky assets for single female households relative to single male households at almost every point over the life-cycle.

The rest of the paper is as follows: Section 2 discusses the empirical evidence, which guides the development of the theoretical framework in Section 3. Section 4 provides details of a

quantitative analysis of our framework and Section 5 concludes.

2 Empirical Evidence

2.1 Data and Sample Selection

The Panel Study of Income Dynamics is a longitudinal household survey that began in 1968. PSID collects data on household wealth and consumption and individual level information on income, hours worked and other demographic characteristics of the household members. It started as an annual survey but became a bi-annual survey from 1999. From 1999 it started collecting much more detailed information on the various asset categories than previously. But, the PSID underestimates wealth compared to the Survey of Consumer Finances (SCF) which is considered as the gold standard in for wealth measurement in the US (F. Pfeffer, Schoeni, Kennickell, & Andreski, 2016). Thus, to complement our empirical analysis we also employ SCF. The SCF is a cross-sectional household survey conducted by the Federal Reserve Board that collects very detailed information on the household balance sheet. This will allow us to construct better measures of the fraction of wealth in risky and non-risky assets. Starting from 1989 survey, the survey design and implementation have been consistent up until the latest 2019 survey. The main drawback of the SCF is that we cannot follow households over time and thus, cannot control for household-specific characteristics through either lagged variables or fixed effects.

The sample selection performed on each of the datasets is fairly standard. We focus on households where the age of the interview respondent is between 25-64. We also drop those households where household income is less than $100. This is done since these individuals will have strong attachment to the labour force. As a robustness check, we include households where reference individual's age is between 65-70. We drop households with missing information on age, race, education and marital status of the reference individual. We control for outliers in total wealth and various wealth categories like stocks, bonds, IRA, etc. Additionally, we drop the Survey of Economic Opportunity (SEO), Latino and immigrant samples in the PSID. We focus on the years 1999-2019 in the PSID and 1989-2019 in the SCF. This leaves us with 35,943 and 24,941 households in the PSID and SCF respectively. We convert all nominal variables into real terms using CPI of year 2006.

2.2 Risky Asset Share Definition

We consider predominantly two definitions of risky asset share: (1) the ratio of risky financial assets to total financial assets, and (2) the ratio of risky assets to total wealth excluding housing. Risky financial assets include stocks in publicly held corporations, mutual funds and investment trusts. It excludes stocks in employer-based pensions or Individual Retirement Accounts (IRAs). Safe financial assets include checking or savings accounts, money market funds, certificates of deposit, governmental savings bonds, treasury bills and cash value in a life insurance policy. Total financial assets is a sum of risky and safe financial assets.

Risky assets in wealth include risky financial assets plus business net worth, net worth of real estate excluding primary residence and money in private annuities or Individual Retirement Accounts (IRAs). Non-risky assets in wealth comprises of safe financial assets. Total wealth excluding housing combines risky assets and non-risky assets in wealth as defined above.[3] The benefit of the financial asset measure is that it allows us to investigate both the intensive and extensive margin portfolio choice. Though while dealing with quantitative macro models, we usually think about total wealth rather than only financial wealth. Thus, to be more consistent with our model later, we will treat the ratio of risky assets to total wealth excluding housing as the baseline definition of "risky asset share".

2.3 Empirical Specification and Results

A single household in our specification is defined where the reference individual of a household is can be either never married or divorced or separated.[4] To show that the ranking across the marital status and gender dimension remains even after controlling for household characteristics, we consider the following linear model:

$$RS_{it} = \alpha + \beta_M M_{it} + \beta_{SM} SM_{it} + \beta_X X_{it} + u_{it} \tag{1}$$

where RS_{it} denotes risky asset share of household i at time t, M_{it} is a dummy variable with value 1 for married household and 0 otherwise, SM_{it} is a dummy variable with value 1 for single male household and 0 otherwise and single female household is the omitted category in the

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[3]We exclude residential investment while defining risky asset share in wealth since it has been shown that marital transitions and divorce have significant effect on housing choices (Chang, 2020) rather than income risk and insurance. But we check the robustness of our results by incorporating in the definition of risky assets in Section 2.4.2.

[4]In the PSID, when the household structure changes because of members moving in or out then we treat it as a new household.

model. X_{it} contains controls such as, household income, household wealth, family size, number of children, state of residence, dummy for presence of children, five-year age bins, education, race and self-employment status of reference individual and year fixed effects. We restrict the ratio of risky asset share to be less than equal to 1 and greater than equal to 0 and use a OLS model for most of the empirical analysis. The benefit of using OLS is the ease of interpreting the coefficients due to the large number of fixed effects. But, instead of dropping the negative and greater than 1 risky asset shares, we consider a censored Tobit regression in our robustness checks in Section 2.4.1.

The benefit of the PSID is that we can use the panel structure to account for individual-specific unobservable characteristics. We use the lagged risky asset share to control for individual-specific characteristics that affect portfolio allocation between risky and safe assets in some regression specifications.[5] The lack of panel structure in the SCF does not allow us to include lagged or individual fixed effects as controls. We use self-reported measures of risky behaviour and financial knowledge as additional controls in some regression specifications to partly account for individual traits. Jianakoplos and Bernasek (1998) show that females are more risk-averse than men in the SCF and they argue that this fact can explain differences in portfolio allocations among single men and women. Gu, Peng, and Zhang (2019) find financial knowledge an important factor in understanding gender asymmetric portfolio decisions.

