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## Article

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Article

# Household Portfolio Allocations: Evidence on Risk Preferences from the Household, Income, and Labour Dynamics in Australia (HILDA) Survey Using Tobit Models

Safdar Ullah Khan <sup>1,2,\*</sup>, Satyanarayana Ramella <sup>3</sup>, Habib Ur Rahman <sup>4</sup> and Zulfiqar Hyder <sup>5</sup>

<sup>1</sup> Bond Business School, Bond University, Gold Coast, QLD 4229, Australia

<sup>2</sup> Economy, Planning and Environment, City of Gold Coast (CoGC), Gold Coast, QLD 9726, Australia

<sup>3</sup> Department of Business Administration, Southwestern Adventist University, Keene, TX 76059, USA; sramella@swau.edu

<sup>4</sup> Faculty of Higher Education (Accounting and Finance), Holmes Institute, Gold Coast, QLD 4217, Australia; hrahman@holmes.edu.au

<sup>5</sup> Research Department, State Bank of Pakistan (Central Bank), Karachi 74000, Sindh, Pakistan; zulfiqar.hyder@sbp.org.pk

\* Correspondence: skhan@bond.edu.au

**Abstract:** This study investigates intrahousehold risk preferences in household portfolio decision-making. Most household finance data are collected at the household level, and it is challenging to come up with an explanation of risk-taking decisions and have a direction on the within-household bargaining mechanisms. We provide these challenging pieces of evidence by applying a Tobit model on panel data taken from waves 2 to 6 of HILDA surveys. Overall, the results indicate that the risk-taking attitude of partners matters in household portfolio allocations. Risk-averse males and their female counterparts invest less in risky assets. Compared with the no-conflict (identical risk preferences) group, male partners with risk-loving behaviour tend to invest more in risky assets. Further, individual risk preferences are sensitive to fluctuations in equity and housing markets in Australia. Taken together, one of the crucial implications of our findings for future research is that household-bargaining models should, perhaps, give more bargaining power to risk-loving males, offering an additional explanation for the determinants of risk-taking behaviour of households. Understanding the risk-taking attitudes of households is important for future work to understand the fraction of households that end up with a negative net worth in recessions or crisis conditions, such as financial crises, pandemics, and wars.

**Keywords:** intra-household portfolio choice; risk preferences; HILDA surveys; Tobit models



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## 1. Introduction

There is ample evidence that households adjust their investment portfolios with changing business conditions driven by business cycles, prevailing risks, and several other factors. For example, Fan and Zhao (2009), among others,<sup>1</sup> found that income risk, credit constraints, self-employed status, and health risk are positively associated with risky to total asset ratios (a measure of household portfolio allocations). Jiang et al. (2010) and Cardak and Wilkins (2009) considered background risk, financial awareness, and knowledge as essential drivers of household portfolio allocations.<sup>2</sup> The most recent empirical literature reveals that risky investment intentions (Chen and Song 2022), financial literacy (Li et al. 2020), financial market knowledge (Chen and Song 2022), and financial planning ability (Jia et al. 2021) significantly increase a household's investment in risky assets. On the other hand, Campbell (2006) and Guiso and Paiella (2008) could not find any empirical evidence supporting portfolio theory predictions, because most households hold no risky assets or lack diversified investment portfolios.

In addition to risk factors, the literature has recognised demographic change as one of the critical factors in household portfolio management. Recently, [Jones et al. \(2018\)](#) found that the risk-taking traits of women and men matter in determining portfolio choices.<sup>3</sup> Likewise, [Bollen and Posavac \(2018\)](#) observed that male participants are more inclined towards risky allocations—thus, gender is a relevant variable in determining household portfolio allocations.<sup>4</sup> [Gürdal et al. \(2017\)](#) found that males are more risk-seeking, and risk aversion increases with age. [West and Worthington \(2014\)](#), using HILDA (2006), found that the financial risk tolerance decreases with the levels of education, wealth, and self-employed status of men and women.<sup>5</sup>

Despite the importance of household risk preferences in portfolio allocations, there remains a paucity of evidence on (1) the risk-taking decisions at the household level and (2) the direction of the within-household bargaining mechanisms. This paucity of evidence is logical as it is difficult to provide such evidence at the household level, while most household-finance data arrive at the household level. We attempt to contribute to the literature by giving evidence of these challenges. In particular, we mainly examine the role of the interhousehold risk-attitude discrepancy between partners in the household in the decisions of portfolio risk-taking. We apply a Tobit model to the information given by the Household, Income, and Labour Dynamics in Australia (HILDA) survey to explore the role of the intrahousehold risk-attitude discrepancy in risk-taking. The data show a 37.87 percent increase in risky asset allocations in 2006 compared with 2002. This corresponds to an almost two percent intensification of conflict between partners with a 9.26 percent escalation of risk-loving attitudes of men compared with their female counterparts. Overall, the results indicate that the risk-taking attitude of partners matters in household portfolio allocations. Risk-averse males and their female counterparts invest less in risky assets. In the same vein, male partners with risk-loving behaviour tend to invest more in risky assets than with no conflict (identical risk preferences). In contrast, male partners with a higher degree of risk averseness than those with no conflict groups invest less in risky assets. An implication of these findings for future research is the possibility that household-bargaining models should perhaps give risk-loving males more bargaining power. This possibility offers an additional explanation for the determinants of the risk-taking behaviour of households. The insights gained from this study may be of assistance to understand the fraction of households with a negative net worth in recessions or extensive shock/crisis conditions, such as financial crises, pandemics, and wars.<sup>6</sup>

