Portfolio Choice with Intra-Household Bargaining and Gender Differences in Preferences*

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Abstract

In this paper, we combine the literature on intra-household bargaining, gender differences in preferences, and social norms to understand the financial decision making of households. We derive a theoretical model which describes the portfolio choice decision of a two-person household, where both members have different preferences with regard to risk and time. We then use data from the Health and Retirement Study for the years 1992 to 2016 to test hypotheses derived from this model. In contrast to the literature, we find that the bargaining power of the wife does not affect the share of risky assets held by the household once we control for preferences. We find that time preferences and risk preferences affect the financial decision making, while social norms do not. Our results are robust to a wide range of robustness checks and are relevant for researchers, policy makers, and financial advisors.

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1 Introduction

A growing literature has shown that households actions violate the predictions of the classic Becker (1973, 1974) unitary model. In this model, the household is treated as a unit with a joint utility function, pooled income, and - implicitly - identical preferences. Papers such as Thomas (1990, 1994), Gray (1998), Lundberg et al. (1997), Browning et al. (2013), and Bertrand et al. (2015) have provided evidence that intra-household interactions matter for various outcomes, including consumption, health, labor supply, and marriage satisfaction. Along this line, several paper study the portfolio choice decision of a household using collective household models (Chiappori (1988, 1992) and see Lundberg et al. (1997) for an overview). Studies such as Lundberg et al. (1997, 2003); Mazzocco (2004); Lee and Pocock (2007); Yilmazer and Lich (2015); or Addoum et al. (2015) all show that intra-household interactions matter for the household's investment and saving behavior.

Within the household, a large empirical literature has shown that that men are more risk tolerant than women, documenting gender differences in risk preferences (Barsky et al., 1997; Kimball et al., 2008; Croson and Gneezy, 2009; Charness and Gneezy, 2012). Further, studies such as Bettinger and Slonim (2007), Gränsmark (2012), and Dittrich and Leipold (2014) find that men are more impatient than women, indicating differences in time preferences (Benartzi and Thaler (1995); Schroder and Skiadas (1999)). These findings add to the literature studying the effect of risk preferences and time preferences on financial decision making.[1] While some papers (e.g. Neelakantan et al., 2013 and Addoum, 2017) control for the effect of risk preferences on the household's savings decisions, we are not aware of a paper that studies the effect of differences in time preferences on the household's savings decision independently or jointly.

[1] Notice that wives are typically younger than their husbands (in our sample by three years) and therefore have a longer expected planning horizon.

In this paper, we study the effects of gender differences in risk and time preferences for the portfolio choice of a household. We begin by deriving a theoretical model that describes the portfolio choice decision of a two-person household, where both household members have different preferences with regard to risk and time. The model builds on Browning (2000), Mazzocco (2004), and is similar to Neelakantan et al. (2013) and Thörnqvist and Vardardottir (2014). The model allows for differences in the degree of relative risk aversion (using a standard CRRA utility function) and the discount factor across household members. Therefore, household decisions are functions of the preferences of the household members and the relative bargaining power of the members. Importantly, we extend this model by also including social norms (Akerlof and Kranton, 2000; 2010) as a determinant of the bargaining power within the household. In line with the findings by Bertrand et al. (2015), once the wife earns more than 50 percent of the joint income, gender identity norms are violated which affect the bargaining power within the household. Therefore, we expect that at this threshold the household's investment decision could change sizably and our dependent variable, the share of risky investment, could be discontinuous.

From the theoretical model, we derive four testable hypotheses. First, the relative bargaining power matters for the portfolio allocation: the portfolio will be riskier when the husband has a higher bargaining power and vice versa. Second, the household's portfolio will be less risky, when household members are more risk averse. Third, the household's portfolio will be more risky, household members have a longer planning horizon (i.e. lower discount factor). Finally, in line with Bertrand et al. (2015), we expect that once the wife earns more than 50 percent of household income, bargaining power within the household changes due to violations of social norms and the wife's preferences should have a higher weight in the decision making.

We use data from the Health and Retirement Study (HRS) for all available waves from 1992 to 2016 to test these hypotheses. The HRS is a representative longitudinal household survey in the U.S., which contains detailed information about household portfolios, socio-economic background variables, and risk and time preferences of both household members. The data set has been extensively used to study various aspects of financial decision making of households (e.g. Friedberg and Webb, 2006; Neelakantan et al., 2013; Yilmazer and Lich, 2015; Addoum, 2017).[2] Several results stand out. In contrast to the existing literature (e.g. Friedberg and Webb, 2006; Addoum et al., 2016) we find that the relative bargaining power of the wife does not affect the share of risky assets held by the household once we control for risk and time preferences. This finding supports the result by Jianakoplos and Bernasek (2008) who find that the relative bargaining power does not affect the household's risky asset share using the 2004 wave of the Survey of Consumer Finances (N=1,255), not controlling for risk or time preferences. We do find that, in line with our second and third hypothesis, time preferences (positive) and risk preferences (positive) significantly affect the household's share of risky assets. Finally, using a regression discontinuity design, we do not find any support for the fourth hypothesis that once the wife earns more than 50 percent of joint income, household's risky investment behavior would change sizably.

We show that our results are robust to different definitions of income and wealth and to excluding the waves covering the Global Financial Crisis. While our preferred specification exploits only cross-sectional variation, we also show that using within-household variation over time does not change our results.[3] Finally, to address potential concerns about selec-

[2]Notice that the other commonly used data sets such as PSID or SCF can not be used since they do not include questions about risk and/or time preferences or are not available at the household member level (e.g. PHF in Germany or the HFCS in the Eurozone).

[3]As we discuss later, in our sample 78-88 percent of households never cross the 50 percent threshold over time, depending on the definition of the threshold.

tion bias, we use a matching approach to limit these concerns and do not find quantitatively important differences.

The paper combines two streams of the literature. First, it relates to the literature investigating the link between intra-household interactions and household portfolio choice. Addoum et al. (2015) embed a life cycle portfolio choice model into a limited intra-household commitment framework where households make marital status, consumption, and portfolio choice decisions between a risky and a risk free asset. Using data from the PSID, they find that compared with a household in which the husband controls all the income, a household in which the wife controls all the income has a 22 percentage points lower equity portfolio allocation. Addoum (2017) examines the household portfolio choice through the retirement transition. Using data from the HRS, he jointly estimates the effect of retirement on singles' vs. couples' portfolio reallocations using a difference-in-difference approach. He finds that couples significantly decrease their stock allocation after retirement, whereas singles' allocation remains relatively unchanged. Couples where the wife is more risk averse than the husband exhibit the largest reallocation. Other papers in this literature include Neelakantan et al. (2013), Thörnqvist and Vardardottir (2013), and Yilmazer and Lich (2015). It also relates to the literature studying the effect of preferences on financial decisions. Papers studying risk preferences include Riley and Chow (1992) and Shaw (1996) and papers dealing with time preferences include Benartzi and Thaler (1995) and Schroder and Skiadas (1999). Second, it relates to the literature studying the effects of social norms. Akerlof and Kranton (2000, 2010) define identity as a sense of belonging to a social category and suggest that identity influences economic outcomes since any deviation from the expected behavior is inherently costly. Bertrand et al. (2015) use various data sets to study the effect of violating the gender norm that the husband should earn more than the wife. They show that the violation of this norm leads to a higher likelihood of divorce and that women who are overly successful in the labour force pay for this success at home to abate reversal of the traditional gender roles. Further, they find that married women stay out of the labour force in order to avoid a situation where they become the primary bread winner and that this effect is stronger among less educated couples. Hederos Eriksson and Stenberg (2015) use Swedish register data and find, in contrast to Bertrand et al. (2015)'s results, that they cannot find evidence in support for the gender norm. Finally, Ke (2018) documents that families with a "financially sophisticated" husband are more likely to participate in the stock market than those with a wife of equal financial sophistication. They argue that this pattern is best explained by gender identity norms which constrain women's influence over household financial decision-making.

Our results have implications for the understanding of household financial decision making which is relevant for researchers, policy makers, and financial advisors. For researchers, our findings strongly suggest that not controlling for risk and time preferences creates an important omitted variable bias that can lead to wrong conclusions about the driving forces of financial decision making at the household level. For policy makers and financial advisors, the results suggest that understanding the risk and time preferences of both household members is important.

The paper is structured as follows. Section 2 derives our theoretical model. Section 3 discusses the construction of the data set and provides descriptive statistics. In section 4, we present our main results and we discuss various robustness checks in section 5. Section 6 briefly concludes.

2 Theoretical Model

In this section, we aim to provide a theoretical motivation for our hypotheses tested in the empirical part of this paper. The model follows the contribution by Mazzocco (2004, 2007).[4] We use a two-period, two-person household model where household members make efficient decisions under cooperation, i.e. they fully commit to future allocations.[5]

The model economy is populated by one household with two agents i: husband (h) and wife (w). Each agent lives for two periods and time is denoted by t. The household consumes a public good, c, in each period. Total wealth of the household, m_t, is the sum of each spouses initial wealth levels, m_t^i.
The household faces a savings problem, having to decide how much to consume in the first period and how much to invest (and consume in the second period). In addition, it has to decide on how to allocate savings across two assets. First, it can invest into a risk-free, one-period asset, b, which earns the return r^b. Second, it can invest into a risky, one-period asset, s, which earns the stochastic return $r^s(\phi)$. The stature of nature, determining this return, is denoted by ϕ.

Each agent has individual preferences, which are separable over time and state of nature. Agents are egoistic, such that utility of agent i depends on agent i's consumption only. The utility function for each agent, u_i, is increasing, concave, and at least twice continuously differentiable. Utility of agent i is given by

$$U_i = u^i(c_t) + \beta^i \, \mathbb{E} \, u^i(c_{t+1}(\phi)), \tag{1}$$

[4] See Lee and Pocock (2007); Neelakantan et al. (2013); Yilmazer and Lich (2015) for further applications.
[5] While cooperation has been established in the empirical literature (e.g. Becker (1981); Chiappori (1992); Browning (2000); Cherchye et al. (2015)) and the experimental literature (e.g. Cochard et al. (2016)), a growing literature also studies non-cooperation (see, e.g. Lundberg et al. (2003); Addoum et al. (2015)).

where $\mathbb{E}$ is the mathematical expectation operator. Further, β^i denotes the discount factor for each agent $i \in (h, w)$. We assume that $\beta^h \neq \beta^w$, such that wife and husband have different levels of time preference.[6] In line with the related literature (e.g. Bettinger and Slonim (2007); Gränsmark (2012); Dittrich and Leipold (2014)), we assume that men are more impatient and, therefore have a higher discount factor compared to women, $\beta^h > \beta^w$. We assume that both agents preferences exhibit constant relative risk aversion (CRRA) and that the period utility functions are given by

$$u^h = \frac{c_t^{1-\sigma^h}}{1-\sigma^h}, \tag{2}$$

$$u^w = \frac{c_t^{1-\sigma^w}}{\delta\,(1-\sigma^w)}, \tag{3}$$

where $\delta > 0$ governs the effect of wealth on the agents' utilities (Neelakantan et al. (2013)). Further, σ^i denotes the relative risk aversion of agent $i \in (h, w)$.[7] In general, we assume that $\sigma^h < \sigma^w$, such that the wife has a higher risk aversion than the husband.[8]

Efficiency implies that the optimality conditions can be obtained from a Pareto problem.[9] The household chooses consumption, the amount of savings, and the distribution across the

[6] Browning (2000) builds a non-cooperative model with differences in discount factors but identical preferences. He finds that household savings depend on the distribution of income in the household.

