

COUPLE AND INDIVIDUAL WILLINGNESS TO TAKE RISKS

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Abstract

This study analyses the relationship between the willingness to take risk (WTR) of a sentimental couple and its individual components. Using a survey-based measure collected in a lab experiment with 126 couples, we estimate a joint model for explaining female, male, and couple WTR. We control for socio-demographic characteristics and personality traits in the individual risk specifications and for the length of the relationship in the joint risk specification. We find that individual WTR is related to personality more than to socio-demographic variables. Couple WTR is equally determined by the individual WTR of each partner, once endogeneity arising from unobservable common factors is considered. This implies that risk-averse (risk-tolerant) individuals appear to be willing to take more (less) risk when behaving with the partner than he/she would like when behaving individually.

Keywords: Household's risk preferences; Couples; Personality traits; Willingness to take risks; 3SLS.

JEL Codes: D13, D81, D91.

PsycINFO Codes: 3020, 3120, 3920.

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1. INTRODUCTION

Individuals' willingness to take risk (WTR) is a key dimension for understanding many important decisions in life like migration (Dustmann et al., 2023), entrepreneurship (Falk et al., 2018), or the timing of marriage (Spivey, 2010), among others. Because of its economic relevance, a large body of research has sought to understand its correlation with several dimensions such as demographics (e.g., Dohmen et al., 2011, 2017; Khor et al., 2020; Schurer, 2015), personality traits and other behavioral factors (e.g., Becker et al., 2012; Brown and Taylor, 2014; Bucciol and Zarri, 2017; Lönnqvist et al., 2015; Sekścińska et al., 2021). However, many decisions involving risk are made at the household level and often imply considering the risk attitude of both partners. As discussed in Mazzocco (2004), risk preferences of the representative agent might provide an incomplete picture and could not explain some consumption puzzles. In this regard, little is known yet about couples' risk preferences.

According to the collective model of intra-household bargaining (Browning and Chiappori, 1998), households make decisions based on the weighted sum of partners' utilities. When it comes to risk preferences, couples' WTR are expected to lay within the boundaries of each partner's risk attitude (Abdellaoui et al., 2013; Yilmazer and Lich, 2015). Independently of potential assortative matching in risk attitude (Arrondel and Frémeaux, 2016; Bacon et al., 2014; Dohmen et al., 2012), there might be heterogeneity in individual risk preferences within couples that explain household economic choices. A proper understanding of couples' risk preferences has deep economic implications for explaining households' financial decisions, especially for the risk-sharing component of household savings (Mazzocco and Saini, 2012). Apart from this, the within-household composition of risk attitudes also predicts future household instability through reducing the sharing of public goods (Serra-Garcia, 2022).

This paper studies couple WTR, meant as the risk tolerance of partners as a whole household unit. We adopt a bargaining approach to identify the influence of each partner's

WTR on couple WTR while considering some couple-level controls. Like Carlsson et al. (2013) and De Palma et al. (2011), we estimate partners' individual influence on the WTR of the couple rather than estimating the underlying preference parameters. To avoid estimation biases driven by measurement error and correlated unobservables, we adopt a trivariate modelling approach in which both partners' individual WTR are modelled together with the couple WTR. We estimate the system by SURE, 2SLS and 3SLS (Zellner and Theil, 1962) using standard socio-demographic characteristics plus personality traits as exclusion restrictions for identifying the role of the individual on couple WTR. This way, we aim to answer two research questions: i) Is individual WTR related to personality and, if so, how? ii) Is couple WTR equally determined by the individual WTR of each partner, or does one prevail over the other?