The empirical literature on household portfolio allocations can be classified into survey-based household-level studies and experimental studies. The household-level studies range from standard household bargaining models to arbitrary formulations by incorporating several determinants of portfolio allocations. Using the Health and Retirement Survey (HRS), [Mazzocco \(2004\)](#) found a relationship between intra-household risk-sharing and intertemporal choices. [Browning \(2000\)](#), utilising the Canadian Family Expenditure Survey (FAMEX) data, observed that the household's income level determines its portfolio allocations. Likewise, [Kimball et al. \(2018\)](#) and [Cardak and Wilkins \(2009\)](#), respectively, using the Health and Retirement Survey (from the USA) and HILDA survey from Australia, reported that labour income-committed expenditure, proprietary business income, and health risk influence household portfolio allocations.

The level of education, particularly financial knowledge, has also been considered vital in household portfolio allocations. Alternatively, many others have utilised experimental designs to investigate gender-based intra-household behaviour in financial assets holdings. For example, [Bateman and Munro \(2005\)](#), [De Palma et al. \(2011\)](#), and [Carlsson et al. \(2012\)](#) analysed partners' (male and female) risk preferences in investment allocations at the household level. [Bateman and Munro \(2005\)](#) observed an identical risk attitude of partners towards risky asset allocations. Similarly, [De Palma et al. \(2011\)](#) analysed the risk behaviour of spouses in situations where they make joint decisions. They found men relative to their female counterparts to have substantial decision-making power. However, [Carlsson et al. \(2012\)](#), based on high-stakes experimental formulations from rural China,

found gender-based risk attitude as the leading factor of investment decision-making at the household level. Further, they found husbands to have relatively more substantial influence, particularly when they oversee small investment decisions in the household.

In brief, the literature<sup>7</sup> on intra-household risk preferences and portfolio allocations provides two fundamental guidelines. First, husband and wife may have independent risk preferences but appear with the collective decision in household financial allocations, consistent with collective household decision-making theory predictions. Second, the variations in risk preferences and household saving behaviour depend on individual characteristics.<sup>8</sup> However, there is a lack of research on the relative risk preferences of partners in risky asset allocations.<sup>9</sup> This is perhaps due to the data constraint on the direct measures of risk attitudes of partners at the household level. On the other hand, experimental studies on this topic are usually criticised due to sample bias and time dimension issues. This study, however, aims to meet these gaps by utilising HILDA surveys.

The HILDA data provide information on the direct measures of risk attitudes of partners at the household level. Further, the data allow us to substantiate partners’ household demographics and relative risk preferences in allocating their financial assets. Therefore, we investigate (1) intra-household risk preferences in association with risky assets to household portfolio allocations; (2) whether the gender effect or the risk preferences matter in risky asset allocations; this helps to reconcile the gender-based risk orientation with risky assets management; (3) whether the risk preferences are symmetric across the gender; and (4) the role of market conditions and individual risk preferences in determining household portfolio allocations.

We find individual risk preferences highly significant in determining household portfolio allocations. The male partner’s risk attitude appears to have a higher weight in the decision-making regarding financial assets allocations. In HILDA 2002, a male partner relative to a female counterpart with a risk-loving attitude drives up the risky-asset ratio.<sup>10</sup> Further, the risk-loving attitude has become more visible in the subsample of 2006—the driving-up effect is enhanced, while the dragging-down effect is attenuated. The booming equity and housing market performance during 2002 and 2006 might have shifted the decision power on risky-asset holding toward the risk-loving partner. The overall results show that the relative risk preferences of partners play a significant role in household portfolio allocations.

The rest of the paper is organised into four sections. Section 2 discusses the empirical model and hypotheses, followed by Section 3, which discusses the data and variables. The results and discussion are presented in Section 4. Section 5 concludes with policy implications.

