Do Investors' Subjective Risk Perceptions Influence Their Portfolio Choices? A Household Bargaining Perspective

Charlene M. Kalenkoski[†]

Texas Tech University

Xianwu Zhang[‡]

John Carroll University

Abstract

This paper examines the effects of individual investors' subjective risk perceptions on their portfolio choices from a household bargaining perspective. Using the 2012 wave of the Health and Retirement Study (HRS), this paper finds that individual investors view the stock market to be much riskier than it actually is according to objective measures. This paper also finds that the subjective risk perception of the household member with more bargaining power has a significant negative effect on the allocation of the household portfolio to risky assets, and that the subjective risk perception of the household member with less bargaining power has no significant effect on the allocation of household portfolio to risky assets, controlling for demographic and other factors.

Keywords: Subjective risk perception, household bargaining, Household Portfolio Choice, HRS

JEL Classification: D10, D13, G11, G41

†Department of Personal Financial Planning, Texas Tech University, 1301 Akron Avenue Box 41210, Lubbock, TX 79409-1210; Email: charlene.kalenkoski@ttu.edu

‡Department of Economics and Finance, John Carroll University, 1 John Carroll Boulevard University Heights, OH 44118; Email: xzhang@jcu.edu

Introduction

Campbell (2006) argues that, in order to maximize the total welfare benefits of the financial market, it is critically important to ensure that the households invest effectively in this market. As a result, from a policy perspective, research is much needed to help figure out what explains households' investment behaviors. Indeed, there is a large body of literature examining the various determinants of households' investment behaviors. Most of this literature views a household as a single decision maker, assuming altruism on the part of the household member. However, since the 1980s, a non-unitary model of the household has taken precedence given that household members are not altruistic and that they use their bargaining power to control decisions within the household. The household's decisions, including those related to investing, such as the decision to invest in the stock market or real estate market, are the results of bargaining among the household members. In this paper, the ratio of risky assets in a household portfolio, which is calculated as the dollar amount of risky assets divided by the total dollar value of the financial portfolio, is used to measure the households' portfolio decisions.

There are a handful of studies that examine the effect of household bargaining on households' portfolio choices. The underlying mechanism identified in these studies has been the difference in risk aversion between a wife and her husband. However, in addition to different levels of risk aversion, household members also have significantly different subjective risk perceptions. Subjective risk perception is measured by a household member's subjective probability that mutual fund shares invested in blue-chip stocks (like those in the Dow Jones Industrial Average) will have fallen in value by more than 20 percent next year at the same time. Subjective risk perception plays a significant role in individual investors' decisions to invest in the financial market (Goetzmann et al., 2016; Guiso et al., 2008). Using data from the 2012 wave of Health and Retirement Study

(HRS), this paper finds that, among households in which both the wife and the husband responded to the risk-perception question, 87% of the couples have different risk perceptions.

This paper examines subjective risk perceptions between a wife and her husband as the source of conflict between household members using the 2012 Wave of HRS. It empirically estimates the effect of a household member's subjective risk perception on the households' portfolio decisions. Specifically, this paper uses different frequently used proxies for bargaining power to identify the spouse with more bargaining power and the spouse with less bargaining power. It also examines whether the household member with greater bargaining power has his or her perception of risk reflected in the households' portfolio choices, controlling for other characteristics, such as total wealth, demographic factors, and investment time horizon. The bargaining proxies used include gender norms (male dominates, or female dominates), years of education, hourly wage rate, earnings, a dummy for work-for-pay, and the number of work hours per week. When male-dominate (female-dominate) is used as a bargaining proxy, a husband (a wife) is assumed to have more bargaining power. When years of education is used, the spouse with more years of education is assumed to have more bargaining power. The similar rationale applies to other proxies. Consistent with the existing literature, this paper uses the ratio of the dollar value of risky assets in a household portfolio to measure the allocation choices of a household's portfolio. The definitions of risky assets used in this paper are in line with the existing literature. The data shows that about 61% of households hold zero risky assets. Given this feature of data, this paper uses a Tobit model to describe the relationship between the risky asset ratio and the risk perceptions of different household members, controlling for other characteristics.

This paper contributes to the household portfolio choice literature by investigating a new underlying mechanism through which the bargaining between household members impacts the

households' portfolio choices. Using the Dow Jones Industrial Average monthly historical price from 1885 to 2017, the historical probability of a 20% annual drop is about 2.5%. However, based on the 2012 Wave of HRS, the participants in the sample believe that the subjective probability of this similar 20% drop event is about 34% on average. Consistent with Guiso et. al. (2008), this paper finds that individual investors with higher subjective risk perception tend to reduce their portfolio allocation in risky asset (i.e. stock market). From a policy perspective, this finding can provide some guidance on how to improve the participation of the public in the stock market. There is a great need for the policy makers to ensure that the public can have objective risk perception of the stock market and effectively allocate their portfolios in the financial market.