We contribute to the literature on household risk preferences examining the relationship between individual and couple preferences over risk. Our work is especially related to Carlsson et al. (2013), De Palma et al. (2011) and Yilmazer and Lich (2015), who evaluate the balance of power within couples in the aggregation of risk preferences. We depart from them in three dimensions. First, we develop a trivariate model in which individual and couple WTR are jointly modelled so that it is possible to estimate the relative weight of males' and females' individual contributions to couple WTR. Therefore, our approach does not take individual WTR as exogenous and deals with shared unobservables driving the influence of partners' individual WTR on the couple's one. Second, we consider the role of personality traits and their relative influence in explaining individual risk attitude; to date, their relationship with WTR is unclear (Brown and Taylor, 2014; Dohmen et al., 2010) and has not been considered in the analysis of couple risk preferences. Third, we use a survey measure to elicit risk preferences both for individual partners and the couple. From this viewpoint, our approach complements existing evidence on how couple risk attitude relates to partners' individual WTR by avoiding switching behavior stemming from task miscomprehension as documented by Yu et al. (2021).

2. DATA AND METHODS

2.1. Data description

The data come from a lab experiment conducted in July-November 2019 on a sample of real-life couples in four Northern Spanish cities (Avilés, Bilbao, Gijón and Oviedo). Couples from the general population aged 18 or more were invited to participate in a study about couple preferences through flyers, posters and announcements in the social networks. This recruitment procedure follows Abdellaoui et al. (2013) and Cochard et al. (2016). The experiment consisted of two main tasks: i) a Public Goods Game (PGG) for understanding couple cooperation, and ii) a Discrete Choice Experiment (DCE) for uncovering couple's preferences for a joint leisure trip. Participants were paid a show-up fee of EUR 10 plus some variable earnings based on the allocations made in the Public Goods Game (ranging from EUR 5 to 15). The payment was made in cash at the end of the experiment.

Overall, 133 couples took part in the experiment. Three same-sex couples were excluded from the analysis since they represent a low share of the sample. Four additional couples were removed because of providing incomplete answers on couple WTR. The final dataset comprises 126 couples (252 individuals). We are aware there might be sample selection bias since participation is voluntary. This is a common limitation in many experimental studies (Levitt and List, 2007). The usual self-selection of risk tolerant individuals into economic experiments is partially offset here by the introduction of a fixed (and relatively large) payoff encouraging more risk-averse individuals to participate (Harrison et al., 2009).

The experimental tasks were completed in paper and pencil format and the whole experiment took about one hour. Instructions were read aloud and handed in paper at the beginning of each task, which was introduced sequentially only once everybody finished the previous one. After completing the PGG and the DCE (in randomized order), partners were separated into different rooms and answered an individual questionnaire (see Online Appendix,

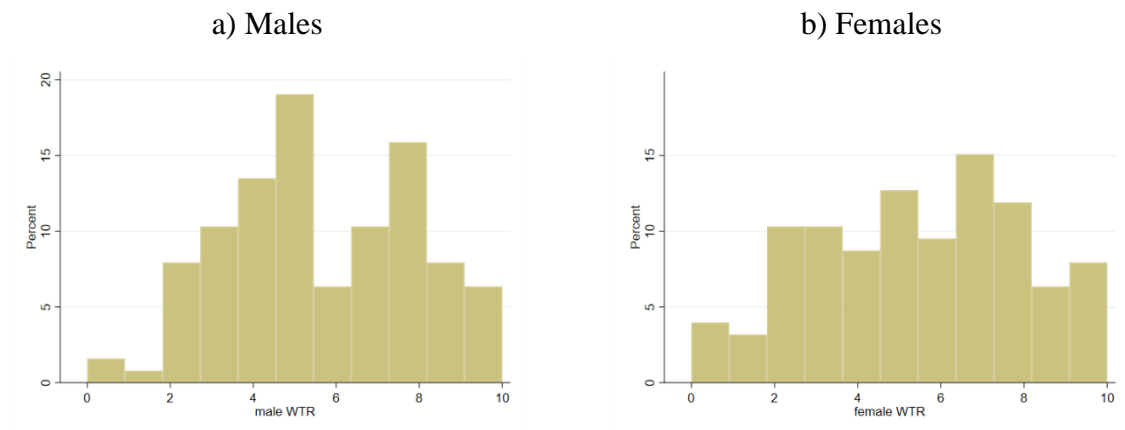
Section B). In this way there is no risk of potential contamination of responses as they could not observe each other's decisions, as in Abdellaoui et al. (2013), Bateman and Munro (2005) and Carlsson et al. (2012; 2013). The questionnaire asked to report, in addition to socio-demographic characteristics, individual willingness to take risk (WTR) according to the following question, drawn from the German Socio-Economic Panel:

«In general terms, would you describe yourself as someone who tries to avoid risks or as someone who is willing to take risks? Please answer on a scale from 0 to 10, where 0 means “Nothing at all” and 10 means “A great deal”.»