[7] It also denotes the relative prudence minus one. Hence, our utility function also exhibits constant relative prudence.

[8] Barsky et al. (1997) use the HRS and find that male and female respondents have statistically different levels of risk aversion. Along this line, Kimball et al. (2008) find that men are more risk tolerant using HRS data. See also Croson and Gneezy (2009); Charness and Gneezy (2012).

[9] It also implies that household members will only save jointly.

risk-free and the risky asset (i.e. they chose a financial portfolio). They solve

$$\forall\phi: \max_{c_t, c_{t+1}(\phi), b, s} \theta \underbrace{\left[u^h\left(c_t\right) + \beta^h \mathbb{E}\, u^h\left(c_{t+1}(\phi)\right)\right]}_{U_h} + (1-\theta) \underbrace{\left[u^w\left(c_t\right) + \beta^w \mathbb{E}\, u^w\left(c_{t+1}(\phi)\right)\right]}_{U_w}, \tag{4}$$

$s.t.$

$$c_t + b_t + s_t \leq m_t, \tag{5}$$

$$c_{t+1}(\phi) \leq \left(1 + r^b\right) b_{t+1} + \left(1 + r^s\left(\phi\right)\right) s_{t+1}. \tag{6}$$

In this optimization problem, the household maximizes expected, joint utility as the weighted sum of husband's and wife's utility. The weights, $\theta \in [0, 1]$, are Pareto weights, which are determined in the intra-household bargaining process. We extend the model by assuming that these weights are a function of observable variables, x, such that $\theta = \theta\left(x\right)$. In our empirical approach, we follow Bertrand et al. (2015) and assume that gender identity norms create aversion against cases in which the wife earns more than 50 percent of total income. Therefore, θ might have a jump at the 50 percent income threshold. This adds to the traditional factors that are not considered important to model investment decisions, but are relevant for pinning down within-household bargaining power. These include the value of the outside option (divorce), divorce laws, non-labor income, wages, household production, as well as factors such as race, religion, and immigrant status.[10]

The financial portfolio of the household is given by $b_t + s_t = \vartheta m_t$, where $\vartheta \in (0, 1)$ denotes the savings rate. Further, we define the share of risky assets in the portfolio as $\lambda = s_t / \left(s_t + b_t\right)$.

[10] See, e.g. Lundberg and Pollak (1996); Pollak (2005); Friedberg and Webb (2006); Roff (2017).

Solving the Pareto problem via substitution yields the following optimization problem

$$\begin{aligned}\forall\phi : \max_{\vartheta,\lambda} \theta \left[u^h\left(\left(1-\vartheta\right)m_t\right) + \beta^h \,\mathbb{E}\, u^h\left(\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t + \left(1+r^s\left(\phi\right)\right)\vartheta\lambda m_t\right)\right] \\ + \left(1-\theta\right)\left[u^w\left(\left(1-\vartheta\right)m_t\right) + \beta^w \,\mathbb{E}\, u^w\left(\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t + \left(1+r^s\left(\phi\right)\right)\vartheta\lambda m_t\right)\right].\end{aligned} \tag{7}$$

Using the utility functions (eq. 2 and 3), the first-order conditions for ϑ and λ are given by

$$\partial\vartheta : \theta\beta^h \,\mathbb{E}\left\{\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t + \left(1+r^s\left(\phi\right)\right)\lambda\vartheta m_t\right]^{-\sigma^h}\left[\left(r^s\left(\phi\right)-r^b\right)\vartheta m_t\right]\right\} \tag{8}$$

$$+\left(1-\theta\right)\beta^w \,\mathbb{E}\left\{\frac{\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t + \left(1+r^s\left(\phi\right)\right)\lambda\vartheta m_t\right]^{-\sigma^w}}{\delta}\left[\left(r^s\left(\phi\right)-r^b\right)\vartheta m_t\right]\right\} = 0,$$

$$\partial\lambda : \theta\left\{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^h}\left(-m_t\right) + \beta^h \,\mathbb{E}\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t + \left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^h}\right. \tag{9}$$

$$\left.\left(\left(1+r^b\right)\left(1-\lambda\right)m_t + \left(1+r^s\right)\lambda m_t\right)\right\}$$

$$+\left(1-\theta\right)\left\{\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^w}}{\delta}\left(-m_t\right) + \beta^w \,\mathbb{E}\,\frac{\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t + \left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^w}}{\delta}\right.$$

$$\left.\left(\left(1+r^b\right)\left(1-\lambda\right)m_t + \left(1+r^s\right)\lambda m_t\right)\right\} = 0.$$

After some math (see the Appendix for the full derivation), the equilibrium optimality conditions are given by

$$\frac{\theta\beta^h\delta\left(\vartheta m_t\right)^{\sigma^w-\sigma^h}}{\beta^w\left(1-\theta\right)}\,\mathbb{E}\left(r^s\left(\phi\right)-r^b\right)\left[1+r^b+\left(r^s\left(\phi\right)-r^b\right)\lambda\right]^{-\sigma^h} \tag{10}$$

$$+\,\mathbb{E}\left(r^s\left(\phi\right)-r^b\right)\left[1+r^b+\left(r^s\left(\phi\right)-r^b\right)\lambda\right]^{-\sigma^w} = 0,$$

$$\frac{\theta\beta^h\delta\left(\vartheta m_t\right)^{\sigma^w-\sigma^h}}{\beta^w\left(1-\theta\right)}\left[-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^h}}{\beta^h\left(\vartheta m_t\right)^{-\sigma^h}} + \mathbb{E}\left(1+r^b+\left(r^s\left(\phi\right)-r^b\right)\lambda\right)^{1-\sigma^h}\right] \tag{11}$$

$$-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^w}}{\beta^w\left(\vartheta m_t\right)^{-\sigma^w}} + \mathbb{E}\left(1+r^b+\left(r^s\left(\phi\right)-r^b\right)\lambda\right)^{1-\sigma^w} = 0.$$

Equation 10 is the optimality condition for the savings rate and 11 is the optimality condition for the risky asset share. The first equation equates the expected marginal utility from one Dollar invested in the risk free asset with the marginal utility of investing one Dollar into the risky asset when young. The second equation is the stochastic Euler equation, linking marginal utility in period t with expected, discounted marginal utility in period $t+1$.

While the equation system cannot be solved analytically, it allows to draw some conclusions about the effects of varying underlying parameters (Neelakantan et al. (2013)). When the bargaining power of the wife increases, household risk aversion decreases, because the wife is assumed to have a higher risk aversion. In addition, when the bargaining power of one of the household member increases, the solution to the above problem will get closer to the solution preferred by this member. When the wife's discount factor increases, the weight on the husband's marginal utility will decrease, shifting the household solution towards the wife's solution. Finally, the effect of changes in the wife's risk aversion are ambiguous, as they affect each part of the equation.

Importantly, a priori, it is unclear what the total effect of risk and time preferences are, when we vary the wife's bargaining power. On the one hand, the literature has shown that women are more risk averse then men (e.g. Kimball et al. (2008)) and we, therefore, expect a smaller risky investment share, when the wife has higher bargaining power. On the other hand, the literature has also shown that women have a longer planning horizon (lower discount factor) compared to men (e.g. Bettinger and Slonim (2007)), and, hence, we expect a higher risky investment share.[11] Which effect dominates needs to be addressed empirically.

[11] Bhandari and Deaves (2008); Cardak and Wilkins (2009) respectively find that households with longer planning horizons hold higher equity shares, risky financial assets respectively.

3 Data and Descriptive Statistics

3.1 Data Set Construction

The data used in the analysis comes from the Health and Retirement Study (HRS), a nationally representative longitudinal household survey in the U.S. conducted by the Institute of Social Research at the University of Michigan and funded by the National Institute of Aging (NIA). The HRS interviews older Americans since 1992 and has detailed information on financial assets collected at the household level. The dataset also contains a wide range of socio-economic and demographic variables. HRS surveys have been conducted annually between 1992 to 1996 and biannually since then. We use data for available waves from 1992 to 2016. Baseline interviews are mostly conducted face-to-face in the respondent's home (Fisher and Ryan, 2018). Between 1994 and 2004, follow up interviews were mostly conducted over telephone. Beginning from 2006/2008, all participants receive enhanced face-to-face interviews every four years.

HRS holds comprehensive information about the financial assets of households such as stocks and equity funds, IRA and Keogh accounts, net value of business assets, checkings, savings and money market holdings, government savings bonds, T-bills, bond funds and bonds. There is also information about other investments such as business assets, real estate, and vehicles. One important benefit of using data from HRS is that it allows to measure individual risk and time preferences which is not available with other survey data sets such as the Survey of Consumer Finances (SCF) or the Panel Study of Income Dynamics (PSID).

For our analysis, HRS waves are combined into a single pooled cross-section. We adopt the approach of Bertrand et al. (2015) and for each household, we use the data from the first year that the household is in the panel. As a robustness check, we also use the last observation a household appears in the survey and find no differences. The main sample consists of households where both partners are earning labor income and are less than sixty-five years old. This leaves us with 6,417 households over 13 waves (1992-1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014 and 2016). Additionally, we exclude same-sex households, losing 61 households. There are 6,354 household-level observations in the final data set. There are other American datasets with very detailed financial information like Survey of Consumer Finances (SCF) and Panel Study of Income Dynamics (PSID). However, we could not use these data sets in our analysis as SCF contains only household variables which means we cannot calculate the relative income of the wife from the data. PSID on the other hand, does not include risk and time preference variables.

In line with Bertrand et al. (2015) we use different threshold levels. The reason is that there is a spike in the data where the relative income of couples is exactly 50 percent and these households are excluded. This spike is typically found in the data and can, for example, be explained by respondents rounding incomes, which increases the chance to obtain a 50-50 split. Therefore, we follow the strategy in Bertrand et al. (2015) and use different (but close) threshold levels. We find that a total of 22 percent of households in our sample cross the threshold of 50 percent relative income of wife over time (in either direction) in the full sample. This drops to 16 percent when we consider households where the relative income of wife is less than or equal to 48 percent jumps to at least 52 percent. There is a further drop to 12 percent when we consider the jump from 45 percent of relative income of wife to 55 percent. Since, the percentage of households that cross the threshold is small, most of the variation in our analysis will come from the cross-sectional variation of couples rather than the time dimension. As a robustness check, we analyze the households in our sample over time. The panel is formed by households who stay married to the same partner and do not become unemployed.[12] We do not see any change in our results even when we consider the within-household variation over time (see robustness section).