The SCF asks the respondent to classify their risk taking behaviour in four categories: (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 and (4) Not willing to take any financial risks. We include all the four categories in our analysis. SCF also asks the respondent about their knowledge on personal finance with 0 being "Not at all knowledgeable about personal finance" and 10 being "Very knowledgeable about personal finance". We create four categories as following: (1) High knowledge is defined as belonging to category 9 and 10, (2) Moderate knowledge being categories 7 and 8, (3) Limited knowledge is categories 4-6 and (4) No knowledge are those who reported categories 0-3. But, the financial knowledge variable is only available for the last two years of the data so we include it in only some regression specification.

Table 1 displays the main coefficients of interest, β_M and β_{SM}, coefficients of some of the

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[5]We cannot use individual fixed effects because of the sample design of PSID. PSID tracks only males across marital transitions and not females.

control variables and the p-value of the null hypothesis that $\beta_M = \beta_{SM}$ using the PSID sample. The definition of Risky asset share corresponding to total wealth excluding housing is used in this regression. Column (1) corresponds to the baseline regression specification. In column (2), we include household income and wealth squared as the change in risky asset share might not be linear in income and wealth. In column (3), we include in the sample those households whose reference individual's age is between 65-70. In column (4), we use weights as provided by PSID in the regression equation whereas the baseline regression model does not use weights as the PSID is considered a nationally representative sample. In Column (5) we include lagged share of risky asset as an additional control.

We see from Column (1) that single male and married households hold 3.3 percentage points (pp) and 12.4pp higher share of risky assets than single female households. These estimates are statistically significant and the null hypothesis that the single male and married household coefficients are equal is rejected at the standard levels of significance. The mean dependent variable is 38.6% so, these coefficients imply that single males and married households have 8.5% and 32% relative increase in risky asset share which are sizeable differences. These numbers reduce slightly to 2.3pp and 9.7pp in Column (2) when we include wealth and income squared but the main coefficients continue to be statistically significant from each other and single female. The results do not change much when we include older households or introduce weights in the baseline regression in Column (3) and Column (4) respectively. The coefficient of single male and married household falls a bit more when we include lagged share of risky asset. The coefficient of lagged share of risky asset is quite large and positive and so, explains the share of risky asset today quite a bit. But, the fall in the estimates to 1.8pp and 7.3pp is not substantial enough to alter the statistical and economic significance of our results. Thus, the ranking that we observed in the figures across the gender and marital status dimensions are robust to controlling for observable and unobservable characteristics.

Regarding other controls, the risky asset share is increasing in the age-group bins, income and wealth which is consistent with the literature (Jianakoplos and Bernasek (1998) and Wachter and Yogo (2010)). The share of risky asset increases with a fall in family size, increase in number of children and if reference individual is self-employed. We also find that the risky asset share is negatively related to income squared and wealth squared which Bertocchi et al. (2011) also find.

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Table 1: Regression for Risky Asset Share in Wealth Excluding Housing in PSID

	(1)	(2)	(3)	(4)	(5)
Single Male	0.033***	0.024***	0.033***	0.030***	0.018**
	(0.006)	(0.006)	(0.006)	(0.008)	(0.008)
Married	0.124***	0.097***	0.123***	0.135***	0.073***
	(0.007)	(0.006)	(0.006)	(0.008)	(0.007)
30-34	0.061***	0.055***	0.061***	0.062***	0.016*
	(0.007)	(0.007)	(0.007)	(0.008)	(0.009)
35-39	0.102***	0.088***	0.103***	0.105***	0.034***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.010)
40-44	0.141***	0.120***	0.142***	0.132***	0.046***
	(0.008)	(0.007)	(0.008)	(0.009)	(0.010)
45-49	0.163***	0.135***	0.165***	0.155***	0.051***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)
50-54	0.192***	0.157***	0.194***	0.183***	0.079***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)
55-59	0.230***	0.186***	0.231***	0.229***	0.088***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)
60-64	0.234***	0.182***	0.234***	0.230***	0.091***
	(0.010)	(0.009)	(0.009)	(0.011)	(0.011)
Income (00,000)	0.020***	0.042***	0.021***	0.017***	0.005*
	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)
Wealth (00,000)	0.009***	0.023***	0.008***	0.009***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Family Size	−0.022***	−0.024***	−0.022***	−0.024***	−0.015***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Number of children	0.018***	0.020***	0.018***	0.020***	0.014***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Self-Employed	0.172***	0.143***	0.165***	0.173***	0.094***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Income squared		−0.001***			
		(0.000)			
Wealth squared		−0.000***			
		(0.000)			
65-70				0.227***	
				(0.011)	
Lagged Fraction Risky					0.465***
					(0.006)
Constant	0.199***	0.230***	0.179***	0.193***	0.177***
	(0.025)	(0.024)	(0.024)	(0.031)	(0.028)
Observations	35943	35943	38993	35632	24637
Single Male=Married	0	0	0	0	0

Standard errors in parentheses

Includes year, state, race, education and child present fixed effects

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Regression for Risky Asset Share in Wealth Excluding Housing in SCF

	(1)	(2)	(3)	(4)
Single Male	0.048***	0.047***	0.018**	0.022
	(0.008)	(0.008)	(0.008)	(0.016)
Married	0.118***	0.115***	0.088***	0.090***
	(0.008)	(0.008)	(0.008)	(0.015)
Income squared		−0.000*		
		(0.000)		
Wealth squared		−0.000***		
		(0.000)		
Above Average Risk			0.026**	0.052**
			(0.012)	(0.023)
Average Risk			−0.042***	0.006
			(0.012)	(0.022)
No Risk			−0.210***	−0.140***
			(0.012)	(0.022)
Moderate Knowledge				0.012
				(0.011)
Limited Knowledge				−0.042***
				(0.012)
No Knowledge				−0.128***
				(0.024)
Constant	0.148***	0.153***	0.276***	0.247***
	(0.015)	(0.015)	(0.018)	(0.037)
Observations	24941	24941	24941	6817
Single Male=Married	0	0	0	0

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 shows the regression results from the SCF sample where we have used weights in all the regressions to account for the multiply imputed data structure. Single male-headed and married households hold 4.8pp and 11.8pp respectively more risky assets than single female-headed households as shown in Column (1). Moreover, married households invest 7pp more in riskier assets than single males. All of these differences are highly significant. The PSID estimates are also similar to those from SCF which is quite reassuring. These magnitudes hardly change post inclusion of income squared and wealth squared in the OLS estimation. After controlling for risky attitudes that are different across gender in Column (3), single male and married households still own 1.8pp and 8.8pp respectively higher fraction of risky investments.