## 2. Empirical Model and Testable Hypotheses

### 2.1. Empirical Model

We aim to investigate the role of risk attitude and other characteristics of partners in determining portfolio allocations of financial assets at the household level. In particular, we explore whether the risk attitude differences between partners matter in driving investment decisions in risky assets at the household. We set up the following latent regression model to examine the investment decisions in risky assets allocation.

$$Y_i = \alpha + \beta_1 X_i^f + \beta_2 X_i^m + \tau_1 ATR_i^f + \tau_2 ATR_i^m + \varphi Z_i + u_i \tag{1}$$

The corresponding indicator function can be written as

$$Y_i = \begin{cases} Y_i^* & \text{if } Y_i^* > Y_L \\ Y_L & \text{if } Y_i^* \leq Y_L \end{cases}$$

where  $Y_i^*$  represents the type of risky assets ratio (decisions in risky assets allocations) at the household level (i). This is a common variation in the Tobit model, censoring at

a value  $Y_L$  when the latent variable (risky asset ratio)  $Y_i^* \leq Y_L$ . ‘ $X^m$ ’ and ‘ $X^f$ ’ represent individual characteristics, including incomes and education levels of male and female partners, respectively. ‘ $ATR^m$ ’ and ‘ $ATR^f$ ’ represent the risk-taking attitude of male and female partners, respectively, explained in Section 3. In Equation (1), ‘ $Z$ ’ is a vector of control variables at the household level (captures individual and household effects), including net wealth, health risk, financial prosperity, and family type. The coefficients  $\beta_1$  and  $\beta_2$  are the marginal effects of income and educational levels, respectively.  $\tau_1$  and  $\tau_2$  are the principal coefficients of interest and capture the marginal effects of the risk-taking attitude of partners on the portfolio of the risky asset to total household assets allocations.

The data reveals that almost half of the sample reported ‘no holdings’ of risky assets<sup>11</sup> in the year 2006. This highlights the importance of the left-side censoring of  $Y_i$  at 0. Therefore, we estimate the Tobit model (Equation (1)) and take care of the above censoring aspect instead of relying on the simple Ordinary Least Square (OLS) technique. The OLS estimators are likely to be inconsistent in the current case.<sup>12</sup> However, we also report OLS estimates for comparison purposes.

The empirical model (Equation (1)) does not capture the relative risk-taking behaviour of partners. To incorporate the relative risk-taking behaviour, we classify partners into three groups. These are the male, more-risk-loving (MLF); male, more-risk-averse (FLM); and no conflict groups, which is considered the reference category in the empirical analysis. The modified empirical model can be written as:

$$Y_i = \alpha + \beta_1 X_i^f + \beta_2 X_i^m + \delta_1 MLF_i + \delta_2 FLM_i + \tau_1 ATR_i^f + \tau_2 ATR_i^m + \varphi Z_i + u_i \quad (2)$$

The marginal effect ( $\delta_1$ ) of MLF captures the impact on risky asset holdings when the male partner is more risk-loving than the female counterpart. Similarly, the marginal effect ( $\delta_2$ ) of FLM captures the additional impact on the risky asset ratio of households when the female partner is more risk-averse than the reference group.

## 2.2. Testable Hypotheses

Several studies have confirmed that men prefer more risky portfolios than their female counterparts.<sup>13</sup> We present the relevant hypotheses of gender and preferences in the following.

**Testable Hypothesis 1.** Household allocations in risky assets ( $Y_i$ ) increase with more risk-loving partners as compared with the no conflict group.

**Testable Hypothesis 2.** Household allocations in risky assets ( $Y_i$ ) depend on the individual risk-taking preferences of partners as opposed to the collective risk preferences.

**Testable Hypothesis 3.** Household allocations in risky assets ( $Y_i$ ) increase with the male partner’s risk-taking attitude; however, they decrease with the female partner’s risk behaviour.

Therefore, the coefficients of risk preferences  $\delta_1$  and  $\delta_2$  for male and female partners are expected to take positive and negative signs, respectively. A positive  $\delta_1$  implies that the male partner (with his risk-loving attitude) has more impact on the household’s risky asset allocation. In contrast, the negative  $\delta_2$  reflects less likelihood in the household’s risky asset allocations by the female counterpart. Regarding the collective risk preference, we expect that individuals’ risk preferences  $\delta_1 \neq \delta_2$  must not be identical.

## 3. Data and Variables

### 3.1. Data

The Household, Income, and Labour Dynamics in Australia (HILDA) Survey is a nationally representative longitudinal survey. We use HILDA surveys of waves 2 and 6 of 2002 and 2006. The data refer to the period before the global financial crisis as this period

of heightened uncertainty slowed the pace of economic growth immediately after the sixth wave of HILDA, and its effect lasted for a more extended period. In particular, the global financial crisis led to many corrective actions in household portfolios. Therefore, we restrict our analysis to wave 6 of HILDA. These two waves follow the panel information of 18,295 and 17,454 respondents (over 15 years) from 7245 and 7139 households. In particular, this study focuses on couples living with legal marriage or in a de facto relationship status only. This leaves us with a sample of 1835 married couples and or de facto partners.

### 3.2. Variables

#### Household Assets Allocations

We define the risky asset ratio as equity investments to total financial assets. Financial assets consist of investments (including shares, managed funds, and real estate investment trusts), bank accounts, cash investment, trust funds, the cash-in value of life insurance policies, and superannuation. Nonfinancial assets include the monetary value of the house, other property and business assets, collectibles, and motor vehicles. The net worth of a household is equal to the total financial and nonfinancial assets minus the total debts of all family members in a household.