3.2 Variable Construction

Most papers in the related literature (e.g. Addoum et al. (2015) and Bertrand et al. (2015)) use labor income for the calculation of relative income of wife. However, HRS provides very detailed information about individual income sources. Therefore, we incorporate different concepts of income to investigate whether our results are robust to the various definitions of income. We begin with the different concepts of income. First, labor income is defined as a measure of wage or salary income, bonuses or overtime pay, second job or military reserve earnings, professional practice or trade income. For the second concept of income, we add the individuals' income from all pensions and annuity to the previous concepts. Finally, we also include the individuals' Social Security Disability (SDI) and Supplemental Security Income (SSI), social security retirement and spouse or widow benefits, individuals unemployment benefits and workers compensation. Worker's compensation benefits are intended to reimburse individuals who are injured in the course and scope of employment and the benefit compensates for the wages that is missing due to the injury. Unemployment benefits are designed to support injured individuals while they look for a new position. This variable is constructed from the individuals income from benefits, welfare and food stamps. Relative income of the wife has been defined as the fraction of wife's income out of the total income of the household.

We adopt the definitions of both narrow and broad risky assets from Guiso et al. (1996) and Addoum (2017). First, the standard financial portfolio is defined as the sum of net

[12] Our results are robust to including households where one or both members become unemployed.

value of IRA (Individual Retirement Account) and Keogh accounts[13], stocks, mutual funds and investment trusts, checking, savings and money market accounts, CD (certificates of deposits), government savings bonds and T-bills, bonds and bond funds, and all other savings of households. The share of risky assets in the total financial portfolio is defined as stocks and equity funds holdings over total wealth. The second and broader definition of financial portfolio and share of risky assets includes the net value of private business holdings.[14] The third and the final definition of share of risky assets further includes the net value of real estate holdings.[15]

HRS also provides detailed information on risk and time preference of individuals. The risk preference variable is derived from questions asked to respondents to choose between pairs of jobs where one guarantees current family income while the other offers a chance to increase income but also carries the risk of loss of income. It is a categorical variable with values from 1 to 4, ranging from most risky to least risky. The individual time preference variable in the HRS reveals financial planning preference where respondents are asked which time period is most important to them for planning their family's saving and spending. It is a categorical variable ranging from 1 to 5, where 1 indicates "in the next few months", while 5 indicates "longer than ten years" (see Appendix for detailed survey questions). We find little time variability in risk and time preferences: 16 percent of husbands and 11.5 percent of wives change their answer to the risk question. For time preferences, we find that 19.5 percent of husbands and 19.4 percent of wives change their respective answer.

[13] Keogh plans are retirement plans for self-employed individuals and small businesses in the United States while an IRA plan is a tax-deferred plan that individuals may use to save money for retirement. In waves 1 and 2, the questions regarding the IRA accounts are as follows: "Do you or your husband/wife/partner have any IRA or Keogh accounts?" and "How much in total is in all those accounts?".

[14] Net value of businesses indicate the net value of businesses on a household level.

[15] Net value of real estate (not primary residence) indicates the net value of real estate on a household level.

Finally, we control for the age of husband and wife, years of education, number of children, health, race and religion. Health is a self reported variable where the individual rates their health from 1 to 5, 1 being excellent and 5 being poor.[16] These variables have been shown to be drivers of financial decisions (Cole et al. (2014), Love and Smith (2010), Yao et al. (2011)).

3.3 Descriptive Statistics

In this section, we present the summary statistics of our data set, address various concerns, and provide some intuition for our hypotheses.

Tables 1 and 2 present descriptive statistics of households where both husband and wife are working and are below the age of 65. The first three rows in table 1 provide the mean household income. Average income in our data set is about 81,500 USD. This also addresses concerns about access to the financial market. As shown by Calvet et al. (2009), higher income earners will be less affected by entry and transaction costs and should have higher financial sophistication. The first row provides the mean household labor income, the second row adds pension income to the labor income and in the third row we finally add security income. We find only small differences across the three definitions of income. Nevertheless, we will provide robustness for our results using these different definitions.

The next six rows summarize the standard financial portfolio and share of risky assets in the households using the narrow and broad definitions from section 4.2. We find that the risky asset share varies between 39 percent (Def.1) and 50 percent (Def.3). The increase from

[16]Fletcher and Lehrer (2011) has shown that self reported health proxy actual health with sufficient accuracy. Further, Smith (2009) has shown using HRS and PSID data, that that respondents recall childhood illnesses with reasonable quality.

adding private business holdings, real estate holdings respectively is of similar magnitude (5, 6 resp. percentage points). The standard portfolio (Def.1) is about 107,000 USD, with a maximum of about 35 Mio. USD. Adding private business holdings (Def.2) adds about 35,000 USD to the average portfolio and adding real estate holdings (Def.3) adds another 35,000 USD to the average portfolio size. These statistics are similar to the findings in Neelakantan et al. (2013) or Yilmazer and Lich (2015).

The average male in our sample is 54 years old, has 13 years of education, is Protestant, of very good health, and White. The average female is 51 years old, has 13 years of education, is Protestant, of very good health, and White. Most males are in the most risky category, while relatively more women are in the least risky category. The time preferences of the average male and female are also similar.

In figure 1, using our full sample, we display the density distribution of the share of wife's income. Using the McCrary (2008) test for the discontinuation of the distribution function, we find a sharp and statistically significant drop at the point where the wife starts earning more than her husband. This finding are similar to the results in Bertrand et al. (2015).

To address concerns about selection across the 50 percent threshold of relative income, table 3 provides the results from t-tests for our variables of interest. Column 1 includes the sample of households where the wife earns more than her husband, while column 2 includes households where the wife earns less than her husband. The worry is that these women/men are different and select into these categories according to (risk or time) preferences. We do not find evidence that risk or time preferences of women across the threshold are different. Along this line, we also test whether these women are married to men with different risk or time preferences. We do not find evidence to support this. The only significant differences

Table 1: Descriptive Statistics

	Mean	SD	Min	Max	Count
Household Labour Income	81,543.57	90,121	26	3,560,000	6,188
Household Pension Income	82,944.68	90,498	26	3,560,000	6,188
Household Security Income	84,500.01	90,645	26	3,560,000	6,188
Standard Financial Portfolio (Def.1)	107,327.58	575,253	0	35,352,000	6,188
Standard Financial Portfolio (Def.2)	143,049.05	712,340	0	35,352,000	6,188
Standard Financial Portfolio (Def.3)	178,580.46	771,689	0	35,352,000	6,188
Share of Risky Assets (Def.1)	0.39	0	0	1	5,555
Share of Risky Assets (Def.2)	0.44	0	0	1	5,581
Share of Risky Assets (Def.3)	0.50	0	0	1	5,614
Risk (Husband): Most Risky	0.13	0	0	1	3,481
Risk (Husband): 2nd Most Risky	0.11	0	0	1	3,481
Risk (Husband): 3rd Most Risky	0.14	0	0	1	3,481
Risk (Husband): Least Risky	0.61	0	0	1	3,481
Risk (Wife): Most Risky	0.11	0	0	1	3,775
Risk (Wife): 2nd Most Risky	0.10	0	0	1	3,775
Risk (Wife): 3rd Most Risky	0.15	0	0	1	3,775
Risk (Wife): Least Risky	0.65	0	0	1	3,775
Time Pref.(Husband): Few Months	0.12	0	0	1	4,204
Time Pref.(Husband): One Year	0.08	0	0	1	4,204
Time Pref.(Husband): Few Years	0.29	0	0	1	4,204
Time Pref.(Husband): 5-10 Years	0.38	0	0	1	4,204
Time Pref.(Husband): >10 Years	0.13	0	0	1	4,204
Time Pref.(Wife): Few Months	0.14	0	0	1	4,537
Time Pref.(Wife): One Year	0.09	0	0	1	4,537
Time Pref.(Wife): Few Years	0.30	0	0	1	4,537
Time Pref.(Wife): 5-10 Years	0.35	0	0	1	4,537
Time Pref.(Wife): >10 Years	0.12	0	0	1	4,537

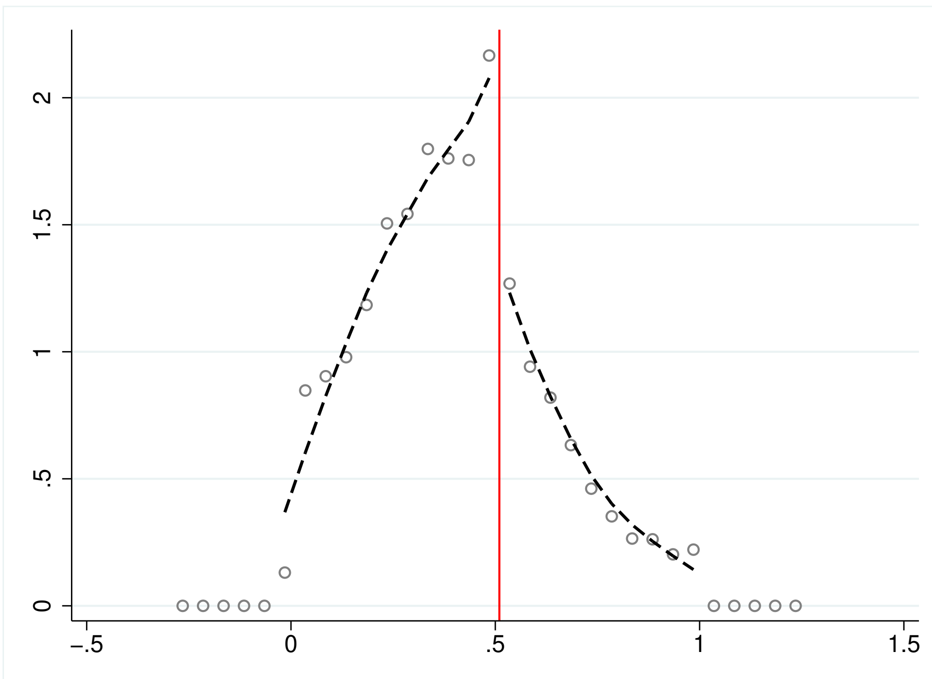
Notes: The sample includes households where both the husband and wife have positive incomes and are between 18 and 65 years of age. The household pension income adds the pension earned by the couple to their labor income, and the household security income further adds the security benefits and compensation earned by the couple.The standard financial portfolio (Def.1) is defined as the sum of net value of IRA and Keogh accounts, stocks, mutual funds and investment trusts, checking, savings and money market accounts, CD, government savings bonds and T-bills, bonds and bond funds and all other savings of households. The share of risky assets (Def.1) is defined as the share of stocks and equity funds holdings in the financial portfolio. Financial portfolio (Def.2) and share of risky assets (Def.2) includes the net value of private business holdings for both. Financial portfolio (Def.3) and share of risky assets (Def.3) further include the net value of real estate holdings.