Literature

The research question in this paper is motivated by the collective bargaining model of the household (Chiappori, 1988; Lundberg and Pollak, 1993; Manser and Brown, 1980). The intuition reflected in the theoretical framework is simple. A wife and her husband are assumed to be self-interested individuals that each has their own utility function. The household-level utility function is a weighted sum of each spouse's individual utility function. The weights represent each spouse's bargaining power. The household portfolio decisions are jointly determined by the household members because the household portfolio decisions maximize the household-level utility function. A household member with higher weight (bargaining power) will bring his/her influence into the household portfolio decisions. Specifically, a less risk-averse husband with more bargaining power will increase the allocation of risky assets to the utility-maximizing household portfolio and a more risk-averse wife with more bargaining power will decrease the allocation of risky assets to the utility-maximizing household portfolio. The Health and Retirement Study (HRS) also shows that the husband's risk preference is different from wife's risk preference in almost 50% of married

couples (Mazzocco, 2004). Since the 1980s, theoretical and empirical work have shown that non-unitary models of the household can better explain household behaviors than the unitary models of the household (Manser and Brown, 1980; Chiappori, 1988; Lundberg and Pollak, 1993). Non-unitary models can be divided into two broad categories – cooperative models (or collective models) and non-cooperative models. Non-unitary models do not view households as a single decision maker. Instead, they assume that household members are not altruistic and that they use their bargaining power to control decisions within the household.

There is existing literature that investigates the determinants of the household bargaining power and thus this paper chooses bargaining power proxies that have been used already. Lundberg (2005) and Friedberg and Webb (2006) study the effect of a household member's labor market opportunities on the bargaining power. Lundberg (2005) examines the effects of property ownership and restraint of women's mobility on bargaining powers. A household member's current earnings, retirement status, educational attainment and others are used in previous studies(Yilmazer and Lich, 2013; Lyons and Nelson, 2013; Gervais et al., 2012) . Yilmazer and Lich (2015) use two bargaining-power-related survey questions from HRS as direct proxies and current earnings as indirect proxies for the household members' bargaining powers.

A number of recent papers investigate the determinants of household portfolio choice (Van Rooij et al. 2011; Bertocchi et al. 2011; Atella et al. 2012; Disney and Gathergood 2013; Roche et al. 2013; Von Gaudecker 2015). A short list of the determinants includes financial literacy, labor income risk, health status, peer effects, marriage, religion, information asymmetry, dividend preference, life insurance and overconfidence.

Household portfolio decisions are the results of bargaining among the household members. However, there are only a few papers which study the effects of household bargaining on

households' portfolio choices. The existing literature on household bargaining and household portfolio choice mainly investigates the effects of different risk preferences (or risk tolerance) among household members. Lundberg and Pollak (1993) provide the theoretical framework for this line of research. Their paper assumes that each household member has his or her own utility function and his or her own risk tolerance or preference, and that the household maximizes a weighted household utility function that incorporates both the husband's and wife's utility functions. Each household member's risk preference will affect the household portfolio decisions through his or her bargaining power. Lyons and Nelson (2008) use the HRS and find that the risk aversion of the household member with more bargaining power determines a household's portfolio choices. Their paper also suggests that the share of risky assets in the household portfolio is associated positively with wealth. Gervais et al. (2012) examine the effect of household bargaining on households' portfolio choices over the life cycle and find that changes in intra-household bargaining power are associated with significant shifts to the allocation of risky assets in households' portfolio choices. Vardardottir (2013) use panel data covering the entire Swedish population over seven years and find that married women's bargaining power is associated negatively with the riskiness of the household portfolio and associated positively with the diversification of the household portfolio. Yilmazer and Lich (2015) use the 1992-2006 waves of HRS and find that the risk tolerance of the household member with more bargaining power is associated positively with the allocation of risky assets in a two-person-household portfolio. Their paper also further finds that a household member's risk tolerance is not correlated with his or her bargaining power. Ke (2016) investigates one alternative channel by which household bargaining power affects households' portfolio choices and examines over 30 million U.S. households and

finds that gender identity norms, rather than a difference in risk preferences of household members, can explain stock market participation in the household portfolio.

Model

The empirical model in this paper is given by:

$$\frac{risky\ assets}{total\ financial\ portfolio} * 100 = \alpha + \beta_1 * the\ dominat\ spouse's\ probability$$

$$+ \beta_2 * the\ other\ spouse's\ probability + \beta_3 * X + \mu \qquad (1)$$

This paper examines the effect of the household members' subjective risk perceptions on the household portfolio decisions. This paper separates the household members by using the bargaining power. The dominant spouse is defined as the spouse with more bargaining power and the other spouse is defined as the spouse with less bargaining power. Risky assets ratio is used to proxy the household portfolio decision. The spouse's subjective probability is used to proxy the spouse's subjective risk perception. Given that about 61% of households in the sample hold zero risky assets, this paper uses a Tobit model to describe the relationship between the risky asset ratio and the risk perceptions of different household members, controlling for other characteristics.