Moreover, households with no or little risk appetite invest less in risky assets compared to households with very high risk appetite, consistent with economic intuition. The magnitudes and significance of the estimates do not change much after also including self-reported financial knowledge measures as displayed in Column (4). We also see that households who report no or little knowledge about personal finance hold much lower proportion of wealth in risky assets than those who report high level of financial literacy. Thus, the results more SCF strengthen the hypothesis seen in the PSID data.

Table 3 highlights the coefficients of single male and married households in the PSID sample using the risky asset share in financial wealth. We again find that married households have significantly higher risky asset holdings than single males and single males have significantly higher risky asset portfolio than single females. The differences across the gender and marital status categories are a bit smaller in absolute terms using financial wealth than total wealth excluding housing (2.8pp vs. 3.3pp and 4.6pp vs. 12.4pp). But in relative terms the differences are 21% and 34% for single males and married households which are higher than considering the risky asset definition with more wealth classes.

Table 3: Regression for Risky Asset Share in Financial Wealth in PSID

	(1)	(2)	(3)	(4)	(5)
Single Male	0.028***	0.023***	0.024***	0.027***	0.014***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Married	0.046***	0.030***	0.045***	0.051***	0.023***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Constant	0.132***	0.152***	0.126***	0.127***	0.083***
	(0.020)	(0.020)	(0.020)	(0.023)	(0.020)
Observations	34323	34323	37189	34041	22723
Single Male=Married	0	.081	0	0	.076

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
Compared to Column (1), Column (2) additionally includes income and wealth squared, Column (3) includes household where reference individual age is 65-70, Column (4) includes regression weights and Column (5) includes lagged risky asset share
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4 shows that the ranking of risky wealth share in financial wealth is preserved in the SCF too. The differences are statistically significant everywhere except between married and single males when we add financial knowledge and risk aversion dummies. Partly, the reason is that financial knowledge is only available for two years so we lose a lot of observations when we

include it as an explanatory variable.

Table 4: Regression for Risky Asset Share in Financial Wealth in SCF

	(1)	(2)	(3)	(4)
Single Male	0.038***	0.037***	0.019***	0.034***
	(0.006)	(0.006)	(0.006)	(0.010)
Married	0.054***	0.050***	0.037***	0.038***
	(0.005)	(0.005)	(0.005)	(0.010)
Constant	0.039***	0.045***	0.125***	0.110***
	(0.010)	(0.010)	(0.013)	(0.023)
Observations	24857	24857	24857	6787
Single Male=Married	.014	.032	.005	.76

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
Compared to Column (1), Column (2) additionally includes income and wealth squared, Column (3) includes risky behaviour categorical dummies and Column (4) includes dummies for financial knowledge
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The benefit of using the financial wealth definition of risky asset share is that it also allows us to focus on the participation choice of investing in stocks. Column (1) of table 5 shows that married and single male-headed households are likely to invest 8.1pp and 2.7pp respectively more than single females. Married households on average own stocks 5.4pp more than single males, with all the differences being statistically significant. These results are quite robust to adding additional controls like income and wealth squared and lagged dummy of holding a risky asset as seen in Columns (2) to (4). While controlling for lagged decision of holding a risky asset or not, the coefficient of single male reduces compared to the baseline regression but is significant at 15% level of significance. Table 12 in the Appendix shows the same asymmetry in the extensive margin of risky asset as in the PSID with the estimates being a bit higher than the PSID. This is not surprising since the SCF oversamples richer households who are more likely to acquire risky assets.

The panel structure of the PSID enables us to study transitions into and out of holding stocks. This will serve to better highlight the extent of asymmetries in portfolio allocations among the various household groups. Entry in the stock market is defined as household investing in stock market in current period but not in previous period. Exit from the stock market is defined as household investing in the stock market in the previous period but not in the current period.

Table 5: Regression to invest in Risky Asset or not in PSID

	(1)	(2)	(3)	(4)	(5)
Single Male	0.027***	0.019***	0.022***	0.023***	0.007
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Married	0.081***	0.054***	0.079***	0.089***	0.039***
	(0.006)	(0.005)	(0.006)	(0.007)	(0.005)
Constant	0.148***	0.170***	0.144***	0.138***	0.099***
	(0.021)	(0.021)	(0.020)	(0.022)	(0.021)
Observations	41702	41702	45001	41314	29976
Single Male=Married	0	0	0	0	0

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
Compared to Column (1), Column (2) additionally includes income and wealth squared, Column (3) includes household where reference individual age is 65-70, Column (4) includes regression weights and Column (5) includes lagged investing in risky asset or not dummy
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Married households enter the risky asset market significantly more by 2.6pp than single females and exit significantly less by 10pp as seen in Table 6. This is true with regards to single males and the differences are significant too. Thus, married households are more likely to buy a risky asset and continue to hold it for longer than single female-headed and male-headed households. Single male-headed households are equally likely to purchase a risky asset but are 5pp less likely to relinquish it than single female-headed households. Thus, the gender asymmetry in stock market participation that we saw in Table 5 is explained by single males continuing with their investment for longer duration than single females.