Table 2: Descriptive Statistics

	Mean	SD	Min	Max	Count
Age (Husband)	54.21	4	25	65	6,188
Age (Wife)	51.21	5	18	65	6,188
No. of Yrs of Education (Husband)	13.12	3	0	17	5,948
No. of Yrs of Education (Wife)	13.22	3	0	17	5,993
Health(Husband): Excellent	0.22	0	0	1	5,832
Health(Husband): Very Good	0.33	0	0	1	5,832
Health(Husband): Good	0.31	0	0	1	5,832
Health(Husband): Fair	0.12	0	0	1	5,832
Health(Husband): Poor	0.02	0	0	1	5,832
Health(Wife): Excellent	0.23	0	0	1	5,915
Health(Wife): Very Good	0.34	0	0	1	5,915
Health(Wife): Good	0.30	0	0	1	5,915
Health(Wife): Fair	0.11	0	0	1	5,915
Health(Wife): Poor	0.02	0	0	1	5,915
No. of Children	3.10	2	0	16	6,146
Religion: Protestant	0.55	0	0	1	6,169
Religion: Catholic	0.27	0	0	1	6,169
Religion: Jewish	0.02	0	0	1	6,169
Religion: Other	0.10	0	0	1	6,169
Race: White	0.75	0	0	1	6,170
Race: Black	0.16	0	0	1	6,170
Race: Other	0.08	0	0	1	6,170

Notes: The sample includes households where both the husband and wife have positive incomes and are between 18 and 65 years of age. This table presents the demographics of the sample.

Figure 1: McCrary test on the wife's relative income.



Note: The data are from Health and Retirement Studies (1992-2016). The sample includes couples between 18 to 65 years of age where both partners are earning positive labor income. For each couple we use the first observation in the panel. The vertical red line indicates the relative income share at 0.5. Each dot represents the density of couples in the bin of 0.05. This graph analyses the break to the right of 0.5.

Table 3: Descriptive Statistics: t-Test

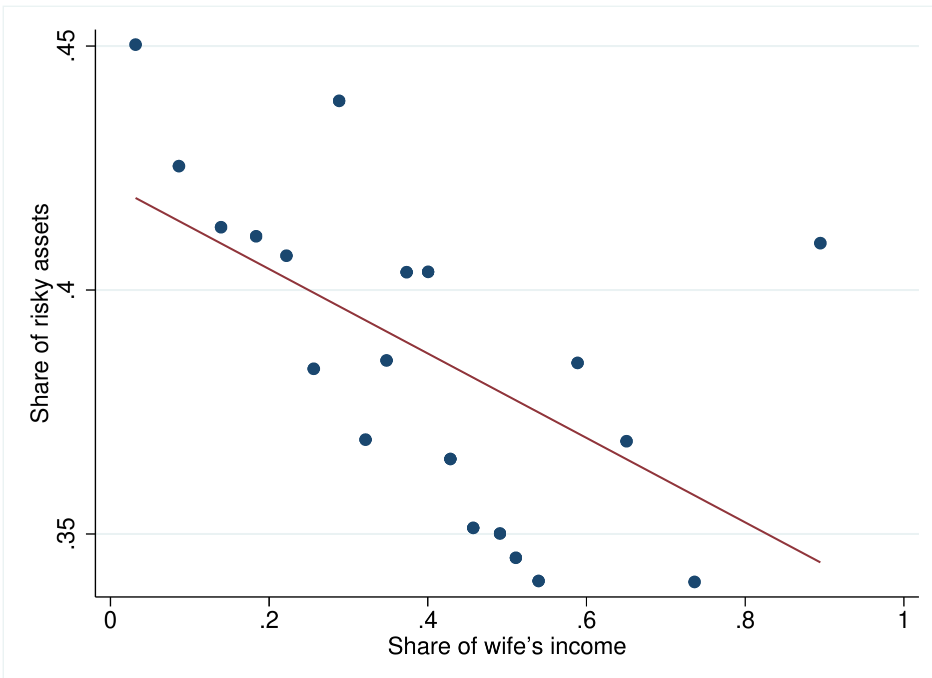
	Wife's Income Share>0.5 (1)	Wife's Income Share<0.5 (2)	1-2 (3)
Wife's Income	51,005.48	23,071.48	27,934.00***
SRA (Def.1)	0.37	0.40	-0.03**
SRA (Def.2)	0.42	0.44	-0.02
SRA (Def.3)	0.49	0.50	-0.02
Wife's Age	51.47	51.07	0.40**
Wife's Edu. (Yrs)	13.59	13.09	0.50***
No. of Children	3.16	3.06	0.10
Wife's Risk Pref.	3.37	3.33	0.04
Wife's Time. Pref.	3.23	3.22	0.01
Husband's's Risk Pref.	3.26	3.23	0.03
Husband's Time. Pref.	3.28	3.32	-0.04
Observations	1650	4202	5852

Notes: Column 1 includes households where the wife earns more than her husband and column 2 includes households where the wife earns less than her husband. The first two columns show the mean of the two samples for different variables, while the last column shows the difference in the sample means. SRA stands for share of risky assets. Significance levels: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$.

are found for income, wife's education, and marginally significant for wife's age and the risky share (Def.1).

Finally, figure 2 presents a (binned) scatter plot of the relationship between the bargaining power of the wife (proxied by her relative income share) and the household's risky asset share. In line with theory and the related literature, the figure provides suggestive evidence that as the wife's bargaining power increases, the household invests less in risky assets. The figure might suggest a non-linear relationship, due to the high share of risky assets for the 0.8-1 bin of relative incomes. While only five percent of households are in this bin, we include a quadratic term in our regression model to test for potential non-linearity.

Figure 2: Share of risky assets vs. wife's relative income.



Note: The graph shows a binned scatter plot where the share of wife's income is grouped into equal bins of size 0.2. The graph shows a negative relationship between the share of wife's income and the share of risky assets of the household.

4 Empirical Results

4.1 Econometric Approach

We estimate a fixed-effects regression model at the household-level using our pooled cross-sectional data set. The model is in line with the implications from the theoretical model discussed in section 3. Specifically, we estimate the model

$$\begin{aligned} SRA_h = \alpha + \beta RelIncWife_h + \gamma_{wife} RiskPref_{h,wife} + \gamma_{husb} RiskPref_{h,husb} \\ +\eta_{wife} TimePref_{h,wife} + \eta_{husb} TimePref_{h,husb} + \zeta_{wife} x_{h,wife} + \zeta_{husb} x_{h,husb} + \epsilon_h. \end{aligned} \tag{12}$$

Here, our dependent variable is the share of risky assets, SRA_h, for each individual household h. The wife's relative bargaining power is proxied by the share of the wife's income, $RelIncWife_h$. Further, $x_{h,husb}$ and $x_{h,wife}$ denote the set of controls we use at the individual-level. We use the spouse's age, number of years of education, race, religion, self-reported health of husband and wife, and region as controls. We also include wave (i.e. year) fixed effects.

Given the richness of our data set, we follow the standard in the literature (e.g. Lee and Pocock, 2007; Neelakantan et al., 2013; Addoum et al., 2016) and include control variables and our variables of interest (risk and time preferences) for husband and wife rather than including them (or averages) at the household level. The variables $RiskPref_{h,husb}$ and $RiskPref_{h,wife}$ denote the risk preference variables of husband and wife respectively. Similarly, $TimePref_{h,husb}$ and $TimePref_{h,wife}$ denotes the time preference variables of the spouses. We use OLS to estimate the model using Huber-White robust standard errors.[17]

Before we turn to formalizing our hypotheses, we want to discuss threats to our econo-

[17] The results are robust to using a fractional regression model. See robustness section.

metric strategy and how we address them. First, in line with the standard Merton-Samuelson model, we do not control for the household's wealth level in our preferred specification. However, we do control for wealth in a robustness check and find that the inclusion of wealth does not change our results, while the wealth level is significant. Second, we do not find a correlation between risk or time preferences with the relative share of income (our proxy for the bargaining power) similar to the findings by Yilmazer and Lich (2015).[18] This should address the worry that our results are biased because, for example, more risk-seeking people also have a higher bargaining power due to his or her risk preferences. Third, in line with the implications from Calvet et al. (2009), since respondents in our sample have a relatively high average income, transaction and entry costs should not be a major concern and selection into participating in the financial market is not expected to be a source of significant bias. Fourth, our measure of bargaining power is the share of the wife's income of total household income. This measure has been widely used in the literature (e.g. Lee and Pocock, 2007; Mazzocco, 2007; Yilmazer and Lich, 2015; Bertrand et al., 2015; Addoum et al., 2016). Friedberg and Webb (2006) document a large, positive correlation ($\rho = 0.45$) between earnings and the responses of both household members to the question who has the final say in the 1992 wave of the HRS. Fifth, our sample considers ever-married and ever-employed households which should limit the heterogeneity in divorce risk and unemployment (i.e. labor income) risk. Finally, we address concerns around selection bias using three different approaches.[19] First, we have shown that women across or below the 50 percent relative income threshold do not have statistically significant risk and time preferences (cf. Table 3). Second, we will perform a robustness check and run our regression on a matched sample. This should limit the selection bias as observed and unobserved characteristics are highly correlated (Stuart, 2010; Ferraro and Miranda, 2014). Hence, if we match on observables we also match on some of the unobservables. We generate the matched sample using an one-to-one nearest neighbor

[18] The strongest correlation is 0.055 between risk preferences and bargaining power of wives.

[19] We do not find strong evidence for assortative mating in our data set. We find weak correlations between age ($\rho = 0.32$), income ($\rho = 0.19$), and education ($\rho = 0.55$), but a strong correlation between race of wife and husband ($\rho = 0.79$).

matching with replacement. Our results are robust to this different approach (see robustness section for discussion). Third, we use a fixed effects panel regression strategy similar to Olafsson and Pagel (2018), where we exploit variation within-households over time. Here, we explicitly also take into account that risk and time preferences might change over time. Our results again hold to this different strategy (see robustness section for discussion).

4.2 Hypotheses

In this section, we want to derive our hypotheses tested in the next section. In line with our theoretical model presented in section 3, we identify four testable hypotheses. First, as implied by the theoretical model and as shown by the related literature (e.g. Mazzocco, 2007; Yilmazer and Lich, 2015; Addoum et al., 2016), we expect that the relative bargaining power significantly affects the risky asset share. We expect that the portfolio will be more risky when the husband has a higher bargaining power (and vice versa) and expect $\beta < 0$. Second, ceteris paribus, we expect that the household's portfolio will be less risky, when household members are more risk averse and, therefore, expect $\gamma_{wife} > 0$ and $\gamma_{husb} > 0$. Third, ceteris paribus, the household's portfolio will be more risky when household members have a longer planning horizon (i.e. lower discount factor), such that we expect $\eta_{husb} > 0$ and $\eta_{wife} > 0$. Finally, in line with Bertrand et al. (2015) and our modelling of the bargaining power parameter, θ, we expect that once the wife earns more than 50 percent of household income, bargaining power within the household changes due to violations of social norms and the wife's preferences should have a higher weight in the decision making. We expect to find a discontinuity at this point.