The dependent variable is the ratio of risky assets in a household portfolio, which is calculated as the dollar amount of risky assets divided by the total dollar value of the financial portfolio. This ratio is used to measure the households' portfolio decisions. Consistent with the existing literature, both narrow and broad definitions of the risky assets are adopted and examined in this paper. Total financial portfolio is defined as the sum of the net value of stocks, mutual funds, investment trusts, checking, savings, money market accounts, CDs, government savings bonds, T-bills, bonds, bond fund and other savings. The narrow definition of the risky assets is the sum of stocks, mutual funds,

and investment trusts. After adding the net value of the business to the total financial portfolio, the broad definition of the risky assets is the sum of stocks, mutual funds, investment trusts and the net value of business. This paper shows the results by using the broad definition of the risky assets.

Two main independent variables of interest are the dominant spouse's subjective probability and the other spouse's subjective probability. The bargaining proxies used include gender norms (male dominates, or female dominates), years of education, hourly wage rate, earnings, a dummy for work-for-pay, and the number of work hours per week. A key hypothesis in this paper is that the subjective risk perception of the household member with more bargaining power should be significantly negatively associated with the allocation of the households' portfolio to risky assets.

X includes a list of control variables for demographic and other factors. Consistent with existing literature, X includes age, race, religion and total household wealth.

β_1 measures how much impact the "subjective risk perception of the spouse with more bargaining power" has on the risky asset ratio of the household portfolio. As bargaining model predicts, the spouse with more bargaining power has more say in household decisions than the spouse with less bargaining power. In context of household portfolio decisions, the subjective risk perception of the spouse with more bargaining power should significantly decrease the allocation of risky assets in the household portfolio. The expectation for β_1 is to be negative.

β_2 measures how much impact the "subjective risk perception of the spouse with less bargaining power" has on the risky asset ratio of the household portfolio. The expectation for β_2 is to be negative.

β_3 measures how much impact other control variables have on the risky asset ratio of the household portfolio.

μ is error term, which is assumed to follow a normal distribution.

Data

The sample is from the Health and Retirement Study (HRS), a very rich household survey data set focusing on the elderly in the United States. Two data sources are used in this paper. One is the 2012 HRS Core data set and the other one is the 2012 Rand HRS (Wave 11), which is a very user-friendly version of HRS data set which includes already cleaned and nicely formatted variables. For convenience purposes, this paper uses the risk perception variables from the Expectations Module of the 2012 HRS Core data set and the demographic variables from the 2012 Rand HRS (Wave 11).

In the 2012 wave of HRS, the original sample has 20,554 participants and 9,642 households. In the Expectations Module of the 2012 HRS Core data set, a frequently used question in the literature (What is your subjective probability that mutual fund shares invested in blue-chip stocks (like those in the Dow Jones Industrial Average) will have fallen in value by more than 20 percent next year at the same time) is employed in the research. A participant can choose his/her subjective probability, from 0% to 100%. Out of 20,554 participants, 12,506 participants answered this question. Out of 9,642 households, both wives and husbands in 2,709 households answered this question (after eliminating the 998 or 999 invalid observations, i.e. don't know or refuse to answer).

Table 1 The sample Summary statistics

	Mean	Standard error	95% Confidence interval	
Characteristics				
Age-husband	63.38	0.2	63	63.77
Age-wife	61.04	0.23	1950.51	1951.41
Education-husband	14.1	0.06	13.97	14.22
Education-wife	14.08	0.06	13.97	14.2
Labor income-husband	$34,000	$1,865	$30,344	$37,656
Labor income-wife	$35,119	$2,101	$30,999	$39,239
Level				
Stocks	$100,255	$11,165	$78,361	$122,150
Bonds	$24,513	$7,769	$9,278	$39,749
Cash	$62,849	$4,309	$54,399	$71,298
Private Business	$73,470	$12,097	$49,747	$97,193
Real Estate	$68,005	$11,045	$46,347	$89,664
Portfolio allocation				
Stocks	9.07%	0.42%	8.24%	9.89%
Bonds	0.98%	0.11%	0.76%	1.20%
Cash	25.04%	1.97%	21.19%	28.90%
Number of observations	2282			

The final sample includes 2,282 households (either married or cohabiting) in the 2012 wave of HRS after eliminating the households with missing values on demographic variables. Table I presents a summary of variables of interest with weights. According to the figures, both the wife and the husband have about same average years of education. On average, wives have a little higher labor income than husbands. The average dollar value of stock is $100,255. Average stock share in the total financial portfolio is about 9%. In fact, about 61.31% of households hold zero stocks. On average, bonds account for 1% of a household's financial portfolio and cash accounts for 25% of a household's financial portfolio. Here the definition of cash is sum of checking and saving account and Money Market Accounts.