Table 6: Regression for Exit and Entry in Risky Asset Investment

	(1) Entry	(2) Exit
Single Male	0.000	−0.050*
	(0.004)	(0.027)
Married	0.026***	−0.100***
	(0.006)	(0.025)
Constant	0.082***	0.310***
	(0.019)	(0.087)
Observations	23996	5980
Single Male=Married	0	.035

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

2.4 Robustness Checks

In this subsection, we discuss the robustness of our analysis to alternate empirical specification and alternate measurement of risky asset share.

2.4.1 Censored Tobit Regression

In the baseline regression specification, we assume that all risky shares have to be greater than equal to zero and less than equal to one. We consider an alternate empirical specification where:

$$RS^*_{it} = \alpha + \beta_M M_{it} + \beta_{SM} SM_{it} + \beta_X X_{it} + u_{it} \tag{2}$$

where u_{it} is the error term. Moreover, actual risky asset share can be defined as:

$$RS_{it} = \begin{cases} 1, & \text{if } RS^*_{it} \geq 1 \\ RS^*_{it}, & \text{if } 0 < RS^*_{it} < 1 \\ 0, & \text{if } RS^*_{it} \leq 0 \end{cases} \tag{3}$$

where, we have used a two-sided censoring.

Table 7 shows the results from the two-sided censored Tobit regression for both the definitions of the risky portfolio share. Single male-headed and married households own 14.8pp and 30.2pp respectively higher fraction of risky asset share in financial wealth than single females. The estimate for single males and married households is 7.3pp and 28.6pp respectively for risky asset share in total wealth excluding housing. Moreover, in each of the case married households also hold significantly more risky portfolio than single males.[6] Thus, the facts that we have highlighted so far are robust to the how negative and greater than one values of risky shares are treated.

2.4.2 Alternate Definitions of Risky Asset

Risky asset share in total wealth excluding housing includes stocks, net business worth, IRA and non-primary residential investment as risky assets. Housing is a risky investment that constitutes a large share of wealth for most households even if they only periodically invest in housing. We consider an alternate definition of risky asset share with housing. We include

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[6]Our results are robust to either left or right side censoring as well.

Table 7: Tobit Regression for investment in Risky Assets in PSID

	(1) Financial Wealth	(2) Total Wealth excluding housing
Single Male	0.148***	0.073***
	(0.022)	(0.015)
Married	0.302***	0.286***
	(0.022)	(0.015)
Constant	−0.833***	−0.289***
	(0.078)	(0.051)
Observations	34323	36002
Single Male=Married	0	0

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

investment in IRA as risky investment as significant share of this investment is made in stocks and mutual funds. But, one can argue households do not face the same risk as the loss or gain is not realised during the working life. To address this concern, we consider another definition of risky asset share where we exclude IRA's and instead consider them as safe assets.

Table 8: Regression for investing in Risky Assets with Alternative Definitions in PSID

	(1) Excluding Housing	(2) With Housing	(3) IRA Safe
Single Male	0.033***	0.012*	0.047***
	(0.006)	(0.007)	(0.005)
Married	0.124***	0.156***	0.069***
	(0.007)	(0.007)	(0.005)
Constant	0.199***	0.366***	0.141***
	(0.025)	(0.021)	(0.021)
Observations	35943	37723	35964
Single Male=Married	0	0	0

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The first column of Table 8 shows the risky asset share in total wealth excluding housing which is the same as the first column in Table 1. Single males hold a higher risky asset share by 1.2pp than single females when we consider housing as a risky asset. This estimate is much smaller than the baseline estimate but still significantly different from zero. This is not the

case for married households. In fact the estimate increases to for married households relative to single female-headed households which is consistent with the evidence presented in Chang (2020). When we include IRA's as a non-risky asset then single males and married households own 4.7pp and 6.9pp larger fraction of risky portfolio compared to single females. For both the definition, it continues to be the case that married households possess significantly larger fraction of risky assets than single males. Thus, the ranking over gender and marital status groups is preserved across ways we compute risky asset shares.

2.5   Role of Multiple Earners in Portfolio Allocations

One of the hypothesis we propose to explain the marital status asymmetries is that the presence of multiple earners in a household provides insurance against income risk and facilitates greater risk appetite of married households. To provide some suggestive evidence along this direction, we consider the risky asset shares for married households where both spouses are working or one spouse is working or neither are working. PSID asks each spouse about their current employment status on their main job but about last period regarding income and wealth. We construct two measures of working status due to this timing discrepancy: (1) use the lagged employment status, and (2) consider as not working if annual hours worked in last period is less than 20 hours. We do not make a distinction between unemployed and out of the labour force in these regressions as there are not sufficient observations in these categories for inference.

Table 9 shows the coefficient of both spouse, one spouse and neither working when the risky asset share in total wealth without housing is the dependent variable in a OLS regression. Columns (1)-(2) considers the lagged employment status to compute working status whereas Columns (3)-(4) regards a hours cutoff to measure employment status. Lagged risky portfolio fraction is included in the regression specification in the second and fourth column to account for individual-specific properties. Risky asset share is 9.2pp and 4.2pp higher when both and one spouse is working relative to none working. This implies that the risky asset share of both working spouse is 5pp larger than when one is working. All of the differences are statistically at standard levels of significance. Moreover, these estimates become a bit smaller when we include lagged risky asset share as an additional control but all of the differences continue to be large and highly significant. Households where both members are working display higher risky investments than both and none working even while considering the hours cutoff measure. The difference in risky portfolio share between one member employed and both unemployed (or out

of the labour force) is positive but not statistically significant from zero. The key take-away from this exercise is that risky asset shares vary with the number of working households within married families, thus, indicating that within household insurance can explain heterogeneity in risky portfolios among married and non-married households.