In summary, we test these four hypotheses:

1. The relative income of the wife negatively affects the share of risky assets held by the household.

2. Higher risk tolerance increases the share of risky assets held by the household.

3. Longer planning horizons increase the share of risky assets held by the household.

4. Once the wife earns more than 50 percent of household income, we expect the risky asset share to show a discontinuity.

4.3 Main Results

In this section we present our main results from estimating equation (12). All regressions use the relative labor income of the wife as independent variable and the share of risky assets, the dependent variable, are defined as the sum of stocks and equity funds. Table 4 presents our estimation results.[20]

Column (1) presents the results from estimating a misspecified version of our model, which only includes the relative income of the wife and does not control for any confounding variables. While this regression clearly suffers from omitted variable bias, it at least does not introduce a bad control problem (Angrist and Pischke (2008)), i.e. including control variables which are themselves outcomes of our variable of interest. For example, the wife's relative income could affect the number of children the couple has or the likelihood of divorce (Bertrand et al., 2015). We find that the effect of relative income is significantly negative ($p < 0.01$). A household in which the wife earns all of the income will have, on average, a 9.5 percentage points lower holding of risky assets compared to a household in which the husband earns all of the income. Column (2) adds the full set of controls. Our results show that

[20] A sub-sample regression only for the observations that include both risk and time variables shows similar results; see Table 8 in the appendix.

Table 4: Main Results: Effect of Wife's Income Share on Risky Asset Holdings

	(1)	(2)	(3)	(4)	(5)
Relative Income of Wife	-0.095***	-0.044*	-0.013	-0.014	-0.088
	(0.024)	(0.026)	(0.032)	(0.032)	(0.101)
Risk:Husband					
2nd Most Risky			0.033	0.034	0.035
			(0.027)	(0.027)	(0.028)
3rd Most Risky			0.008	0.004	0.004
			(0.025)	(0.026)	(0.026)
Least Risky			0.013	0.010	0.010
			(0.021)	(0.021)	(0.021)
Risk:Wife					
2nd Most Risky			0.047	0.049*	0.049*
			(0.029)	(0.029)	(0.029)
3rd Most Risky			0.015	0.019	0.020
			(0.027)	(0.027)	(0.027)
Least Risky			0.019	0.023	0.023
			(0.022)	(0.022)	(0.022)
TimePref:Husband					
One Year				0.008	0.007
				(0.032)	(0.032)
Few Years				0.026	0.026
				(0.024)	(0.024)
5-10 Years				0.043*	0.043*
				(0.023)	(0.023)
>10Years				0.022	0.021
				(0.028)	(0.029)
TimePref:Wife					
One Year				-0.010	-0.010
				(0.029)	(0.029)
Few Years				0.021	0.021
				(0.023)	(0.023)
5-10 Years				0.053**	0.053**
				(0.023)	(0.023)
>10Years				0.060**	0.061**
				(0.029)	(0.029)
$RelativeIncomeofWife^2$					0.086
					(0.112)
Controls	N	Y	Y	Y	Y
N	5,555	4,465	2,955	2,887	2,887
R^2	0.00	0.12	0.12	0.13	0.13

Notes: All regressions use the relative labor income of the wife as independent variable and the share of risky assets, the dependent variable, are defined as the sum of stocks and equity funds. Robust standard errors are shown in parenthesis. Constant not shown. Estimates for control variables can be found in the appendix. Significance levels: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$.

the coefficient is still significantly negative ($p < 0.1$), but the effect has more than halved -0.044 compared to -0.095. The size of the estimated effect is much smaller compared to the results in Addoum et al. (2015), where the effect varied between -0.14 and -0.25.

In column (3) we add the elicited risk preferences of the wife and the husband and in column (4) we add the respective time preferences. In our preferred model specification (4), which controls for both preference parameters, we find that the effect of the wife's relative income becomes insignificant and quantitatively unimportant -0.014. Among the risk preferences, we only find that the risk preferences of the wife matter: being in the second highest risk preference category increases the risky investment by 4.9 percentage points ($p < 0.1$). Time preferences, have a stronger effect. We find that male and female time preferences matter. A planning horizon of 5-10 years of the husband's increases risky investment by 4.3 percentage points ($p < 0.1$). Wife's time preferences matter even more. Having a planning horizon between 5-10 years increases risky investment by 5.3 percentage points ($p < 0.05$), and a planning horizon of more than 10 years increases risky investment by 6.1 percentage points ($p < 0.05$).
Finally, in order to test for a non-linear relationship between risky investment and the wife's relative income, i.e. bargaining power, column (5) adds the square of the relative income of wife. Neither the linear nor the quadratic term are significant.

Our estimation results offer mixed support for the theoretical predictions from the model derived in section 3 and our hypotheses derived from it. First, we do not find support that the bargaining power of the wife, $(1-\theta)$, has an effect on the investment strategy. Second, and in line with equation (11), higher risk taking by the wife, σ^w, increases the amount of assets invested into risky options. This result is intuitive, as the household is more willing to take risks for promises of higher gains. However, risk preferences of the husband,σ^h, does not affect investment strategies. Third, for time preferences, β^i, we find that a lower discount factor, i.e. a longer planning horizon, of the wife and the husband increase the risky investment share. Intuitively, the household cares more about increasing utility in the more distant future, which, in the model, is created by higher consumption financed by higher investment returns (from the risky asset).

Further, our findings contrast the results by Thörnqvist and Vardardottir (2014) and Addoum et al. (2015), where the wife's relative bargaining power has a highly significant, negative, and economically important effect on household risky investment.[21] It also relates to the findings by Neelakantan et al. (2013); Yilmazer and Lich (2015), showing that risk preferences matter for households portfolio allocations, but do not control for time preferences in their regression designs. We find that time preferences are more important compared to risk preferences. Our results also contrast the results by Yilmazer and Lyons (2010), who show that the characteristics of the wife have only small effects on the investment behavior of married men. Our findings support the insignificant effect of the wife's relative income on risky investment documented in Jianakoplos and Bernasek (2008) using data from the 2004 SCF.

Overall, our results show that the wife's relative income is negative across all specifications, but is statistically insignificant when we add risk and time preferences. This result contradicts findings in the literature showing that the bargaining power matters (e.g. Addoum et al. (2015)) and suggests that controlling for risk and time preferences is important when explaining financial behavior. Preferences create an important omitted variable bias in the context of studying the effect of intra-household bargaining on risky investment.

[21] Addoum et al. (2015) use calibrated risk and time preference variables for their analysis while using the PSID data.

Finally this model seems well behaved as estimates of age, education and health are significant and in line with past literature like Addoum et al. (2015), Ameriks and Zeldes (2004), among others (see appendix for full table including all controls).

4.4 Regression Discontinuity Results

A different approach to study whether the wife's income share matters for risky investment is to exploit the discontinuity at the 50 percent threshold. This discontinuity has already been documented in Figure 1 using the McCrary (2008) test. In this section, we employ the regression discontinuity (RD) approach (see Lee and Lemieux (2010) for an overview) to exploit local randomization around the threshold and answer our fourth hypothesis. The rationale for this approach is derived from the findings in Bertrand et al. (2015), where behavior changes sizably around the 50 percent threshold. Intuitively, gender identity norms generate an aversion against the outcome where the wife earns more than the husband. Further, households where the relative income of the wife is close to the threshold of 0.5, are considered to be similar in their background characteristics. The RD design then compares the households just below and just above the threshold and considers the difference in outcome, i.e. the share of risky assets as the effect of the wife's relative income.

In line with the findings by Bertrand et al. (2015), our theoretical model (see section 3), and our fourth hypothesis, we expect a change in the relationship between the wife's relative income (as a proxy for bargaining power) and risky investment. The idea is that, if the wife has more impact on the household's investment decisions, her preferences will have a larger effect on the investment strategy. On the one hand, women are more risk averse compared to men (e.g. Kimball et al. (2008)) and therefore, we would expect a small risky investment share. On the other hand, women have a longer planning horizon compared to men

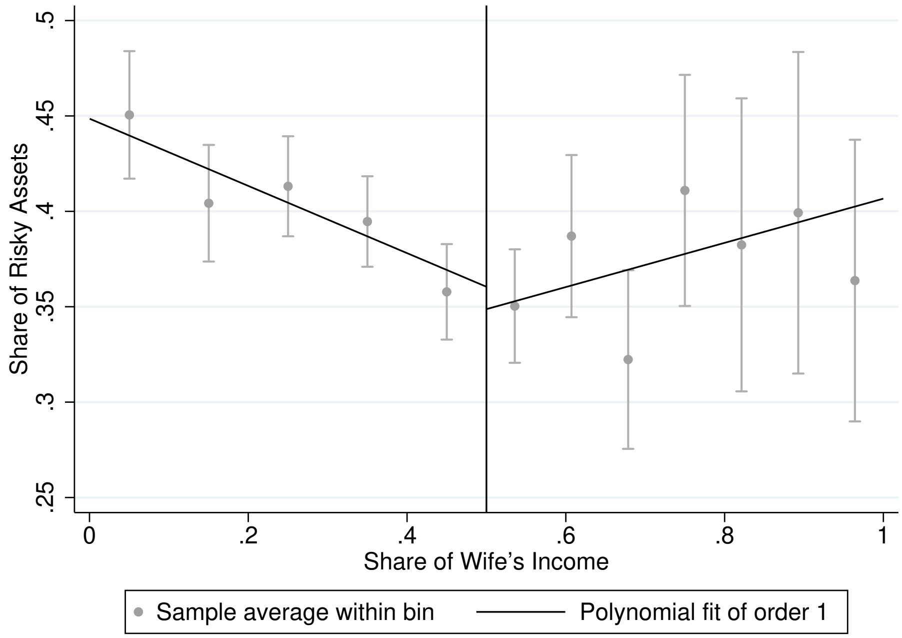


Figure 3: Regression Discontinuity Plot. Vertical line indicates location of the threshold (wife's income share is equal to 50 percent).

(e.g. Bettinger and Slonim (2007)), and we therefore would expect a higher risky investment share. It is unclear, a priori, which effect will dominate.

Typically, results from RD designs can be best illustrated by a graphical representation. We use a polynomial fit of order one and the IMSE-optimal evenly spaced method for bin selection to generate our results.[22] Figure 3 presents the results from using the RD design on our data set. The horizontal axis shows the relative income of wife and the vertical axis shows the share of risky assets. The vertical line indicates the location of the threshold (at 50 percent of income).

We find a drop at the 50 percent threshold, but this drop is not statistically significant. This can be seen by the overlapping confidence bands just below and above the threshold. Therefore, the RD design supports our previous finding that the wife's share of relative income has

[22]We have also used polynomial fits of one and four and several bin selection methods to ensure the robustness of our method. We also use age and education levels as controls. See appendix for full table.

no significant effect on the share of risky asset holdings. Given that the RD design relies on the property that the households just below and above the threshold are comparable, this finding strongly supports our OLS results.

Finally, we want to highlight that one could interpret Figure 3 such that there is a negative linear relationship before the threshold and a positive linear relationship after the threshold. However, one needs to remember that the model fits a linear model for each of these samples. For the entire sample (without threshold), we would recover the negative linear relationship shown earlier in Figure 2.