One concern when using self-reported data on risk attitude is that responses are not incentive compatible. However, this survey measure has been validated in large-scale field experiments with representative subject pools (Dohmen et al., 2011; Vieider et al., 2015).

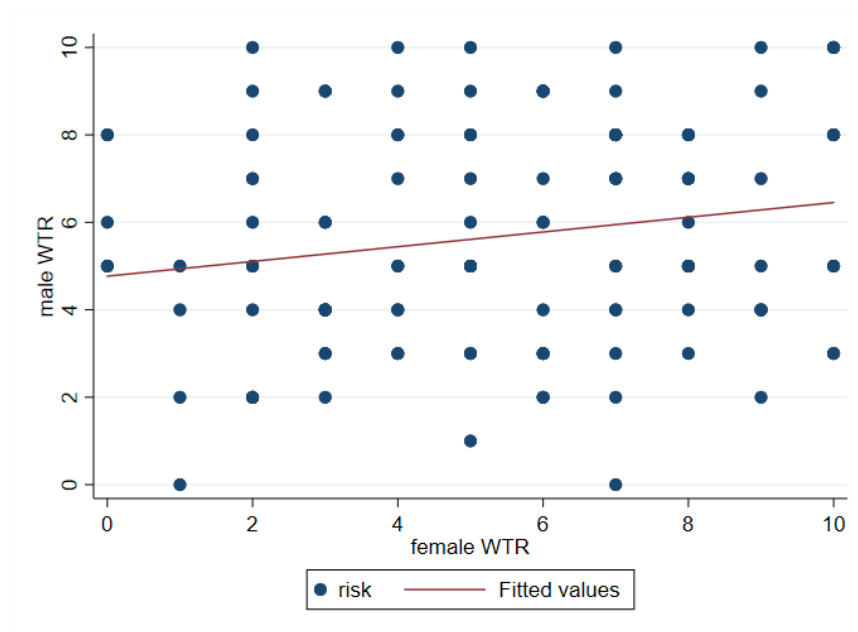
Figure 1 presents histograms of the distribution of female and male WTRs. While we document substantial heterogeneity for both sexes, a t-test for mean equality does not detect significant gender differences ($t=0.651$, $p\text{-value}=0.515$), nor are any differences detected based on the attainment of college education ($t=1.513$, $p\text{-value}=0.131$). However, married individuals ($t=2.516$, $p\text{-value}=0.012$) and those with children ($t=2.262$, $p\text{-value}=0.024$) are significantly less willing to take risks. Furthermore, individual WTR is negatively correlated with age ($\text{corr.}=-0.220$, $p\text{-value}<0.001$) but weakly associated with monthly individual income intervals ($\text{corr.}=-0.036$, $p\text{-value}=0.560$).

Figure 1. Individual WTRs



The pairwise correlation between partners' WTR is moderate ($\text{corr.}=0.184$, $p\text{-value}=0.003$). Figure 2 presents a scatterplot of male WTR over female WTR. There is large variability in individual WTR within couples. The average difference between male WTR and female WTR is 0.218, ranging from -7 to 8 with a standard deviation of 3.35.

Figure 2. Scatterplot of male WTR against female WTR



After completing the individual tasks and the questionnaire, partners were gathered into the same room and asked their WTR as a couple (single answer) to avoid individual answers to

be affected by couples' interaction, as in Abdellaoui et al. (2013), Bateman and Munro (2005), Carlsson et al. (2012; 2013) and De Palma et al. (2011). The question was the following:

«In general terms, would you describe yourselves as a couple who tries to avoid risks or as a couple who is willing to take risks? Please provide a single joint answer on a scale from 0 to 10, where 0 means “Nothing at all” and 10 means “A great deal”.»