In about 87% of households, there are different subjective perceptions of a blue-chip stock's riskiness between a wife and her husband. According to Figure 1 and Table II, there is a significant

discrepancy between a wife's subjective probability and her husband's subjective probability. Figure 2 and 3 show the distribution of the subjective risk perception of the household members. The average subjective probability of the head of household is 34% and the average subjective probability of the spouse is 35%. However, according to Figure 4, Dow Jones Industrial Average (DJI) Monthly price data (Jan. 1885-Jan. 2017) show that a 20% annual drop only happened at a 2.5% probability.
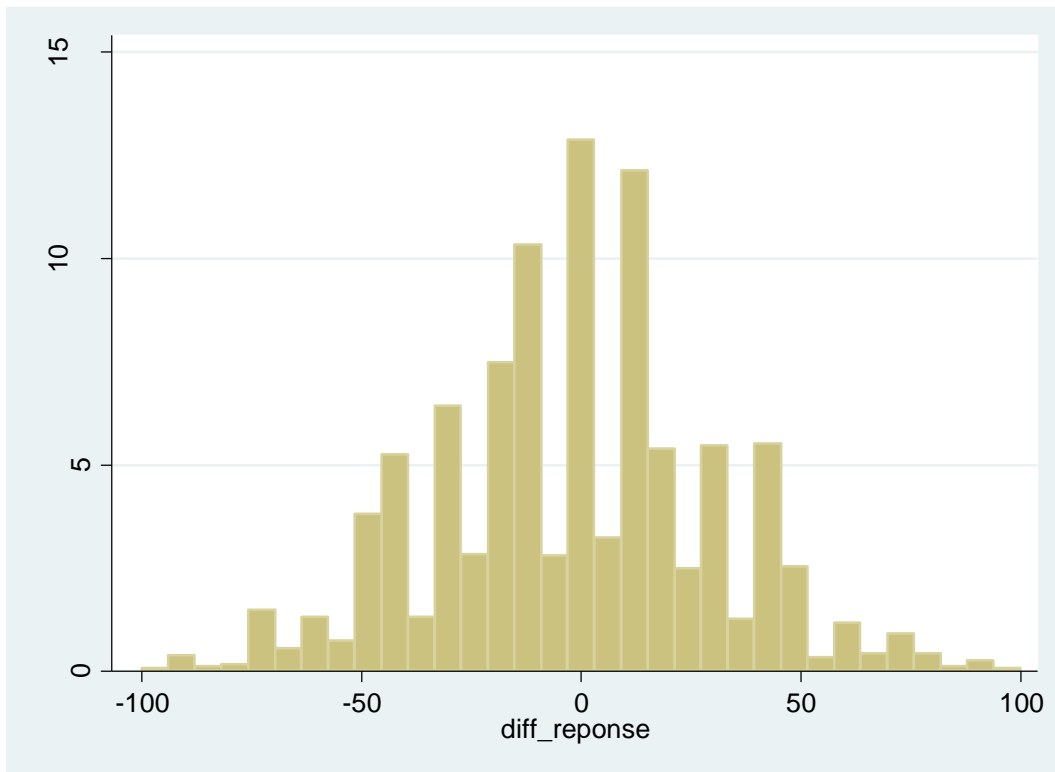

Figure 1 the distribution of difference between wife and husband's subjective perception of risk

Table 2 Summary of subjective risk perception of Head of Household and Spouse

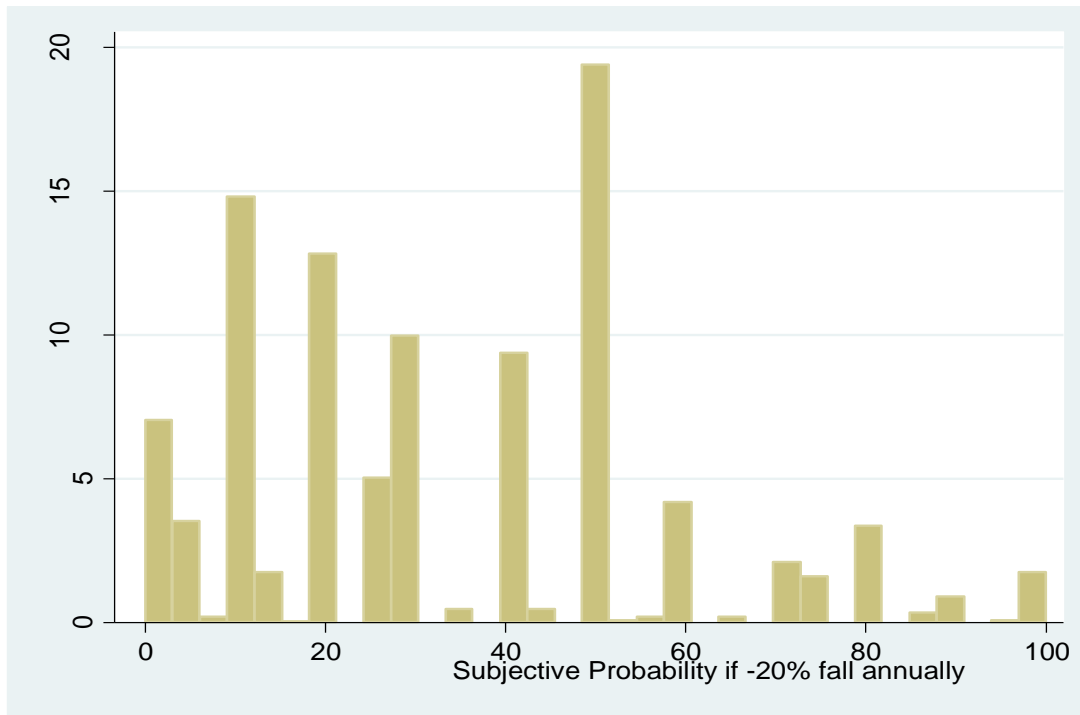| Subjective probability of market going down	Freq.	Percent
Respondent has lower subjective probability	1224	45.18
Both have same subjective probability	335	12.37
Respondent has higher subjective probability	1,150	42.45
Total	2,709	100