Table 1 presents the summary statistics of the components of household wealth. The net wealth of households substantially increased by almost 48.9 per cent from 2002 to 2006. This is accompanied by more significant holdings of risky assets, which increased to 37.9 per cent in 2006. However, the share of risky assets to total assets has declined by 10.9 per cent during the same period. Households at the 90th percentile show AUS 100,000 and AUS 116,300 in risky assets in 2002 and 2006, respectively.

**Table 1.** Household wealth indicators for subsample of household with married and de facto partners only (thousand AUS).

	Mean	SD	Percentiles				
			10th	25th	50th	75th	90th
<b>2002</b>							
Financial Assets	195.900	332.200	8.200	29.500	81.600	226.400	481.500
of which							
Risky Assets	39.600	135.000	0.000	0.000	1.000	20.000	100.000
Share of Risky Assets (%)	12.400	21.400	0.000	0.000	0.800	15.200	46.600
Superannuation©	112.600	183.400	0.000	10.000	41.500	133.700	318.200
Nonfinancial Assets	376.800	500.400	17.000	145.000	275.000	447.500	764.600
Total Assets	572.700	714.100	58.200	203.700	399.200	707.700	1158.100
Total Debt	84.500	138.000	0.000	0.000	30.000	122.400	232.900
Net Wealth	486.900	656.900	36.900	136.600	304.000	594.600	1044.100
<b>2006</b>							
Financial Assets	265.200	507.200	12.500	41.000	111.300	302.100	615.200
Risky Assets	54.600	217.800	0.000	0.000	0.000	17.900	116.300
Share of Risky Assets (%)	11.100	21.200	0.000	0.000	0.000	10.900	42.500
Superannuation	151.300	262.500	0.000	15.700	65.300	178.000	371.200
Nonfinancial Assets	583.000	870.900	29.500	251.300	393.500	652.900	1059.900
Total Assets	850.800	1210.200	125.500	331.400	565.500	964.200	1646.900
Total Debt	122.500	223.700	0.000	0.000	35.800	163.000	323.600
Net Wealth	724.900	1160.600	72.600	236.700	462.300	815.400	1457.700

Note: All values deflated at the prices of the base period (2002). © Data do not allow us to incorporate the break-up information of superannuation, whether composed of purely money market funds or stocks.