Table 9: Regression for Risky Asset Share in total wealth among married working types

	(1) Work status	(2) Work status	(3) Hours Measure	(4) Hours Measure
Both working Lag	0.092***	0.055***		
	(0.016)	(0.014)		
One working Lag	0.042***	0.029**		
	(0.016)	(0.015)		
Both working Today			0.077***	0.054***
			(0.019)	(0.018)
One working Today			0.027	0.024
			(0.020)	(0.018)
Fraction Risky Lag		0.459***		0.459***
		(0.008)		(0.008)
Constant	0.307***	0.223***	0.262***	0.222***
	(0.039)	(0.038)	(0.037)	(0.039)
Observations	18287	17218	22889	17243
One Working=Both Working	0	0	0	0

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3 Model

3.1 Overview

In this paper we use an incomplete markets life-cycle model with heterogeneous agents. Time is discrete. The economy is populated with individuals of two genders, males and females, who work for the first J periods of their life, retire and live for another J_R periods after which they die. Further, there are three types of households: (a) single female-headed, (b) single male-headed, and (c) married, which comprise of one male and one female. We assume that there are no marriage or divorce shocks in this environment.

Agents are assumed to be risk averse and derive utility only from consumption, c. Each period, households decide how much to consume, and how much to save, $a' \geq 0$. Further,

households have the option of saving in two types of assets: one which yields a risk-free return, R_f, and the other which yields one out out of several possible return values, $R \in \mathbb{R}$ with equal probability, such that $\mathbb{E}(R) > R_f$, but requires the household to incur a variable cost, ϕ. Their total wealth each period is denoted as ψ and the law of motion is given by

$$\psi' = \left\{ \theta R' + (1 - \theta) R_f \right\} a' \tag{4}$$

where θ is the fraction of total savings invested in the risky asset.

3.2 Single Households

For single households, individual earnings, y, for each working period ($j \leq J$), comprise of two components: (a) their permanent income, z, and (b) a transitory shock, ε, and is denoted by

$$y = \max\{\exp(z + \varepsilon), \underline{y}\} \tag{5}$$

where $\varepsilon \sim F_{g,j}(\varepsilon)$, which is both gender, $g \in \{m, f\}$, and age specific. $\underline{y}$ denotes some minimum level of income, and can be perceived as benefits earned by unemployed individuals. The permanent income process is given by

$$z' = z + \eta' \tag{6}$$

where η represents shock to the permanent income process and $\eta' \sim G_{g,j}(\eta')$. The transitory and permanent income shocks are uncorrelated with each other and over time.[7] Further we assume that there exists a gender income gap which arises through the initial permanent that you start with such that $\exp(z_{m,0}) = 1$ and $\exp(z_{f,0}) = 0.7$.[8] Retired households receive pension earnings, $b(z_J)$, which are a function of their permanent income level in their last working period. Individual earnings are subject to a progressive tax system, where τ measures the degree of progressivity in the economy. Their earnings net of taxes is given by $y^{1-\tau}$.

The optimization problem for a single working household ($j \leq J$) of gender $g \in \{m, f\}$ is

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[7]This is a popular method to model the income process as it matches the lifecycle income profile quite well (Meghir & Pistaferri, 2004).

[8]The ratio of median female earnings to median male earnings has been around 70% in the US over the past four decades.

given by

$$V(j, z, \varepsilon, \psi) = \max_{c, a', \theta} u(c) + \beta \mathbb{E}_{z', \varepsilon', R'} \left[V \left(j + 1, z', \varepsilon', \psi' \right) \right] \tag{7}$$

subject to

$$c + a' \leq y^{1-\tau} + \psi - \phi \theta a' \tag{8}$$

$$\psi' = \left\{ \theta R' + (1 - \theta) R_f \right\} a' \tag{4}$$

$$c, a' \geq 0; 0 \leq \theta \leq 1 \tag{9}$$

where $u(c)$ is the period utility function, β is the discount factor, and y is given by equation (5), as described above.

For retired households ($J < j \leq J + J_R$), the problem is given by

$$V(j, z_J, 0, \psi) = \max_{c, a', \theta} u(c) + \mathbb{1}_{j \neq J + J_R} \beta \mathbb{E}_{R'} \left[V \left(j + 1, z_J, 0, \psi' \right) \right] \tag{10}$$

subject to

$$c + a' \leq \left\{ b(z_J) \right\}^{1-\tau} + \psi - \phi \theta a' \tag{11}$$

$$\psi' = \left\{ \theta R' + (1 - \theta) R_f \right\} a' \tag{12}$$

$$c, a' \geq 0; 0 \leq \theta \leq 1 \tag{13}$$

as we assume that they do not receive any transitory or permanent shocks to their income.

3.3   Married Households

For married households, family earnings, y, for each working period ($j \leq J$), comprise of four components: (a) male permanent income, z_m, (b) female permanent income, z_f, (c) a transitory shock to male income, ε_m, and (d) a transitory shock to female income, ε_f, and is denoted by

$$y = \max\{\exp(z_m + z_f + \varepsilon_m + \varepsilon_f), \underline{y}\} \tag{14}$$

where $\begin{bmatrix} \varepsilon_m \\ \varepsilon_f \end{bmatrix} \sim F_j^M(\varepsilon_m, \varepsilon_f)$. As in the case for single households, $\underline{y}$ denotes some minimum level of family earnings, and can be perceived as benefits earned by both unemployed members. The

permanent income process for each member is given by

$$z'_g = z_g + \eta'_g \tag{15}$$

where η_g represents shock to the permanent income process of gender g and $\begin{bmatrix} \eta'_m \\ \eta'_f \end{bmatrix} \sim G^M_j(\eta'_m, \eta'_f)$. Further we assume that $\exp(z_{m,0}) = 1$ and $\exp(z_{f,0}) = 0.7$ due to the gender income gap. The individual transitory and permanent income shocks are uncorrelated to each other and exhibit no serial correlation. We allow for the two spouses income shocks to be correlated. We specify this structure in more detail in Section 4.2. Retired households receive pension earnings, $b(z_{m,J}) + b(z_{f,J})$, which are a function of the permanent income level of each member of the household in their last working period. Family earnings are also subject to the same progressive tax system. Their earnings net of taxes is given by $y^{1-\tau}$.