4.5 Interaction Effects

Previously, we have established that the wife's relative income share, as a proxy for her bargaining power, has no significant effect on the household's risky asset holdings. Further, we have shown that risk and, in particular, time preferences affect the household's investment strategy.

In this section, we want to investigate whether there are important interaction effects between risk and time preferences as documented, for example, in Halevy (2008); Fudenberg and Levine (2011); Baucells and Heukamp (2012), and whether they affect investment. Table 4 presents the only significant interaction effects we found in our data set by searching below and above the threshold as well as across the entire distribution.

We find that for households in which the wife earns more than the husband, there is a significant interaction between risk and time preferences. Precisely, when the wife's planning horizon is above 10 years (lowest discount factor), high risk aversion (3rd most risky, ($p < 0.05$) and least risky, ($p < 0.01$)) will reduce the investment in risky assets. Two effects are at work here. First, a longer planning horizon will, ceteris paribus, increase risky investment. Second, high risk aversion should reduce risky investment. It appears that the risk effect dominates, as the estimated coefficients are negative.

Table 5: Effect of Relative Income of Wife on Share of Risky Assets

	Dep Variable: Share of Risky Assets
	(1)
Relative Income of Wife	-0.029
	(0.049)
Wife:2nd Most Risky × WifeEarnsLess × WifeTimePref:One Year	0.326
	(0.288)
Wife:2nd Most Risky × WifeEarnsLess × WifeTimePref:Few Years	-0.180
	(0.195)
Wife:2nd Most Risky × WifeEarnsLess × WifeTimePref:5-10 Years	-0.033
	(0.196)
Wife:2nd Most Risky × WifeEarnsLess × WifeTimePref:>10Years	0.331
	(0.242)
Wife:3rd Most Risky × WifeEarnsLess × WifeTimePref:One Year	0.290
	(0.283)
Wife:3rd Most Risky × WifeEarnsLess × WifeTimePref:Few Years	-0.005
	(0.172)
Wife:3rd Most Risky × WifeEarnsLess × WifeTimePref:5-10 Years	0.102
	(0.178)
Wife:3rd Most Risky × WifeEarnsLess × WifeTimePref:>10Years	0.429**
	(0.213)
Wife:Least Risky × WifeEarnsLess × WifeTimePref:One Year	0.407*
	(0.222)
Wife:Least Risky × WifeEarnsLess × WifeTimePref:Few Years	-0.013
	(0.135)
Wife:Least Risky × WifeEarnsLess × WifeTimePref:5-10 Years	0.145
	(0.142)
Wife:Least Risky × WifeEarnsLess × WifeTimePref:>10Years	0.632***
	(0.158)
Controls	Y
N	2,887
R^2	0.13

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5 Robustness Checks

In this section, we present the outcome of various robustness checks. Table 6 presents the results from re-running our analysis on a panel data set and table 7 presents the results from using alternative specifications.

While the variation in our data set comes predominantly from the cross-section, we also want to analyse the effect of relative income of wife on share of risky assets using within-couple variation in relative income over time. We use observations of ever-married and ever-employed households over time.[23] Since we observe couples over time we can ask whether violating the social norm by earning more than the husband actually affects the financial portfolio of the household. Specifically, we estimate a fixed effects model regressing relative income of wife on share of risky assets using region and wave fixed effects. The first column in table 6 does not include any demographic controls or risk and time preference variables. Column (2) includes demographic controls like age of husband and wife, squared age of husband and wife, number of years of education, health, race, religion, and number of children of the household. In column (3), we add risk preference variables of husband and wife to the demographic controls of column (2). We further add husband and wife time preference variables to column (4). Finally, in column (5) we include households where one or both the spouses get unemployed but are still married. We find similar results to our cross-sectional model. In fact, significance levels increase in the panel regression for our key variables of interest.

Table 7 presents regression results using alternative specifications. Column (1) shows our benchmark OLS result using all controls and risk and time preference variables on our main

[23]Our results are robust to including households where one or both the spouses might get unemployed over time.

Table 6: Robustness Table: Panel Data Evidence.

	(1)	(2)	(3)	(4)	(5)
Relative Income of Wife	0.001***	0.000	0.000	-0.000	0.001
	(0.000)	(0.000)	(0.011)	(0.011)	(0.011)
Risk:Husband					
2nd Most Risky			0.030	0.033	0.046**
			(0.023)	(0.023)	(0.021)
3rd Most Risky			0.006	0.002	0.020
			(0.021)	(0.021)	(0.019)
Least Risky			0.002	-0.001	0.007
			(0.017)	(0.017)	(0.015)
Risk:Wife					
2nd Most Risky			0.017	0.021	0.021
			(0.024)	(0.025)	(0.023)
3rd Most Risky			-0.004	-0.000	0.003
			(0.023)	(0.023)	(0.021)
Least Risky			-0.001	0.005	0.008
			(0.019)	(0.019)	(0.018)
TimePref:Husband					
1 Year				0.019	-0.002
				(0.027)	(0.025)
Few Years				0.030	0.019
				(0.020)	(0.019)
5-10 Years				0.042**	0.033*
				(0.020)	(0.019)
>10Years				0.016	0.019
				(0.024)	(0.022)
TimePref:Wife					
1 Year				-0.009	0.011
				(0.024)	(0.022)
Few Years				0.041**	0.053***
				(0.020)	(0.018)
5-10 Years				0.068***	0.073***
				(0.019)	(0.018)
>10Years				0.051**	0.064***
				(0.024)	(0.022)
Controls	N	Y	Y	Y	Y
N	13,528	13,288	4,011	3,929	4,637
R^2	0.02	0.12	0.12	0.13	0.13

Notes: We use observations of ever-married and ever-employed households over time. All regressions use the relative labor income of the wife as independent variable and the share of risky assets, the dependent variable, is defined as the sum of stocks and equity funds. Robust standard errors are shown in parenthesis. Constant not shown. Estimates for control variables can be found in the appendix. Significance levels: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$.

sample. In column (2), we exclude the waves covering the Global Financial Crisis. Since we use data from 1992 to 2016, a natural concern is that during and after the period of Global Financial Crisis, the share of risky assets might behave dramatically different due to the financial turmoil during this time. To address this concern, we use a sample till 2006 (pre GFC period) and show the result in column (2). We see no significant change in our results.

Another possible concern is selection bias. To address the concern that households where the wife earns more than her husband are essentially different in their background characteristics from households where the wife earns less than her husband, we use Propensity Score Matching (PSM). We use matching score on background characteristics of age and number of years of education. Then we use the matched sample for our regression. Column (3) shows the results from running our regression model on the PSM matching sample and we find no relevant differences compared to our baseline model. Figure 4 in the appendix presents the distribution before and after matching rather then performing a t-test, because the sample size can affect the t-test validation of the balanced sample.

Further, our data set also allows to use alternative definitions of wealth (i.e. the share of risky assets) and income. Our baseline specification of risky assets considers only the allocation to stocks. Following Guiso et al. (1996) and Addoum (2017) we cumulatively add private business in column 4 and investment in real estate in column (5) to show that our main results are robust to changes in the definition of share of risky assets. Our baseline definition of income includes only labor income of husband and wife. We add pension to labor income for the relative income of wife and show the results in column (6). We also add security income and show the result in column (7). Again, we observe that our results are robust to these different definitions.

Further, our dependent variable, the share of risky assets, is a continuous variable ranging between 0 and 1. Therefore, we also provide robustness by using a fractional response regression model and report the results in column (8). Again, we find that our results are

Table 7: Robustness Table: Alternative Specifications.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Relative Income of Wife	-0.014	-0.018	-0.072	0.017	0.016			-0.037	-0.007
	(0.032)	(0.032)	(0.051)	(0.033)	(0.033)			(0.087)	(0.008)
Risk:Husband									
2nd Most Risky	0.034	0.036	-0.013	0.033	0.025	0.034	0.034	0.090	0.030
	(0.027)	(0.028)	(0.045)	(0.028)	(0.028)	(0.027)	(0.027)	(0.075)	(0.026)
3rd Most Risky	0.004	0.002	0.003	-0.003	0.002	0.004	0.004	0.012	0.003
	(0.026)	(0.026)	(0.043)	(0.026)	(0.026)	(0.026)	(0.026)	(0.069)	(0.024)
Male:Least Risky	0.010	0.008	0.045	0.017	-0.002	0.010	0.010	0.025	-0.004
	(0.021)	(0.021)	(0.034)	(0.022)	(0.022)	(0.021)	(0.021)	(0.057)	(0.019)
Risk:Wife									
2nd Most Risky	0.049*	0.051*	-0.014	0.040	0.015	0.049*	0.049*	0.142*	0.040
	(0.029)	(0.029)	(0.049)	(0.031)	(0.031)	(0.029)	(0.029)	(0.081)	(0.027)
3rd Most Risky	0.019	0.020	0.013	0.023	0.005	0.019	0.019	0.060	0.016
	(0.027)	(0.027)	(0.044)	(0.028)	(0.029)	(0.027)	(0.027)	(0.075)	(0.026)
Least Risky	0.023	0.023	-0.002	0.021	0.013	0.023	0.023	0.069	0.013
	(0.022)	(0.022)	(0.037)	(0.023)	(0.024)	(0.022)	(0.022)	(0.063)	(0.021)
TimePref:Husband									
1 Year	0.008	0.003	-0.005	0.018	0.021	0.008	0.008	0.022	0.022
	(0.032)	(0.032)	(0.047)	(0.034)	(0.034)	(0.032)	(0.032)	(0.092)	(0.030)
Few Years	0.026	0.028	0.031	0.035	0.029	0.026	0.026	0.072	0.040*
	(0.024)	(0.024)	(0.039)	(0.025)	(0.026)	(0.024)	(0.024)	(0.069)	(0.022)
5-10 Years	0.043*	0.043*	0.032	0.048*	0.041*	0.043*	0.043*	0.116*	0.043*
	(0.023)	(0.023)	(0.038)	(0.024)	(0.025)	(0.023)	(0.023)	(0.067)	(0.022)
>10Years	0.022	0.022	0.034	0.018	0.009	0.022	0.022	0.055	0.022
	(0.028)	(0.029)	(0.045)	(0.030)	(0.030)	(0.028)	(0.028)	(0.080)	(0.027)
TimePref:Wife									
1 Year	-0.010	-0.006	0.019	0.004	0.009	-0.010	-0.010	-0.032	-0.003
	(0.029)	(0.029)	(0.048)	(0.031)	(0.032)	(0.029)	(0.029)	(0.086)	(0.026)
Few Years	0.021	0.024	0.057	0.014	0.019	0.021	0.021	0.063	0.034
	(0.023)	(0.023)	(0.038)	(0.024)	(0.024)	(0.023)	(0.023)	(0.066)	(0.022)
5-10 Years	0.053**	0.055**	0.112***	0.053**	0.069***	0.052**	0.053**	0.147**	0.064***
	(0.023)	(0.023)	(0.038)	(0.024)	(0.024)	(0.023)	(0.023)	(0.065)	(0.022)
>10Years	0.060**	0.066**	0.084*	0.055*	0.068**	0.060**	0.060**	0.167**	0.039
	(0.029)	(0.029)	(0.048)	(0.030)	(0.030)	(0.029)	(0.029)	(0.080)	(0.027)
Relative Income of Wife(pen)						-0.014			
						(0.034)			
Relative Income of Wife(sec)							-0.016		
							(0.035)		
Controls	Y	Y	Y	Y	Y	Y	Y	Y	
N	2,887	2,868	1,106	2,899	2,909	2,887	2,887	2,887	3,042
R^2	0.13	0.13	0.14	0.10	0.09	0.13	0.13		0.14

Notes: Column (1) provides the main benchmark regression from column (3) of table 1. Column (2) provides the same regression with the pre GSM period. Column (3) provides the PSM matching regression. We add business holdings to the definition of risky assets in column (4) and further include real estate holdings in column (5). We add pension to the definition of relative income in column (6) and further include security and benefits in column (7). Column (8) shows the results from our fractional regression model. Finally, for column (9), we use the household's last appearance in the survey.
Standard errors in parentheses. Significance levels: *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$.

robust to this different estimator.