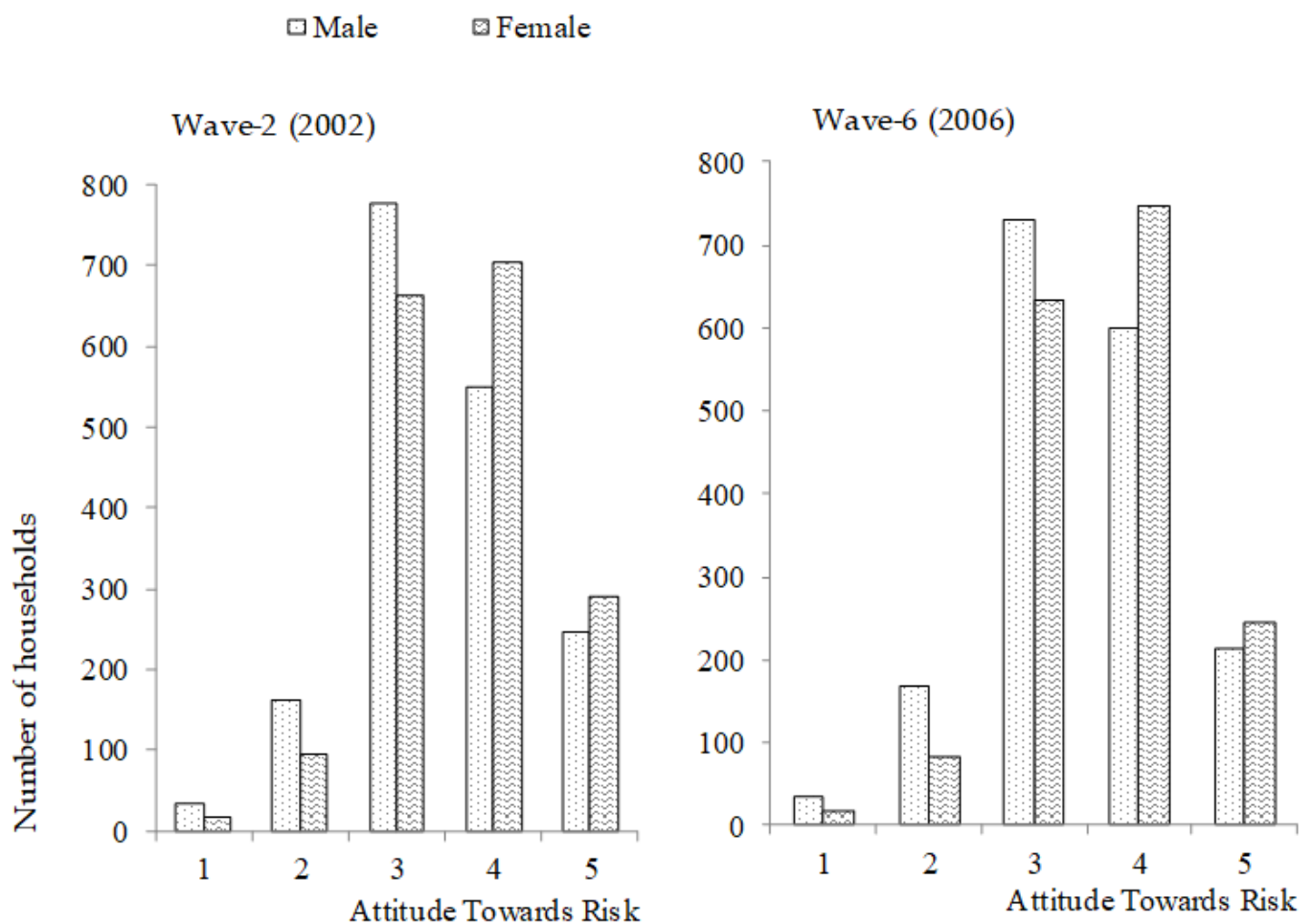
### 3.3. Explanatory Variables

#### 3.3.1. Risk Preferences (Attitudes)

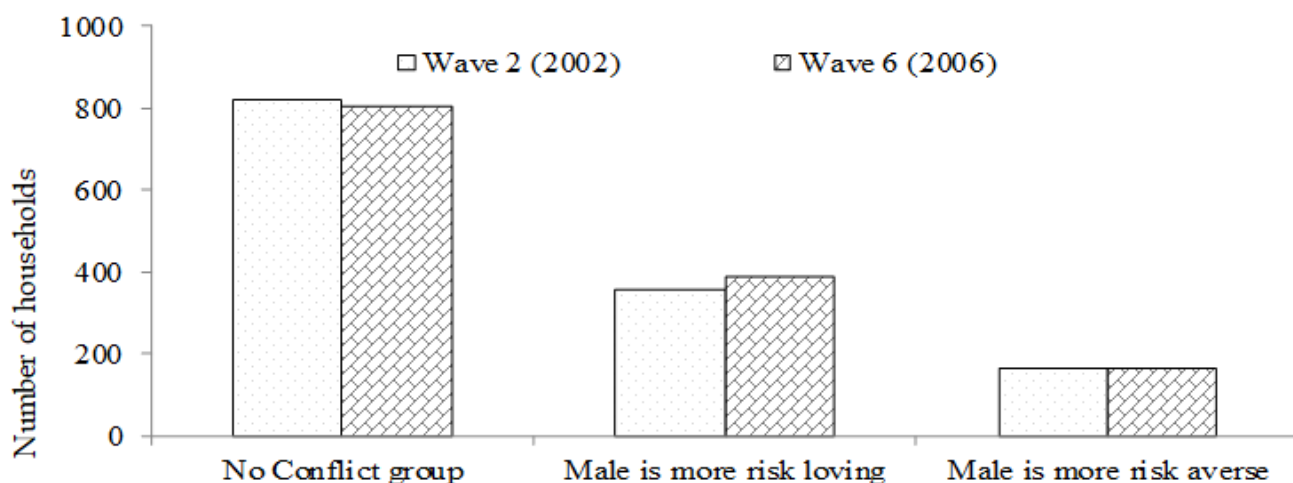
The HILDA surveys provide direct responses on the risk-taking attitudes of respondents at the household level. For example, a relevant question in the survey states: ‘Which

of the following statements comes closest to describing the amount of financial risk that you are willing to take with your spare cash? That is, cash used for savings and investment.’ The response to this question is coded initially on a one to five scale. One represents respondents who take a substantial financial risk with the liquid money in their hands. Two, three, and four represent the above-average risk, the average risk, and not willing to take financial risk, respectively. On this scale, five represents the one who responded: ‘I never have any spare cash.’ The last category 5 of responses does not provide any meaningful information on risk attitude; therefore, it is dropped from further analysis.

Figures 1 and 2 show patterns of the risk attitude of partners at a household from the years 2002 and 2006, respectively. The overall averages show that males are more risk-loving than their female counterparts. In 2006, as compared with 2002, we find a significant increase in the male population in the category of high-risk-taking behaviour—this is consistent with boom-like conditions in financial markets in 2006.



**Figure 1.** Gender-based Risk Preferences. The risk attitude is coded on a 1–5 scale, with one representing taking the substantial financial risk, followed by 2 for taking the above-average risk, 3 for average risk, 4 for not willing to take financial risk, and 5 for those who respond, “I never have any spare cash”. The last answer does not provide any meaningful information about the risk attitude of the respondent.



**Figure 2.** Intra-Household Risk Attitude. We construct three dummy variables of intra-household risk attitude from the self-assessment of partners regarding their risk attitudes. These are: (1) the male spouse is more risk-loving than his partner; (2) the male spouse is more risk-averse than his partner; and (3) the risk attitude of both spouses is the same, which also serves as a base dummy in our analysis.