Within married households, we assume that both members are of the same age; they pool their income and share consumption. The optimization problem for a married household of working age $j \leq J$ is given by

$$V_M(j, z_m, z_f, \varepsilon_m, \varepsilon_f, \psi) = \max_{c,a',\theta} u\left(\frac{c}{1+\chi}\right) + \beta \mathbb{E}_{z'_m, z'_f, \varepsilon'_m, \varepsilon'_f, R'} \left[V_M\left(j+1, z'_m, z'_f, \varepsilon'_m, \varepsilon'_f, \psi'\right)\right] \tag{16}$$

subject to

$$c + a' \leq y^{1-\tau} + \psi - \phi\theta a' \tag{17}$$

$$\psi' = \{\theta R' + (1-\theta)R_f\} a' \tag{18}$$

$$c, a' \geq 0; 0 \leq \theta \leq 1 \tag{19}$$

where χ denotes the consumption equivalence scale and y is described by equation (14).

Similarly for retired married households of age $(J < j \leq J + J_R)$,

$$V_M(j, z_{m,J}, z_{f,J}, 0, 0, \psi) = \max_{c,a',\theta} u\left(\frac{c}{1+\chi}\right) + \mathbb{1}_{j \neq J+J_R}\beta \mathbb{E}_{R'} \left[V_M\left(j+1, z_{m,J}, z_{f,J}, 0, 0, \psi'\right)\right] \tag{20}$$

subject to

$$c + a' \leq \{b(z_{m,J}) + b(z_{f,J})\}^{1-\tau} + \psi - \phi\theta a' \tag{21}$$

$$\psi' = \{\theta R' + (1-\theta)R_f\} a' \tag{22}$$

$$c, a' \geq 0; 0 \leq \theta \leq 1 \tag{23}$$

4 Quantitative Analysis

4.1 Parameterization

In order to quantitatively study the impact of differential income risk faced by men and women on portfolio choices across households, we solve this model using numerical methods. Table 10 lists the parameter choices made.

Table 10: Parameter Choices

Name	Source	Value
β	Aiyagari (1994)	0.96
σ	Aiyagari (1994)	3
χ	OECD (n.d.)	0.7
R_f	Krueger and Wu (2021)	1.02
$\mathbb{R}$	Neelakantan and Chang (2010)	{1.2703,1.13,0.8475}
ϕ	Catherine (2016)	0.02
τ	Heathcote, Storesletten, and Violante (2017)	0.18
b_R	Low (2005)	0.55

This is an annual model and therefore the discount factor β takes a value of 0.96 similar to Aiyagari (1994). Since we observe agents from the start of their working life, we assume the starting age to be 25, with a retirement age of 65. Therefore the number of working years, $J = 40$. Further, since the life expectancy in the US is 78.7 (World Bank, 2019), the number of years in the retired stage, $J_R = 14$. We assume a constant relative risk aversion period utility function where $u(c) = \frac{c^{1-\sigma}}{1-\sigma}$, where σ is the coefficient of risk aversion and $\sigma = 3$ (Aiyagari, 1994). The adult equivalence scale for married households $\chi = 0.7$ is taken from the OECD tables corresponding to two-member households. Tax progressivity rate is assumed to be 18% (Heathcote et al., 2017). The pension earnings function $b(z_J)$ is assumed to equal to $b_R \exp(z_J)$, where $b_R = 0.55$ (Low, 2005), that is, retirees receive 55% of what their earnings was when they retired.

We assume that the return on the risk-free asset is 2% annually (Krueger & Wu, 2021). Following Neelakantan and Chang (2010), the return on risky assets is assumed to take one out

of three possible values, $27.03\%, 13\%$, and -15.25% with equal probability. This yields a mean return of 8.26%. Next, following Catherine (2016), we take the variable cost of holding risky assets to be 2%.

4.2 Estimation of the Income process

We parametrize the income shocks for single males and females in the following manner:

$$\varepsilon_{i,g,t} \sim \text{iid } N\left(0, \sigma^2_{\varepsilon,g}\right), \ \eta_{i,g,t} \sim \text{iid } N\left(0, \sigma^2_{\eta,g}\right) \tag{24}$$

where $\varepsilon_{i,g,t}$ and $\eta_{i,g,t}$ denote transitory and permanent income shock respectively to individual i and gender $g = \{m, f\}$ realized at time t. Both the transitory and permanent income process are independently drawn from a Normal distribution with variances given by $\sigma^2_{\varepsilon,g}$ and $\sigma^2_{\eta,g}$ respectively. The important thing to note is that the expected values of the shocks do not change by gender but we allow for income risk to be gender asymmetric. The gender income gap is incorporated in the initial permanent income draw $\exp(z_0)$.