Finally, instead of using the first time the household appears in the survey, we use the last time they appear. We find that our results are robust to this alternative measurement (column (9)).

6 Conclusion

This paper combines three different streams in the literature on financial decision making of households. To be precise, we combine the literature on intra-household bargaining, gender differences in preferences, and social norms to add to our understanding of how household members jointly make financial decisions. We begin by deriving a theoretical model which describes the portfolio choice decision of a two-person household, where both members have different risk and time preferences. From this model, we derive four testable hypotheses about the role of the bargaining power, risk preferences, and time preferences as well as a potential discontinuity at the 50 percent relative income threshold. Using pooled cross-section and panel data from the HRS between 1992 and 2016, we find that our results contradict the related literature (e.g. Addoum et al. (2015)) in that the relative bargaining power does not influence the risky asset share once we control for risk and time preferences. Further, we find that risk and time preferences do matter for the risky asset share, especially the wife's preferences. Further, we do not find any evidence for the effect of social norms on risky financial decision making, which is different to the work by Bertrand et al. (2015) and others documenting the effect of social norms on various variables. We then provide various robustness checks for our main results and show that our results hold for all of them.

The findings in this paper carry implications for researchers, policy makers, and financial advisors. First, they imply that not controlling for risk and time preference in household-level models leads to an important omitted variable bias. Second, for policy makers and financial advisers it stresses the importance of understanding the risk and time preference of husband and wife.

Future research is limited by the availability of data. It would, for example, be very interesting to study the effect of risk and time preferences, as well as intra-household bargaining in newly-weds and across the duration of marriage.

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7 Appendix

7.1 Risk and Time Preference Questions from Survey

7.1.1 Risk Preference:

In these questions Respondent is asked to choose between pairs of jobs where one guarantees current family income and the other offers a chance to increase income but also carries the risk of loss of income. If Respondent says s/he would take the risk, the same scenario but with riskier odds is presented. If Respondent says s/he would not take the risk, the same scenario with less risky odds is asked.

The risk preference variable is set using the four levels:

1. Respondent would take a job with even chances of doubling income or cutting it in half.
2. Respondent would take a job with even chances of doubling income or cutting it by a third.
3. Respondent would take a job with even chances of doubling income or cutting it 20 percent.
4. Respondent would take or stay in the job that guaranteed current income given any of the above alternatives.

7.1.2 Time Preference:

The time preference variable is derived from the question: "In planning your family's saving and spending, which time period is most important to you?".

The time preference variable is set using the five levels:

1. Next few months
2. Next year
3. Next few years
4. Next 5-10 years
5. Longer than 10 years

7.2 Mathematical Appendix

Derivation for the risky share proceeds as follows:

$$\partial\vartheta : \theta\beta^h\,\mathbb{E}\left\{\left[\left(1+r^b\right)(1-\lambda)\,\vartheta m_t + \left(1+r^s(\phi)\right)\lambda\vartheta m_t\right]^{-\sigma^h}\left[\left(r^s(\phi)-r^b\right)\vartheta m_t\right]\right\} \tag{13}$$
$$+ (1-\theta)\,\beta^w\,\mathbb{E}\left\{\frac{\left[\left(1+r^b\right)(1-\lambda)\,\vartheta m_t + \left(1+r^s(\phi)\right)\lambda\vartheta m_t\right]^{-\sigma^w}}{\delta}\left[\left(r^s(\phi)-r^b\right)\vartheta m_t\right]\right\} = 0,$$

$$\theta\beta^h\,\mathbb{E}\left\{\left[\left(1+r^b\right)(1-\lambda)\,\vartheta m_t + \left(1+r^s(\phi)\right)\lambda\vartheta m_t\right]^{-\sigma^h}\left[\left(r^s(\phi)-r^b\right)\right]\right\} \tag{14}$$
$$+ (1-\theta)\,\beta^w\,\mathbb{E}\left\{\frac{\left[\left(1+r^b\right)(1-\lambda)\,\vartheta m_t + \left(1+r^s(\phi)\right)\lambda\vartheta m_t\right]^{-\sigma^w}}{\delta}\left[\left(r^s(\phi)-r^b\right)\right]\right\} = 0,$$

$$\frac{\theta\beta^h\delta}{(1-\theta)\,\beta^w}\,\mathbb{E}\left\{\left[\left(1+r^b\right)(1-\lambda)\,\vartheta m_t + \left(1+r^s(\phi)\right)\lambda\vartheta m_t\right]^{-\sigma^h}\left[\left(r^s(\phi)-r^b\right)\right]\right\} \tag{15}$$
$$+ \mathbb{E}\left\{\left[\left(1+r^b\right)(1-\lambda)\,\vartheta m_t + \left(1+r^s(\phi)\right)\lambda\vartheta m_t\right]^{-\sigma^w}\left[\left(r^s(\phi)-r^b\right)\right]\right\} = 0,$$

$$\frac{\theta\beta^h\delta}{(1-\theta)\,\beta^w}\,\mathbb{E}\left\{\left[\left(1+r^b\right)(1-\lambda) + \left(1+r^s(\phi)\right)\lambda\right]^{-\sigma^h}\left(\vartheta m_t\right)^{-\sigma^h}\left[\left(r^s(\phi)-r^b\right)\right]\right\} \tag{16}$$
$$+ \mathbb{E}\left\{\left[\left(1+r^b\right)(1-\lambda) + \left(1+r^s(\phi)\right)\lambda\right]^{-\sigma^w}\left(\vartheta m_t\right)^{-\sigma^w}\left[\left(r^s(\phi)-r^b\right)\right]\right\} = 0,$$

$$\frac{\theta\beta^h\delta\left(\vartheta m_t\right)^{\sigma^w-\sigma^h}}{\beta^w(1-\theta)}\,\mathbb{E}\left(r^s(\phi)-r^b\right)\left[1+r^b+\left(r^s(\phi)-r^b\right)\lambda\right]^{-\sigma^h} \tag{17}$$
$$+ \mathbb{E}\left(r^s(\phi)-r^b\right)\left[1+r^b+\left(r^s(\phi)-r^b\right)\lambda\right]^{-\sigma^w} = 0.$$

For the savings rate the derivation is:

$$\partial\lambda : \theta\Big\{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^h}\left(-m_t\right)+\beta^h\,\mathbb{E}\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t+\left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^h} \tag{18}$$
$$\left(\left(1+r^b\right)\left(1-\lambda\right)m_t+\left(1+r^s\right)\lambda m_t\right)\Big\}$$
$$+\left(1-\theta\right)\Bigg\{\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^w}}{\delta}\left(-m_t\right)+\beta^w\,\mathbb{E}\,\frac{\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t+\left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^w}}{\delta}$$
$$\left(\left(1+r^b\right)\left(1-\lambda\right)m_t+\left(1+r^s\right)\lambda m_t\right)\Big\}=0.$$

$$\frac{\theta}{\left(1-\theta\right)}\left[-\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^h}+\beta^h\,\mathbb{E}\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t+\left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^h}\right. \tag{19}$$
$$\left.\left(\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right)\right]$$
$$-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^w}}{\delta}+\beta^w\,\mathbb{E}\,\frac{\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t+\left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^w}}{\delta}$$
$$\left(\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right)=0.$$

$$\frac{\theta\delta\beta^h}{\left(1-\theta\right)\beta^w}\left[-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^h}}{\beta^h}+\mathbb{E}\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t+\left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^h}\right. \tag{20}$$
$$\left.\left(\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right)\right]$$
$$-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^w}}{\beta^w}+\mathbb{E}\left[\left(1+r^b\right)\left(1-\lambda\right)\vartheta m_t+\left(1+r^s\right)\lambda\vartheta m_t\right]^{-\sigma^w}$$
$$\left(\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right)=0.$$

$$\frac{\theta\delta\beta^h}{\left(1-\theta\right)\beta^w}\left[-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^h}}{\beta^h}+\mathbb{E}\left[\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right]^{-\sigma^h}\left(\vartheta m_t\right)^{-\sigma^h}\right. \tag{21}$$
$$\left.\left(\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right)\right]$$
$$-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^w}}{\beta^w}+\mathbb{E}\left[\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right]^{-\sigma^w}\left(\vartheta m_t\right)^{-\sigma^h}$$
$$\left(\left(1+r^b\right)\left(1-\lambda\right)+\left(1+r^s\right)\lambda\right)=0.$$

$$\frac{\theta\beta^h\delta\left(\vartheta m_t\right)^{\sigma^w-\sigma^h}}{\beta^w\left(1-\theta\right)}\left[-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^h}}{\beta^h\left(\vartheta m_t\right)^{-\sigma^h}}+\mathbb{E}\left(1+r^b+\left(r^s\left(\phi\right)-r^b\right)\lambda\right)^{1-\sigma^h}\right] \tag{22}$$
$$-\frac{\left(\left(1-\vartheta\right)m_t\right)^{-\sigma^w}}{\beta^w\left(\vartheta m_t\right)^{-\sigma^w}}+\mathbb{E}\left(1+r^b+\left(r^s\left(\phi\right)-r^b\right)\lambda\right)^{1-\sigma^w}=0.$$

7.3 Additional Regression Tables and Graphs

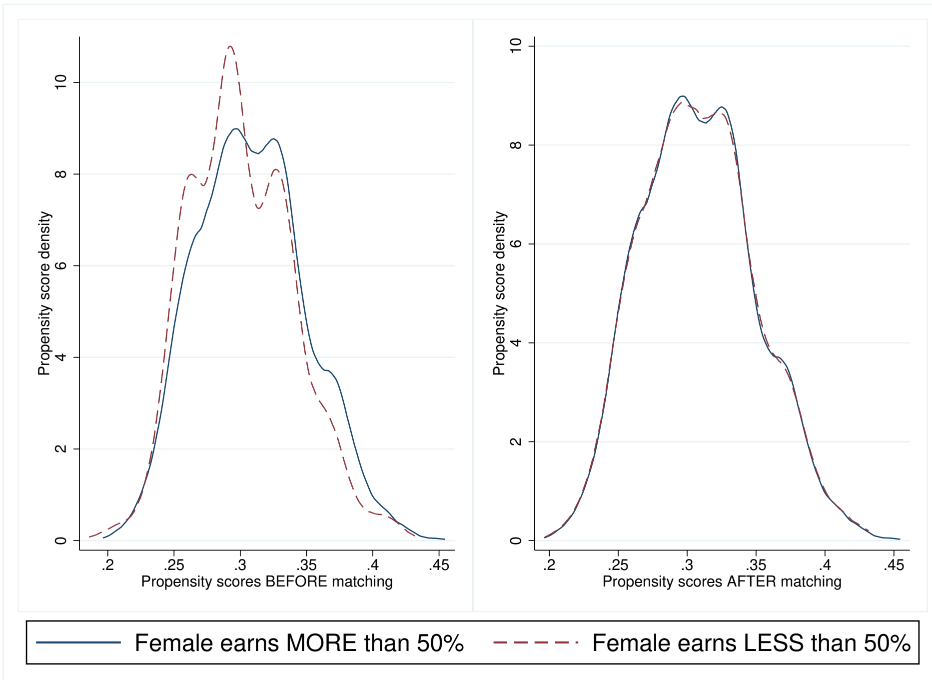

Figure 4: PSM graph (before and after matching).