The data reveal that 60 per cent of households fall in the no-conflict group, followed by a male, more-risk-loving group with more than 25 per cent. The number of households in the male, more-risk-loving group slightly increased, that in the no conflict group declined, and that in the male, more-risk-averse group remained unchanged in 2006 relative to 2002.

The overall distribution shows that most of the observations cluster around the risk-averse attitude and no conflict group. In addition, we incorporate information on financial prosperity reported by the respondents. We create a dummy variable based on direct responses such as financially prosperous, very comfortable, and reasonably comfortable, coded as 1, 2, and 3, respectively.

### 3.3.2. Individual Characteristics of Spouses

Individual characteristics and the mutual bargaining power of partners play an essential role in household portfolio allocations. We consider individual characteristics such as the years of schooling, employment status, and independent income as implicit indicators of partners’ bargaining power. In HILDA surveys, educational level is measured on a 1–9 scale, with one being the highest academic level of PhD and master’s degrees, 2 for graduate diploma and graduate certificate, and up to 9 representing less than 12 years of schooling. The lowest category of fewer than 12 years of education refers to the reference category of empirical analysis.

Table 2 presents the details of the individual characteristics of the partners. The average age of female respondents was 45.7 years and 48.1 years in 2002 and 2006, respectively. The age difference between partners largely remains constant over this period of analysis. Male partners appear relatively more educated than their female counterparts regarding their educational levels. The overall descriptive evidence suggests that gender disparity slightly narrowed from 2002 to 2006. Evidently, the increased female labour force participation and educational attainment depressed the gender disparity from 2002 to 2006.



**Table 2.** Descriptive statistics of partners and other household indicators.

	2002		2006	
	MP	FP	MP	FP
Panel-a: Individual and Demographic Characteristics				
Income (AUD)	43486	25256	47972	28078
Education *	3.790	4.000	3.680	3.830
employed *	0.740	0.590	0.690	0.580
Age (in years)	48.100	45.700	52.100	49.700
Health Risk *	0.200	0.160	0.270	0.220
Observations	1835	1835	1835	1835
Panel-b: Risk Attitude of Male and Female Partners				
	2002		2006	
No conflict group	820		804	
Male is more risk-loving than his partner	355		388	
Male is more risk-averse than his partner	166		162	
Observations	1341		1354	

Note. \* Authors converted the 2006 income in real terms by deflating with 2002 prices. We also calculated and tested mean differences among risk attitudes between partners. We rejected the null hypothesis at the 1 per cent level of significance. This implies that risk attitudes matter regardless of the gender of the respondent. MP and FP indicate male partner and female partner, respectively.

#### 4. Results and Discussion

##### 4.1. Preliminary Results

Table 3 presents the estimation results. Panel-A and Panel-B, respectively, show the marginal effects and hypothesis test statistics. The estimated marginal effects of the risk attitude of the male partner relative to his female partner significantly decreased risky asset allocations in 2002 and 2006. Likewise, the marginal impact of the risk attitude of the female relative to her male partner significantly reduced risky asset allocations in 2002 and 2006. These results are consistent with the observed 13.6 per cent decrease in the household’s risky asset allocations from the male subsample. Likewise, female partners witnessed a 12.4 per cent decrease in 2006 relative to 2002. Further, Panel-B shows the asymmetric risk attitude of partners in risky assets to household portfolio allocations. These results are consistent with the findings by Barber and Odean (2001) and Jianakoplos and Bernasek (1998).<sup>14</sup>

**Table 3.** Marginal effects (basic specifications): Tobit and OLS models (HILDA Wave 2 (2002) and Wave 6 (2006)).

	2002		2006	
	Tobit	OLS	Tobit	OLS
Panel-A	(1)	(2)	(3)	(4)
Log of household net wealth	0.022 ***	0.0152 **	0.023 ***	0.0127 **
Risk Attitude of Male partner	−0.034 ***	−0.0567 ***	−0.039 ***	−0.0598 ***
Risk Attitude of Female partner	−0.031 ***	−0.0374 ***	−0.020 ***	−0.0316 ***
Dummy for Financial Prospects	0.002	0.001	0.027	0.0321 **
Constant		0.070		−0.030
Observations	1183	1183	1278	1278
R-squared		0.163		0.162
Pseudo R2	0.248		0.245	
Log likelihood	−418.630		−490.820	
Sigma	0.288		0.303	
	−0.008		−0.009	

**Table 3.** Cont.

	2002		2006	
	Tobit	OLS	Tobit	OLS
Panel-B: Hypothesis Testing				
Ho: Male and Female partners have a Symmetric Risk Attitude				
F-statistics	81.420	61.400	72.780	53.540
df	11,156	11,155	11,251	11,250
p-Value	0.000	0.000	0.000	0.000
Control for partners'				
Education attainment level	yes	yes	yes	yes
Income level	yes	yes	yes	yes
Age	yes	yes	yes	yes
Health risk	yes	yes	yes	yes
de facto relationship	yes	yes	yes	yes

Note: Dependent variable is the risky asset ratio. Left-censoring for Tobit models are 454 and 564 for 2002 and 2006, respectively. \*\*\*, and \*\* indicate that the t-statistics are significant at 1%, and 5%, respectively.