Note: the 2012 HRS Core Section P NV180

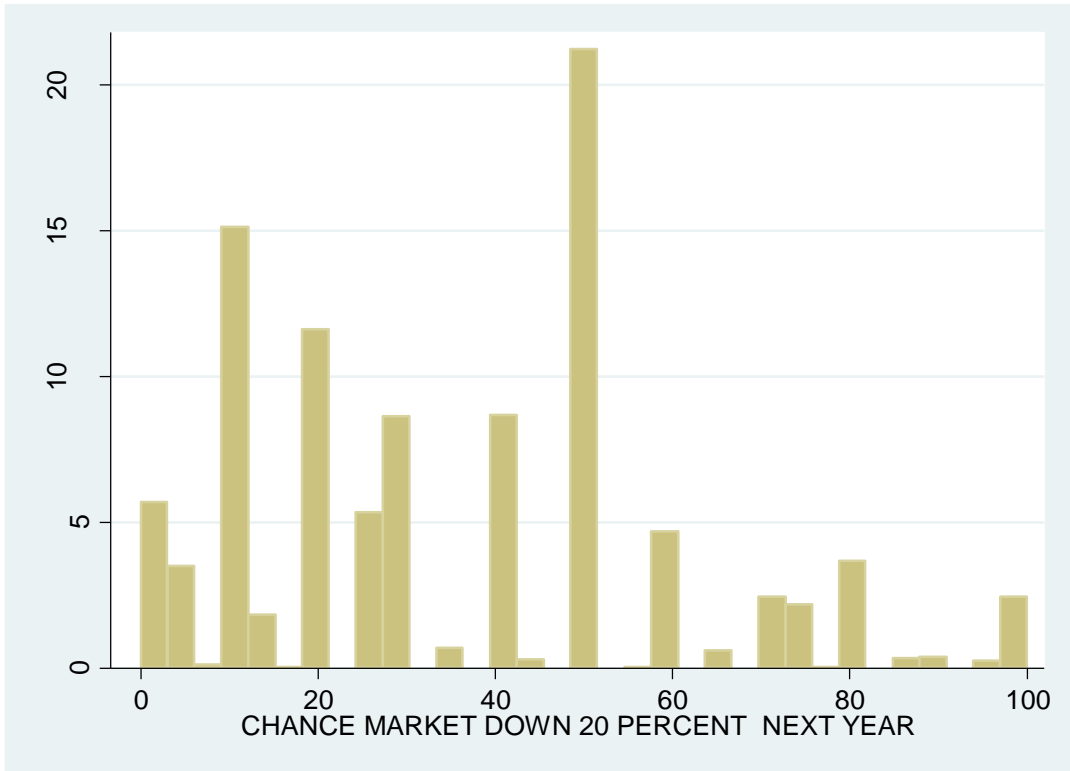Figure 2 the distribution of the subjective risk perception of head of household