The income process for married males and females is shown below:

$$\begin{bmatrix} \varepsilon_{i,m,t} \\ \varepsilon_{i,f,t} \end{bmatrix} \sim \text{iid } N\left(0, \begin{bmatrix} \sigma^2_{\varepsilon,m} & \sigma_{\varepsilon,mf} \\ \sigma_{\varepsilon,mf} & \sigma^2_{\varepsilon,f} \end{bmatrix}\right) \tag{25}$$

$$\begin{bmatrix} \eta_{i,m,t} \\ \eta_{i,f,t} \end{bmatrix} \sim \text{iid } N\left(0, \begin{bmatrix} \sigma^2_{\eta,m} & \sigma_{\eta,mf} \\ \sigma_{\eta,mf} & \sigma^2_{\eta,f} \end{bmatrix}\right) \tag{26}$$

Similar to singles, we allow the variances of the spouses to be gender specific. But we allow the spouses permanent (transitory) shocks to be contemporaneously correlated with covariance denoted by $\sigma_{\eta,mf}$ ($\sigma_{\varepsilon,mf}$). The sign and magnitude of this correlation is theoretically unclear. If spouses intentionally work in separate industries or occupations to share risk then this correlation will be negative. In contrast, assortative matching on income and education lines will hint towards this correlation being positive.

We use the PSID from 1997 to 2019 to estimate the variances and covariances of the income process. The identification of these parameters follows Abowd and Card (1989) and relies on the cross-sectional variance and covariance of current and future income growth. Ignoring $\underline{y}$, log income and growth of log income using equations 5 and 6 of an individual can be written

as:

$$\ln y_{i,g,t} = \varepsilon_{i,g,t} + z_{i,g,t} \tag{27}$$

$$\Delta \ln y_{i,g,t} = \varepsilon_{i,g,t} + \varepsilon_{i,g,t-1} + \eta_{i,g,t} \tag{28}$$

The variance of the transitory income shock can be computed as the negative covariance between current and future income growth. Permanent income is a random walk so, current and future income growth are linked only through the transitory shock as highlighted in equation 29. On the other hand, permanent income shock only shows up in long-term income growth (sum of current, past and future income growth). Thus, the cross-sectional covariance of current and long-term income growth can identify the variance of the permanent income shock.

$$\text{Cov} \left(\Delta \ln y_{i,g,t}, \Delta \ln y_{i,g,t+1} \right) = -\sigma_{\varepsilon,g}^2 \tag{29}$$

$$\text{Cov} \left(\Delta \ln y_{i,g,t}, \Delta \ln y_{i,g,t} + \Delta \ln y_{i,g,t-1} + \Delta \ln y_{i,g,t+1} \right) = \sigma_{\eta,g}^2 \tag{30}$$

The identification of the covariance parameters for husband and wife depends on the cross income growth and follows a similar intuition as above. Equation 31 displays the covariance between husband and wife transitory shocks that can be estimated through the cross-sectional covariance between a spouse's current income growth and the other spouse's future income growth. Similarly, the covariance between the permanent shock is computed using the covariance between a spouse's current income growth and the other spouse's long-term income growth (equation 32).

$$\text{Cov} \left(\Delta \ln y_{i,m,t}, \Delta \ln y_{i,f,t+1} \right) = -\sigma_{\varepsilon,mf} \tag{31}$$

$$\text{Cov} \left(\Delta \ln y_{i,m,t}, \Delta \ln y_{i,f,t} + \Delta \ln y_{i,f,t-1} + \Delta \ln y_{i,f,t+1} \right) = \sigma_{\eta,mf}^2 \tag{32}$$

We implement a multi-step estimation strategy. First, we separately regress income growth of men and women on observable characteristics to predict residuals. The observable variables we include in the regression are marital status dummy, cohort fixed effects, year interacted with education, race and employment status, fixed effects for mortgage, household size, number of children, additional earners, disability, child living outside house, state of residence and change in employment status, mortgage, number of kids, household size and disability. Second, we use the second order moments of the residuals from the first step to estimate the parameters of

interest. We employ an Equally-Weighted GMM instrumenting for marital status and gender and standard errors are clustered at the household level.

The income risk parameters are presented in Table 11. The variance of permanent shock for men and women are 0.026 and 0.047 respectively. Permanent income variance for women is 81% higher than men and is statistically significant. On the other hand, the transitory shock variance is 0.032 and 0.028 for males and females respectively. This difference is not statistically significant. Blundell et al. (2016) find that women have a higher permanent wage shock than men but the difference is much smaller. The deviation in results can be attributed to two reason: (1) they focus on wage rather than income, and (2) they only consider married households in their estimation unlike ours where single male- and female-headed households are also included. Similar to Blundell et al. (2016), we also document that the covariance of permanent and transitory income shocks within married households is economically small and statistically insignificant. This implies, that the permanent (transitory) income process of men and women in a married households are virtually uncorrelated. Thus, merely the presence of additional earners in a household will provide insurance against income shock to the spouse (Krueger & Wu, 2021).

Table 11: Income Process Parameters

	Male	Female	P-value
Variance Permanent	0.026***	0.047***	0
	(21.61)	(24.90)	
Variance Temporary	0.032***	0.028***	0.203
	(14.69)	(10.55)	
Covariance Permanent	0		
	(0.37)		
Covariance Temporary	0.002		
	(1.35)		

T-statistics in parentheses
The third colum shows the test of equality between the variances
of males and females
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Results

We use numerical methods to solve this model. We discretize the total wealth that households have and allow ψ to take 20 values. Similarly, we discretize the income processes. At every age, permanent income level, z can take 5 values, whereas both shocks to permanent income, η, and transitory income, ε, take 3 values. The discretization of the transitory income shocks follows

Tauchen (1986). Since this is a life-cycle model where death occurs deterministically, we solve the model backwards and obtain the corresponding decision rules.