**4.2. Main Results**

In this section, we discuss our results of relative risk aversion in the household's financial wealth portfolio allocations. Table 4 reports the results of Tobit and OLS estimations. We mainly rely on Tobit estimations and use OLS estimations for robustness purposes.

**Table 4.** Marginal effects (flexible specifications): Tobit and OLS models (HILDA Wave 2 (2002) and Wave 6 (2006)).

	2002		2006	
	Tobit	OLS	Tobit	OLS
Panel-A				
log of Household Net Wealth	−1	−2	−3	−4
Male is more Risk Loving than his partner (MLF)	0.023 ***	0.016 **	0.023 ***	0.013 **
Male is more Risk Averse than his partner (FLM)	0.035 ***	0.055 ***	0.055 ***	0.078 ***
Risk Attitude for Female partner	−0.043 ***	−0.078 ***	−0.019 *	−0.037 *
Dummy for Financial Prospects	−0.063 ***	−0.091 ***	−0.054 ***	−0.085 ***
Constant	0.001	0.000	0.028 ***	0.032 **
Observations	1183	1183	1278	1278
R-squared		0.160		0.160
Pseudo R2	0.244		0.242	
Log likelihood	−420.640		−493.060	
Sigma	0.289 ***		0.303 ***	
Panel-B: Hypothesis Testing				
<i>Hypothesis-II</i> ©				
F-statistics	0.670	0.740	4.270	2.420
df	11,155	11,154	11,250	11,249
p-Values	0.415	0.390	0.040	0.120
<i>Hypothesis-III</i> ©				
F-statistics	13.800	15.970	20.280	16.400
df	21,155	21,154	21,250	21,249
p-Values	0.000	0.000	0.000	0.000
Controls				
Education level	yes	yes	yes	yes
Income level	yes	yes	yes	yes
Age	yes	yes	yes	yes
Health risk	yes	yes	yes	yes
De facto relationship	yes	yes	yes	yes

Note: Left-censoring for Tobit models are 454 and 564 for 2002 and 2006, respectively. \*\*\*, \*\*, and \* indicate that the t-statistics is significant at 1%, 5%, and 10%, respectively. © Hypothesis-II ( $H_0 : \delta_1 = \delta_2$  and  $H_1 : \delta_1 \neq \delta_2$ ) and Hypothesis-III ( $H_0 : \delta_1 + \delta_2 = 0$  and  $H_1 : \delta_1 > 0, \delta_2 < 0$ ).

Table 4, Panel-A, shows that the increase in a household's net wealth increases risky assets to the total household financial portfolio in 2002 and 2006. The male is a more risk-loving partner (MLF) than the reference category of 'no conflict', which tends to significantly increase risky asset allocations by 3.5 per cent and 5.5 per cent in the household portfolios in 2002 and 2006, respectively. However, the results reveal that male partners with a risk-averse attitude (FLM) show 4.3 per cent and 1.9 per cent less risky asset allocations than the reference group in 2002 and 2006, respectively.

Table 4, Panel-B, summarises the outcome of our hypotheses testing that the individual risk preferences and symmetric risk behaviour of partners significantly influence risky-asset allocations to the household portfolio investments. We test MLF and FLM jointly concerning the no-conflict group regarding the joint risk preferences. The joint F-test shows that MLF and FLM are significantly different from the no-conflict group, implying that male partners' risk attitudes matter in the household portfolio of risky asset allocations. A household with 'male risk lover (MLF)' tends to hold more risky assets, whereas a household with 'male risk-averse' (FLM) tends to hold fewer risky assets than 'no conflict' as the reference category.

Further, the Tobit results for 2006 are consistent with the results estimated in 2002. The marginal effect of MLF is strengthened to 5.5 per cent, whereas the marginal impact of the FLM group is relatively attenuated in 2006 compared with the findings in 2002. Alternatively, the male partner's risk preferences of risky assets to the household portfolio allocations become more robust in 2006, indicating that the driving-up effect is enhanced while the dragging-down effect is attenuated. In addition, we find that financial prosperity (captured through a dummy variable) appears statistically significant in the subsample of the year 2006.

The overall results suggest that risky assets to the total assets of household portfolios allocation significantly change across the sampling years, depending on the intrahousehold risk preferences. The booming housing and equity markets in 2006 reconcile with the common understanding of intrahousehold risk preferences in driving the risky assets allocations to the total household portfolio allocations. For example, higher returns on equities and housing assets provide credence to the strategies adopted by risk-loving partners. Further, the above results support the anecdotal evidence that the ASX 200 equity market index recorded a growth of 75 per cent from 2002 to 2006 compared to the peak of 2002. The growth rate of ASX 200 is even higher to 118 per cent compared to the trough of 2003. Similarly, the housing market witnessed steady growth as the average prices grew by 30 per cent during 2002–2006.