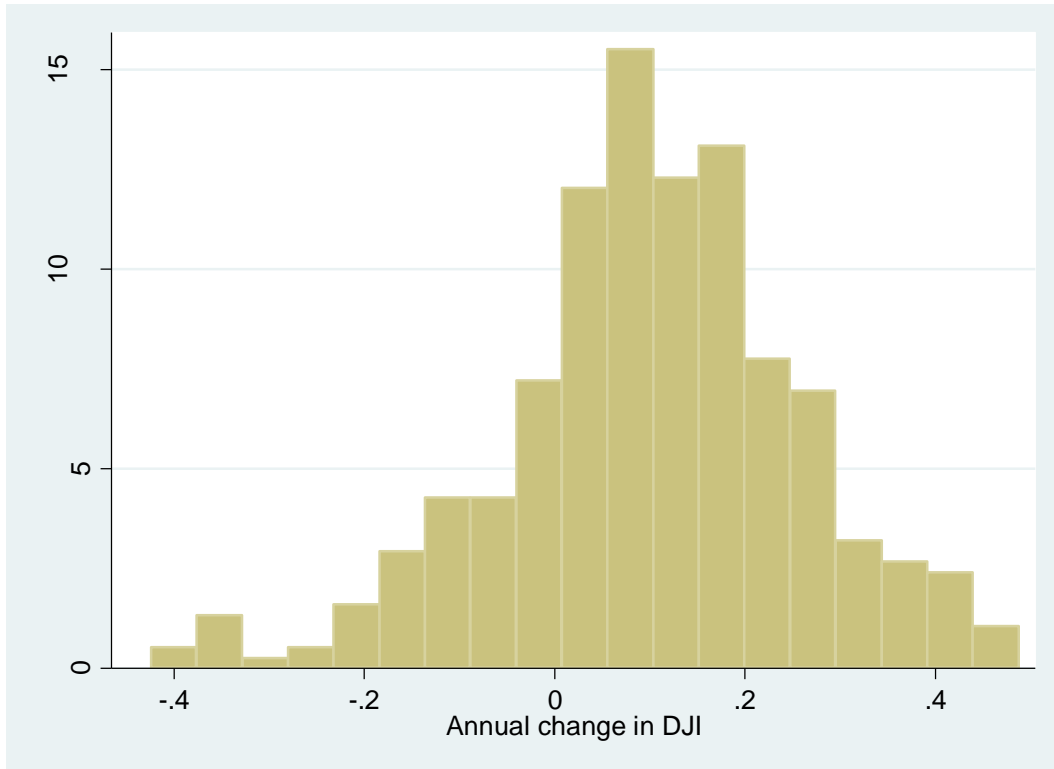Figure 3 the distribution of the subjective risk perception of the spouse

Figure 4 The distribution of annual % change of DJI

Note: Dow Jones Industrial Average (DJI) Monthly price data (Jan. 1885-Jan. 2017)

Empirical results

Consistent with existing literature in household portfolio research, this paper employs a broad definition of a risky asset, i.e. the sum of stocks, mutual funds, and personal business. The total financial portfolio is defined as the sum of all their financial assets, like stocks, bonds, investment funds, business and real estate. The risky asset ratio is defined as risky asset divided by total financial portfolio. As mentioned previously, out of 2,282 households, 1,399 households (61.31%) have zero stocks allocations. As such, a Tobit model is used to estimate the empirical model (1). In the following analysis, different existing bargaining power proxies are used to identify the spouse with more bargaining power and the spouse with less bargaining power. For each

bargaining power proxy, four different model settings are included to answer different questions. Model I and II only include the subjective probability of the spouse with more bargaining power with and without controls. Model III and IV additionally include the subjective probability of the spouse with less bargaining power with or/and without controls. Controls include participants' age, gender, race, and education.

Table 3 Estimates if "work for pay" is used to proxy bargaining power

Risky asset ratio	Model I Tobit ME	Model II Tobit ME	Model III Tobit ME	Model IV Tobit ME
Subjective probability of the spouse who has more bargaining power	-0.1874* *	-0.0979 *		-0.1243*
Subjective probability of the spouse who has less bargaining power			-0.1323***	-0.0881
Total Wealth less IRA	0.0000***	0.0000***	0.0000***	No
Controls				
respondent's characteristics	No	Yes	Yes	Yes
spouse's characteristics	No	Yes	Yes	Yes

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Table 3 represents the estimates of the effect of subjective perception of riskiness combined with bargaining power on household risky assets allocation decision. In this table, this paper uses a variable called "Work for pay" to proxy a household member's bargaining power. The "work for pay" variable is a yes or no question in Rand HRS. Participants answer "1" if they are working to pay expenses and answer "0" if they are not currently working for paying expenses. This proxy is somewhat in line with the existing earning proxy. This paper argues that a working-for-pay household member has more bargaining power than a non-working member. Across the models in table 3, overall the subjective riskiness perception of the spouse with more bargaining power have significant marginal effect on the household risky asset allocation decision. Demographic and total wealth less IRA also significantly contribute to explain variation of risky asset ratio.

Table 4 Estimates if "Working hours per week" is used to proxy bargaining power

Risky asset ratio	Model I Tobit ME	Model II Tobit ME	Model III Tobit ME	Model IV Tobit ME
Subjective probability of the spouse who has more bargaining power	-0.1388***	-0.1158**		-0.1101* *
Subjective probability of the spouse who has less bargaining power			-0.0494	-0.0307
Total Wealth less IRA	0.0000***	0.0000***	0.0000***	0.0000***
Controls				
respondent's characteristics	No	Yes	Yes	Yes
spouse's characteristics	No	Yes	Yes	Yes

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Table 5 Estimates if "Years of education" is used to proxy bargaining power