Once we solve for the decision rules, we simulate the economy for 5000 single individuals, with equal proportion of men and women, and follow them over their lifetime. Figure 3 illustrates the average fraction of their wealth invested in risky assets by single male and single female households over their lifetime.
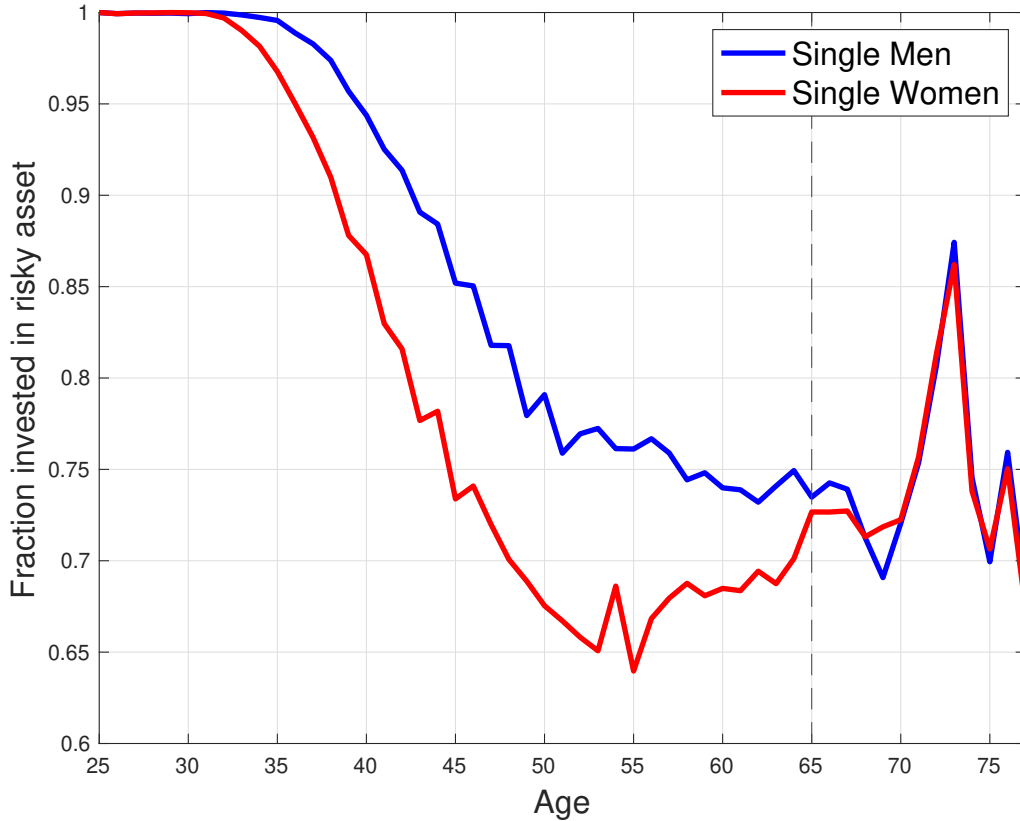

Figure 3: Gender differences in portfolio choice

As is observed in Figure 3, at every working age, single female households invest a lower fraction of their wealth in risky assets, which is consistent with the empirical results that we found using both SCF and PSID. Averaging over all ages, our model predicts that single men would invest 82.52% of their wealth in risky assets, whereas single women would only invest 77.85%. In section 4.2 we found that the variance in permanent income shocks for women was considerably higher than that for men, which implies that women face a higher risk in terms of their permanent income. Even though the risk preference is assumed to be the same for men and women, this higher risk in their permanent income results in them undertaking

safer investments relative to single men. This gap closes post retirement, where they are no longer exposed to the earnings risk. However, the model predicts that individuals reduce their investment in risky assets as they grow older, which is inconsistent with what we find in the data.

5   Conclusion

In this paper we study the role of gender and marital status differences in portfolio allocations across US households. We document using the PSID and SCF that, even after controlling for observable and unobservable characteristics, married households invest a larger share of their wealth in risky assets as compared to single households. Further, single female-headed households have a lower share of risky investment relative to single male households. Next, to assess the role of income risk and spousal insurance in explaining portfolio allocation differences across these households, we develop an incomplete markets two-asset life-cycle model with heterogeneous agents. We estimate the income process for men and women using the panel structure in PSID and find evidence that women face a higher risk in their permanent income. We incorporate that in our framework and quantitatively assess the impact on portfolio allocations across households. Preliminary results from the model suggest that the higher permanent income risk for women leads to lower investment in the risky asset for single female households as compared to single male households.

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Appendix

A   Empirical Evidence

Table 12: Regression to invest in Risky Asset or not in SCF

	(1)	(2)	(3)	(4)
Single Male	0.063***	0.061***	0.031***	0.048***
	(0.009)	(0.009)	(0.009)	(0.016)
Married	0.125***	0.120***	0.094***	0.086***
	(0.008)	(0.008)	(0.008)	(0.015)
Constant	0.064***	0.072***	0.197***	0.181***
	(0.015)	(0.015)	(0.019)	(0.036)
Observations	26169	26169	26169	7103
Single Male=Married	0	0	0	.025

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
Compared to Column (1), Column (2) additionally includes income and wealth squared, Column (3) includes risky behaviour categorical dummies and Column (4) includes dummies for financial knowledge
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Regression for investing in Risky Assets with Alternative Definitions in SCF

	(1) Without Housing	(2) With Housing	(3) IRA Safe
Single Male	0.049***	0.027***	0.048***
	(0.008)	(0.007)	(0.007)
Married	0.119***	0.099***	0.073***
	(0.008)	(0.007)	(0.006)
Constant	0.149***	0.365***	0.050***
	(0.015)	(0.013)	(0.011)
Observations	24656	24656	24656
Single Male=Married	0	0	.001

Standard errors in parentheses
Includes age-bins, income, wealth, family size, number of children, self-employment dummy and year, state, race, education and child present fixed effects as controls in all columns
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$