Partners were allowed to freely communicate, with no time constraint, as in Abdellaoui et al. (2013) and Carlsson et al. (2013). Information of joint risk preferences is rarely available in other datasets. To our knowledge, only Fang et al. (2021), Li et al. (2021) and Wu and Zhao (2020) used a joint subjective measure of WTR in the financial domain at the household level.

Figure 3 plots a histogram of the couple WTR. The distribution is more leptokurtic than those from individual answers. Intuitively, this suggests that when individual WTRs differ, couples tend to report an in-between answer. In support of this, Figure 4 presents a scatterplot between the couple WTR and the simple average of partners' individual WTRs. There is a clear positive and high association between the two ($\text{corr}=0.724$, $\text{p-value}<0.001$), which suggests that the couple WTR tends to be a combination of partners' individual risk attitudes.

Figure 3. Couple WTR

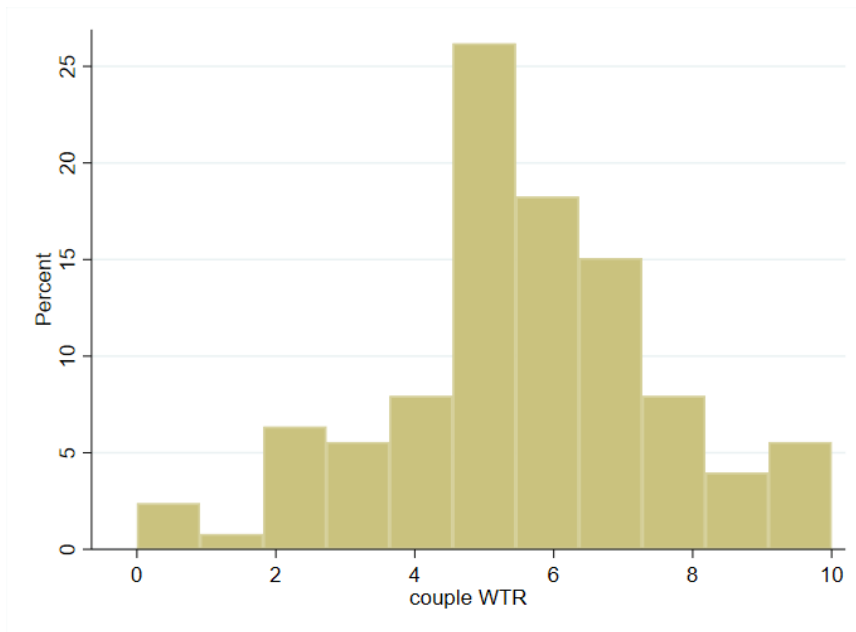
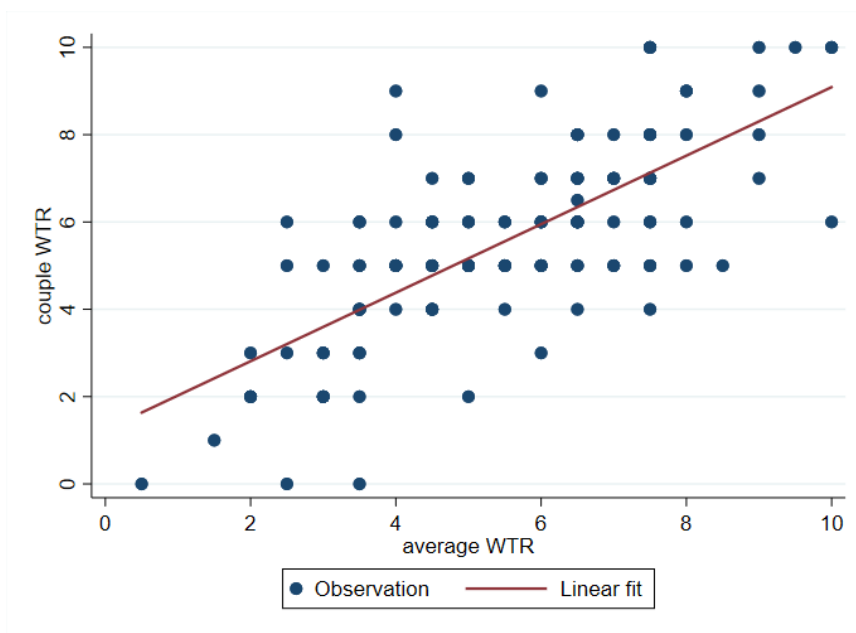