Table 8: Subsample Result: Effect of Wife's Income Share on Risky Asset Holdings

	(1)	(2)	(3)	(4)	(5)
Relative Income of Wife	-0.039	-0.015	-0.016	-0.014	-0.088
	(0.033)	(0.032)	(0.032)	(0.032)	(0.101)
Risk: Husband					
2nd Most Risky			0.034	0.034	0.035
			(0.028)	(0.027)	(0.028)
3rd Most Risky			0.007	0.004	0.004
			(0.026)	(0.026)	(0.026)
Least Risky			0.011	0.010	0.010
			(0.021)	(0.021)	(0.021)
Risk: Wife					
2nd Most Risky			0.052*	0.049*	0.049*
			(0.029)	(0.029)	(0.029)
3rd Most Risky			0.020	0.019	0.020
			(0.027)	(0.027)	(0.027)
Least Risky			0.025	0.023	0.023
			(0.022)	(0.022)	(0.022)
TimePref:Husband					
One Year				0.008	0.007
				(0.032)	(0.032)
Few Years				0.026	0.026
				(0.024)	(0.024)
5-10 Years				0.043*	0.043*
				(0.023)	(0.023)
>10Years				0.022	0.021
				(0.028)	(0.029)
TimePref:Wife					
One Year				-0.010	-0.010
				(0.029)	(0.029)
Few Years				0.021	0.021
				(0.023)	(0.023)
5-10 Years				0.053**	0.053**
				(0.023)	(0.023)
>10Years				0.060**	0.061**
				(0.029)	(0.029)
$RelativeIncomeofWife^2$					0.086
					(0.112)
Controls	N	Y	Y	Y	Y
N	2,887	2,887	2,887	2,887	2,887
R^2	0.00	0.12	0.12	0.13	0.13

Notes: This table presents the results of OLS estimation result from table 3 on the sample that includes risk and time preference variables. Robust standard errors are used for these regressions. Standard errors in parentheses. Significance levels: *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$.

Table 9: Main Regression with Controls:

	(1)	(2)	(3)	(4)	(5)
Relative Income of Wife	-0.095***	-0.044*	-0.013	-0.014	-0.088
	(0.024)	(0.026)	(0.032)	(0.032)	(0.101)
Husband age		0.018	0.019	0.009	0.009
		(0.014)	(0.016)	(0.016)	(0.016)
male_age_sq		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Wife age		0.018	0.028*	0.026	0.026*
		(0.012)	(0.016)	(0.016)	(0.016)
female_age_sq		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Husband_race:Black		-0.055	0.009	0.004	0.003
		(0.067)	(0.092)	(0.091)	(0.091)
Husband_race:Other		-0.039	0.069	0.075	0.075
		(0.037)	(0.051)	(0.052)	(0.053)
Wife_race:Black		-0.051	-0.106	-0.092	-0.090
		(0.068)	(0.093)	(0.092)	(0.092)
Wife_race:Other		-0.048	-0.088*	-0.087*	-0.086*
		(0.038)	(0.051)	(0.051)	(0.051)
Husband_rlgn:Catholic		0.040**	0.059***	0.055**	0.055**
		(0.018)	(0.022)	(0.023)	(0.023)
Husband_rlgn:Jewish		0.095*	0.152**	0.149**	0.149**
		(0.054)	(0.071)	(0.072)	(0.073)
Husband_rlgn:None		-0.008	-0.027	-0.025	-0.025
		(0.020)	(0.026)	(0.027)	(0.027)
Husband_rlgn:Other		-0.034	-0.042	-0.034	-0.034
		(0.047)	(0.081)	(0.080)	(0.080)
Wife_rlgn:Catholic		-0.019	-0.029	-0.026	-0.026
		(0.018)	(0.021)	(0.022)	(0.022)
Wife_rlgn:Jewish		-0.060	-0.106	-0.098	-0.098
		(0.055)	(0.068)	(0.069)	(0.070)
Wife_rlgn:None		-0.032	-0.018	-0.016	-0.016
		(0.024)	(0.033)	(0.033)	(0.033)
Wife_rlgn:Other		-0.036	0.089	0.112	0.112
		(0.046)	(0.084)	(0.086)	(0.086)
Controls	N	Y	Y	Y	Y
N	5,555	4,465	2,955	2,887	2,887
R^2	0.00	0.12	0.12	0.13	0.13

Notes: This table presents the results of OLS estimation regressing relative income of wife on share of risky assets of households. Robust standard errors are used for these regressions. Column (2) includes demographic controls. We add risk preference variables to column (3) and further add time preference variables to column (4). Finally, we add square of relative income of wife to column (3). Standard errors in parentheses. Significance levels: *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$.

Table 10: Main Regression with Controls:(contd.)

	(1)	(2)	(3)	(4)	(5)
Husband_rgn:MidWest		-0.272**	-0.008	-0.008	-0.009
		(0.130)	(0.020)	(0.020)	(0.020)
Husband_rgn:South		-0.326***	-0.350***	-0.285***	-0.282***
		(0.028)	(0.035)	(0.044)	(0.045)
Husband_rgn:West		-0.418***	-0.510***	-0.446***	-0.442***
		(0.098)	(0.059)	(0.069)	(0.069)
Husband_rgn:Other		-0.318***			
		(0.088)			
Wife_rgn:MidWest		0.280**			
		(0.130)			
Wife_rgn:South		0.287***	0.291***	0.229***	0.226***
		(0.027)	(0.034)	(0.043)	(0.043)
Wife_rgn:West		0.400***	0.481***	0.421***	0.417***
		(0.097)	(0.057)	(0.067)	(0.068)
Wife_rgn:Other		0.000			
		(.)			
No. of Children		-0.010***	-0.009**	-0.010**	-0.010**
		(0.003)	(0.004)	(0.004)	(0.004)
Controls	N	Y	Y	Y	Y
N	5,555	4,465	2,955	2,887	2,887
R^2	0.00	0.12	0.12	0.13	0.13

Notes: This table presents the results of OLS estimation regressing relative income of wife on share of risky assets of households. Robust standard errors are used for these regressions. Column (2) includes demographic controls. We add risk preference variables to column (3) and further add time preference variables to column (4). Finally, we add square of relative income of wife to column (3). Standard errors in parentheses. Significance levels: *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$.

Table 11: Main Regression with Controls:(contd.)

	(1)	(2)	(3)	(4)	(5)
Husband_hlth:Very Good		-0.003	0.005	0.009	0.009
		(0.015)	(0.017)	(0.017)	(0.017)
Husband_hlth:Good		-0.018	-0.022	-0.014	-0.014
		(0.015)	(0.018)	(0.018)	(0.018)
Husband_hlth:Fair		-0.008	-0.007	0.006	0.006
		(0.021)	(0.027)	(0.027)	(0.027)
Husband_hlth:Poor		-0.057	-0.101**	-0.086*	-0.086*
		(0.042)	(0.050)	(0.050)	(0.051)
Wife_hlth:Very Good		-0.045***	-0.040**	-0.036**	-0.036**
		(0.014)	(0.017)	(0.017)	(0.017)
Wife_hlth:Good		-0.053***	-0.066***	-0.060***	-0.060***
		(0.016)	(0.018)	(0.019)	(0.019)
Wife_hlth:Fair		-0.095***	-0.110***	-0.100***	-0.101***
		(0.022)	(0.027)	(0.027)	(0.027)
Wife_hlth:Poor		-0.144***	-0.169***	-0.156***	-0.156***
		(0.042)	(0.052)	(0.054)	(0.054)
Husband:2nd Most Risky			0.033	0.034	0.035
			(0.027)	(0.027)	(0.028)
Husband:3rd Most Risky			0.008	0.004	0.004
			(0.025)	(0.026)	(0.026)
Husband:Least Risky			0.013	0.010	0.010
			(0.021)	(0.021)	(0.021)
Wife:2nd Most Risky			0.047	0.049*	0.049*
			(0.029)	(0.029)	(0.029)
Wife:3rd Most Risky			0.015	0.019	0.020
			(0.027)	(0.027)	(0.027)
Wife:Least Risky			0.019	0.023	0.023
			(0.022)	(0.022)	(0.022)
HusbandTimePref:One Year				0.008	0.007
				(0.032)	(0.032)
HusbandTimePref:Few Years				0.026	0.026
				(0.024)	(0.024)
HusbandTimePref:5-10 Years				0.043*	0.043*
				(0.023)	(0.023)
HusbandTimePref:>10Years				0.022	0.021
				(0.028)	(0.029)
WifeTimePref:One Year				-0.010	-0.010
				(0.029)	(0.029)
WifeTimePref:Few Years				0.021	0.021
				(0.023)	(0.023)
WifeTimePref:5-10 Years				0.053**	0.053**
				(0.023)	(0.023)
WifeTimePref:>10Years				0.060**	0.061**
				(0.029)	(0.029)
Controls	N	Y	Y	Y	Y
N	5,555	4,465	2,955	2,887	2,887
R^2	0.00	0.12	0.12	0.13	0.13

Notes: This table presents the results of OLS estimation regressing relative income of wife on share of risky assets of households. Robust standard errors are used for these regressions. Column (2) includes demographic controls. We add risk preference variables to column (3) and further add time preference variables to column (4). Finally, we add square of relative income of wife to column (3). Standard errors in parentheses. Significance levels *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$.

Table 12: Regression discontinuity table

	(1)
Conventional	-0.014
	(0.033)
Bias-corrected	-0.012
	(0.033)
Robust	-0.012
	(0.039)
Observations	5021
R^2	

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Age, education levels, and health of husband and wife are used as controls.