Risky asset ratio	Model I Tobit ME	Model II Tobit ME	Model III Tobit ME	Model IV Tobit ME
Subjective probability of the spouse who has more bargaining power	-0.0933*	-0.0921*		-0.1326* *
Subjective probability of the spouse who has less bargaining power			-0.0603	-0.0051
Total Wealth less IRA	0.0000***	0.0000***	0.0000***	No
Controls				
respondent's characteristics	No	Yes	Yes	No
spouse's characteristics	No	Yes	Yes	No

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Table 6 Estimates if "Earnings" is used to proxy bargaining power

Risky asset ratio	Model I Tobit ME	Model II Tobit ME	Model III Tobit ME	Model IV Tobit ME
Subjective probability of the spouse who has more bargaining power	-0.0666	-0.0356		0.0331
Subjective probability of the spouse who has less bargaining power			-0.1514***	-0.1639***
Total Wealth less IRA	0.0000***	0.0000***	0.0000***	0.0000***
Controls				
respondent's characteristics	No	Yes	Yes	Yes
spouse's characteristics	No	Yes	Yes	Yes

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Table 7 Estimates if "Hourly rate (imputed)" is used to proxy bargaining power

Risky asset ratio	Model I Tobit ME	Model II Tobit ME	Model III Tobit ME	Model IV Tobit ME
Subjective probability of the spouse who has more bargaining power	-0.0927*	-0.0704		-0.0586
Subjective probability of the spouse who has less bargaining power			-0.0866*	-0.07870*
Total Wealth less IRA	0.0000***	0.0000***	0.0000***	0.0000***
Controls				
respondent's characteristics	No	Yes	Yes	Yes
spouse's characteristics	No	Yes	Yes	Yes

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Table 8 Estimates if "Male dominate" is used to proxy bargaining power

Risky asset ratio	Model I Tobit ME	Model II Tobit ME	Model III Tobit ME	Model IV Tobit ME
Subjective probability of the spouse who has more bargaining power	-0.0766	-0.0592		-0.0446
Subjective probability of the spouse who has less bargaining power			-0.1076**	-0.1015**
Total Wealth less IRA	0.0000***	0.0000***	0.0000***	0.0000***
Controls				
respondent's characteristics	No	Yes	Yes	Yes
spouse's characteristics	No	Yes	Yes	Yes

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Table 9 Estimates if "Happy Wife, Happy life" is used to proxy bargaining power

Risky asset ratio	Model I Tobit ME	Model II Tobit ME	Model III Tobit ME	Model IV Tobit ME
Subjective probability of the spouse who has more bargaining power	-0.1141**	-0.1058**		-0.1007**
Subjective probability of the spouse who has less bargaining power			-0.0512	-0.0362
Total Wealth less IRA	0.0000***	0.0000***	0.0000***	0.0000***
Controls				
respondent's characteristics	No	Yes	Yes	Yes
spouse's characteristics	No	Yes	Yes	Yes

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

From Table 4 to Table 9, as a robustness check, this paper employs six different bargaining power proxies and apply the similar empirical settings to run Tobit Model. Based on the empirical

results for those 24 Models, a breadwinner who works longer hours has more bargaining power than his/her spouse and then more significant impact on household risky asset allocation (Table 3 and Table 4). A household member with longer years of education has a significant impact on household risky asset allocation (Table 5).

Surprisingly, contrast to existing literature, empirical results from Table 6 and Table 7 show that a household member with lower earnings and lower hourly wage rate actually has a significant impact on risky asset allocation. However, a household member with more earnings and higher hourly wage rate seems to "give up" bargaining power and has a non-significant impact on household risky asset allocation.

In Table 8 and Table 9, this paper uses gender norm as a proxy for bargaining power. In table 8, this paper assumes that a male member always has more bargaining power. In table 9, this paper assumes that a female member always has more bargaining power. Empirical results from Table 8 and Table 9 collectively support the assumption that on average other things equal, female, instead of male, have more significant impact on household risky asset allocation decisions.

Conclusion

Extensive research has shown that bargaining among the household members influences the household decision making, regarding the decision to save or spend or the decision to retire or work. However, only a few papers examine households' financial portfolio decisions from a household bargaining perspective. The underlying mechanism identified in these studies has been the difference in risk aversion between a wife and her husband. However, in addition to different levels of risk aversion, household members also have significantly different subjective risk perceptions. Recent literature argues that an individual investor's subjective risk perception

significantly impacts his or her investment decisions in the equity market. Intuitively speaking, as an individual investor, a household member with more bargaining power may bring his or her subjective risk perception into the household portfolio construction. This paper examines the effect of household members' bargaining on household portfolio decisions through the household members' subjective risk perceptions. As far as this paper is concerned, this paper is the first paper which looks into the effect of household bargaining on households' portfolio choice through a subjective risk perception channel. This paper contributes to the literature by investigating this new underlying channel by which bargaining influences portfolio choices.