Figure 4. Scatterplot of couple WTR against average individual WTR



Personality traits are elicited through the Ten Item Personality Inventory (TIPI) developed by Gosling et al. (2003), using the Spanish wording implemented in Romero et al. (2012). It consists of asking respondents their agreement on a 1-7 Likert scale with 10 statements about themselves to capture their latent personality traits. The Big Five personality traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism)

were computed as the average of the two item instruments associated to each trait, as done in related studies (Dohmen et al., 2010). An analysis reported in the Online Appendix, Section C.1, reveals that the difference in individual WTR reflects differences in personality traits within the couple, and especially regarding openness.

The Online Appendix, Section C.2, reports descriptive statistics of the sample. On average respondents are 33 years old. Around 61% of them attain university studies or are currently at college, while 29% earn a relatively high income above EUR 1,500 per month. Around 27% have children and another 30% are married. More than half of the sample (52%) have been together for less than 5 years. The male is older in 52% of the cases, earns higher income in 37% of the cases and is more highly educated in 6% of the cases. Females are significantly more educated than males ($t=-5.567$, $p\text{-value}<0.001$) and exhibit greater levels of openness ($t=-2.505$, $p\text{-value}=0.012$) and extraversion ($t=-3.025$, $p\text{-value}=0.002$) according to t -tests. We also know, but do not use in the analysis, that most individuals are Spanish (98%), currently work (56%) and state to be in good health conditions (96%).

2.2. Empirical analysis

In line with previous studies (Dohmen et al., 2010; 2011), individual WTR is described as a function of personality P and a set of standard socio-demographic controls C as follows,

$$(1) \quad WTR = \beta_0 + \beta_1 P + \beta_2 C + \varepsilon$$

where β are parameters and ε the error term capturing unobserved factors.

Since partners have different risk preferences (Figure 2), the couple WTR (WTR^C) is expected to be a weighted combination of each partner's individual WTR (WTR^F and WTR^M), with the corresponding weights reflecting the influence of each partner's preferences on the couple WTR. This assumption follows the household economics literature and empirical studies on couple risk preferences (Carlsson et al., 2013; De Palma et al., 2011). Consistent with the

literature on the assimilation of preferences (Bacon et al., 2014; Di Falco and Vieider, 2018; Nikoloupoulous and Moffatt, 2019), the length of the sentimental relationship L is included as a moderator so that:

$$(2) \quad WTR^C = \gamma_0 + \gamma_1 WTR^F + \gamma_2 WTR^M + \delta L + \varepsilon^C.$$

The above model formulation resembles the one in Andreoni et al. (2003) to describe how couple's charity donations are influenced by the desires of both partners. Like them, we constrain the scalars γ_1 and γ_2 in no way. If we restricted them to sum to one, that would assume there are no possible externalities in the couple risk formation. In this regard, group preferences tend to be more extreme (Eliaz et al., 2006). In case they sum to more than one, that would mean there is extra risk tolerance when behaving as a couple. In case they sum to less than one, by contrast that would mean there is extra risk aversion when behaving as a couple (Bateman and Munro, 2005).

In principle, Equation (2) could be estimated by OLS. However, individual and couple WTRs may share common unobservables due to different forms of assortative matching, assimilation of preferences, emotional factors (Kassas et al., 2022) together with classical measurement error that makes WTR^F and WTR^M potentially endogenous. Therefore, Equations (1) and (2) are jointly estimated in the following way:

$$(3) \quad \begin{cases} WTR^C = \gamma_0 + \gamma_1 WTR^F + \gamma_2 WTR^M + \gamma_3 L + \varepsilon^C \\ WTR^F = \beta_0^F + \beta_1^F P + \beta_2^F C + \varepsilon^F \\ WTR^M = \beta_0^M + \beta_1^M P + \beta_2^M C + \varepsilon^M. \end{cases}$$

The simultaneous estimation of Equation (3) is performed by SURE (“Seemingly Unrelated Regression Equation”), 2SLS (“Two Stage Least Squares”) and 3SLS (“Three Stage Least Squares”). See the Online Appendix, Section C.3, for more details. We take 3SLS as a benchmark method since it is more general and deals with both measurement error (as 2SLS) and shared unobservables (as SURE).