Regarding individual characteristics, we find that the educational attainment of the male partner matters; however, the academic level of a female spouse does not significantly influence the household portfolio choice. These findings partially contrast with the previous literature on the relationship between the level of education and the household portfolio choice. For instance, King and Leape (1998) and Cardak and Wilkins (2009) found that households with higher levels of education are more likely to hold risky assets. Further, partners' income and employment status turn out to be insignificant while controlling for the above characteristics of the counterpart. The income level of a male partner was statistically significant in 2002, but it was economically insignificant—the marginal effect of income level was negligible.<sup>15</sup>

Regarding the control variables, we observe that the household net wealth is significant and positively associated with the risky asset ratio for 2002 and 2006.<sup>16</sup> The results, however, do not support the quadratic impact of net wealth on risky asset ratio, as also shown by Cardak and Wilkins (2009)<sup>17</sup>. In line with the findings by Fan and Zhao (2009) and Cardak and Wilkins (2009), health effects on the household portfolios are not as strong as those found in other studies such as Rosen and Wu (2004) and Berkowitz and Qiu (2006). However, the current study's health risk associated with partners appears statistically insignificant. This may be attributed to Australia's more comprehensive access to pub-

lic healthcare, weakening the relationship between health-related risks and household portfolio choices.

## 5. Conclusions

We examine the role of intrahousehold risk preferences in the household decisions of portfolio risk-taking. For this purpose, we apply a Tobit model on panel data taken from HILDA surveys. The current study is based on waves 2 to 6 of HILDA surveys, and the findings suggest that intrahousehold risk attitudes play a significant role in determining the risky assets to household portfolio allocations. More relevantly, the male partner's risk attitude appears more substantial in the risky asset to total household asset allocations. Further, the results reveal that male partners with risk-loving attitudes tend to invest more in risky assets than the no-conflict group. However, the risk-averse male partners invest less in the risky asset to total assets allocations. If the debate is to be moved forward, the household-bargaining models should perhaps give risk-loving males more bargaining power. These proposed models are expected to offer an additional explanation of the determinants of the risk-taking behaviour of households.

In 2006, the driving-up effect of risk preferences was enhanced while the dragging-down effect was weakened, compared to the results of 2002. Last but not least, the comparison between 2002 and 2006 also shows that the impact of male preferences, which were symmetric in 2002, changed to asymmetric in 2006. It is speculated that the equity and housing market boom might have coupled with the effects of intrahousehold risk preferences on risky assets to total household financial portfolio allocations. A natural progression of this work is to replicate this analysis on the latest wave of HILDA surveys to capture insights from COVID-19 as this recent pandemic is highly likely to affect household decisions on portfolio risk-taking.

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## Notes

- <sup>1</sup> For example, see [Guiso and Paiella \(2008\)](#) and [Berkowitz and Qiu \(2006\)](#) for further details.
- <sup>2</sup> [Cardak and Wilkins \(2009\)](#) utilised HILDA wave 2 (2002) for their empirical analysis.
- <sup>3</sup> They utilised data from 11 waves (1998–2008) of the US Health and Retirement Study.
- <sup>4</sup> This study is based on an electronic survey completed online.
- <sup>5</sup> [West and Worthington \(2014\)](#), in a different study, found personal attributes relevant to financial risk tolerance from Australia using HILDA.
- <sup>6</sup> This is the scope for future research.
- <sup>7</sup> The discussion follows from [Barsky et al. \(1997\)](#), [Jianakoplos and Bernasek \(1998\)](#), [Zinkhan and Karande \(1991\)](#), [Bateman and Munro \(2005\)](#), [De Palma et al. \(2011\)](#), and [Carlsson et al. \(2012\)](#).
- <sup>8</sup> For instance, see discussion by [Lundberg and Ward-Batts \(2000\)](#) and [Gibson et al. \(2006\)](#).

- <sup>9</sup> Cardak and Wilkins (2009) is the exception with a focus on background risk channels in portfolio allocations. Further, the above study used only wave-2 (2002) of HILDA data. A step forward, we use wave-2 through wave-6 of HILDA surveys in this study.
- <sup>10</sup> We noticed that male partners usually appear to be the head of household.
- <sup>11</sup> This refers to percentile distribution given in Table 1.
- <sup>12</sup> The clustering of dependent variables around zero makes the OLS estimators biased as well as inconsistent.
- <sup>13</sup> Among those are Lewellen et al. (1977), Barber and Odean (2001), and Agnew et al. (2008).
- <sup>14</sup> Our results are also robust across different methods of estimations (Tobit and OLS) adopted in this study. However, the magnitude of marginal effects differs across the methods of estimations due to the potential bias and inconsistency associated with OLS estimations, which have been adequately addressed in Tobit methods.
- <sup>15</sup> This is consistent with the finding of Cardak and Wilkins (2009). The above study found that income is an insignificant determinant of risky asset ratio for 2002 from HILDA Australia data.
- <sup>16</sup> Results of individual characteristics and other control variables are available on request.
- <sup>17</sup> However, portfolio allocation suggests that the total wealth is an important determinant of household portfolio allocation as it can influence risk aversion and financing the transaction costs of acquiring certain assets.

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