Using the 2012 wave of HRS, this paper finds that about 87% of the 2,709 couples who answered the subjective risk perception question exhibit conflict regarding the blue-chip stock market. This paper also finds that, on average, individual investors within a household view the stock market as much riskier than it actually is. The much higher subjective risk perception of the stock market may explain why about 60% of households have zero stock participations. Finally, this paper estimates Tobit models to examine the effect of subjective risk perception on the risky-asset-allocation ratios. Using years of education as a bargaining power proxy, this paper finds that the subjective risk perception of the household member with more bargaining power has a more significant impact on the household portfolio decisions compared to that of the household member with less bargaining power. Using hourly wage rate as a bargaining power proxy, this paper finds that the subjective risk perception of the household member with less bargaining power plays a more significant role in households' portfolio decisions. This finding indicates that the higher-hourly-wage member of the household may give up the "bargaining power" to the spouse because of higher opportunity costs (for example, the higher-hourly-wage member may suffer monetary loss if she/he spends a lot of time making portfolio decisions instead of working. Additionally,

she/he may suffer subsequent losses such as a layoff or a failure to be promoted if she/he has a poor performance at work). Using the gender norm as bargaining power proxies, this paper confirms that, on average, females' subjective risk perceptions have more significant impact on the household portfolio decisions.

Future research is still needed. So far, this paper is a cross-sectional study. Ideally one would estimate a panel model as a next step to examine the effect of subjective risk perception. In addition, one would evaluate the performance of different household members' portfolio decisions, especially the member with more bargaining power. Those future research should shed light on households' efficient portfolio construction.

References

Atella, V., Brunetti, M., & Maestas, N. (2012). Household portfolio choices, health status and health care systems: A cross-country analysis based on SHARE. *Journal of Banking and Finance*, *36*(5), 1320–1335. https://doi.org/10.1016/j.jbankfin.2011.11.025

Bertocchi, G., Brunetti, M., & Torricelli, C. (2011). Marriage and other risky assets: A portfolio approach. *Journal of Banking and Finance*, *35*(11), 2902–2915. https://doi.org/10.1016/j.jbankfin.2011.03.019

Chiappori. (1988). Rational Household Labor Supply, *56*(1), 63–90.

Disney, R., & Gathergood, J. (2013). Financial literacy and consumer credit portfolios. *Journal of Banking and Finance*, *37*(7), 2246–2254. https://doi.org/10.1016/j.jbankfin.2013.01.013

Friedberg, L., & Webb, A. (2006). determinants and consequences of bargaining power in households, (May).

Gervais, S., Robinson, D. T., & Mcelroy, M. B. (2012). Essays on Household Portfolio Choice by Abstract.

Goetzmann, W. N., Kim, D., & Shiller, R. J. (2016). Crash Beliefs From Investor Surveys.

Guiso, L., Sapienza, P., & Zingales, L. (2008). Trusting the Stock Market, *LXIII*(6).

Ke, D. (2016). Gender Identity Norms and Intra-Household Financial Decision Making. *Working Paper*.

Lundberg, S. (2005). gender and household decision making, 1–18.

Lundberg, S., & Pollak, R. A. (1993). Separate Spheres Bargaining and the Marriage Market, *101*(6), 988–1010.

Lyons, A., & Nelson, C. (2008). Household Bargaining and Portfolio Choice ∗, *55*(December), 1–27.

Lyons, A., & Nelson, C. (2013). Portfolio Choice in a Two-Person Household ∗, 1–26.

Marilyn Maner; Murray Brown. (1980a). Economics Department of the University of Pennsylvania Marriage and Household Decision-Making : A Bargaining Analysis Author (s): Marilyn Manser and Murray Brown Source : International Economic Review , Vol . 21 , No . 1 (Feb ., 1980), pp . 31-44 Publ, *21*(1), 31–44.

Marilyn Maner; Murray Brown. (1980b). McelroyHorney(1981)_Nash-bargained Household Decisions_Towards a generalization of the theory of demand.pdf.

Mazzocco, M. (2004). Saving, Risk Sharing, and Preferences for Risk. *American Economic Review*, *94*(4), 1169–1182. https://doi.org/10.1257/0002828042002516

Roche, H., Tompaidis, S., & Yang, C. (2013). Why does junior put all his eggs in one basket? A potential rational explanation for holding concentrated portfolios. *Journal of Financial Economics*, *109*(3), 775–796. https://doi.org/10.1016/j.jfineco.2013.03.016

van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics*, *101*(2), 449–472. https://doi.org/10.1016/j.jfineco.2011.03.006

Vardardottir, A. (2013). Determinants of Financial Portfolios of Households Evidence from Sweden.

Von Gaudecker, H. M. (2015). How Does Household Portfolio Diversification Vary with Financial Literacy and Financial Advice? *Journal of Finance*, *70*(2), 489–507. https://doi.org/10.1111/jofi.12231

Yilmazer, T., & Lich, S. (2013). Portfolio choice and risk attitudes: a household bargaining approach. *Review of Economics of the Household*, 1–23. https://doi.org/10.1007/s11150-013-9207-8