3. RESULTS

Table 1 reports the results from the models in Equation (3) whose goal is to describe the WTR of the couple, jointly with the WTR of each individual forming the couple. Notice that the equation for couple WTR excludes the control variables and the variables on personality. If we added all these variables to the specification, a joint F-test would not reject the null hypothesis that they are not significant (based on the OLS model, test: 1.33; p-value: 0.168). This suggests that these variables play only an indirect role in describing couple WTR.

In Column (1) we run an OLS regression of the three equations. From the estimates on individual WTR we highlight that openness is positively and significantly correlated with individual WTR for both males and females, a finding consistent with Lönnqvist et al. (2015). In general, the R-squared statistics indicate that the model explains 24.2% and 35.4% of the variability in individual WTR, respectively for females and males. Most of this explained variability (around 77% on average) originates from personality traits according to a Shapley-type decomposition of the R-squared (see Online Appendix, Section C.4). This evidence is in line with Jagelka (2023), who shows that personality traits explain a large share of the variability in economic preferences including risk aversion. In the estimates for couple WTR, we find a significant role for the WTR of both females and males. The effect is higher for the female WTR, as a unit increase of the index is associated to a 0.488 unit increase of the couple index – as opposed to a 0.246 unit increase resulting from a unit increase of the male index. The difference between the two coefficients is significant according to an F-test ($F(1,354)=9.43$; p-value=0.002). This would align with Abdellaoui et al. (2013), who show that females exert more influence on household joint risk tolerance. We also reject the null hypothesis that the two coefficients sum to one ($F(1,354)=14.62$; p-value<0.001), which interestingly suggests that couple WTR is on average lower and shows less heterogeneity than the individual WTRs. In contrast, we do not reject the null hypothesis that the coefficients

describing female and male WTRs are identical (see Chow test at the bottom of Table 1), which suggests that individual WTR has some common determinants – no matter the gender.

In Column (2) we run a SURE regression. The difference between the two coefficients of individual WTR becomes smaller, although it remains significant ($F(1,354)=5.05$; p -value=0.025). There are no other relevant variations in the coefficients, apart from agreeableness becoming significant in the equation for male WTR.

In Column (3) we run a 2SLS regression. The general picture remains the same, in terms of significance and size of the coefficients. Regarding the key coefficients on individual WTR, the male one increases by about one third with respect to the SURE model. As a result, the difference between the two coefficients reduces and now is no longer significant ($F(1,354)=0.07$; p -value=0.798). Importantly, here we do not reject the null hypothesis that the two coefficients sum to one ($F(1,354)=1.31$; p -value=0.252).

Finally, in Column (4) we run a 3SLS regression. Identifiability of the parameter estimates relies on whether the rank condition is satisfied for each specification in the system. We support this assumption according to a Baum (2007) test for identification status in simultaneous equation systems. Furthermore, a Hansen-Sargan test does not reject the null hypothesis that the over-identifying restrictions are valid (p -value=0.470). Moreover, a Breusch-Pagan diagonal covariance matrix test clearly rejects a standard OLS regression as compared to 2SLS and 3SLS (see the bottom of Table 1). Coefficients are similar to the previous models, but we keep on noticing a realignment of the two coefficients on individual WTR: they are not statistically different from each other ($F(1,354)=0.01$; p -value=0.909) and they sum to one ($F(1,354)=1.68$; p -value=0.196). This implies that the WTR of the couple as a whole is a weighted combination of partners' individual WTR. Therefore, couple risk preferences are compatible with a costless bargaining interpretation: partners' influence weights sum to one so there is no WTR premium when deciding together.

Table 1. Benchmark estimates

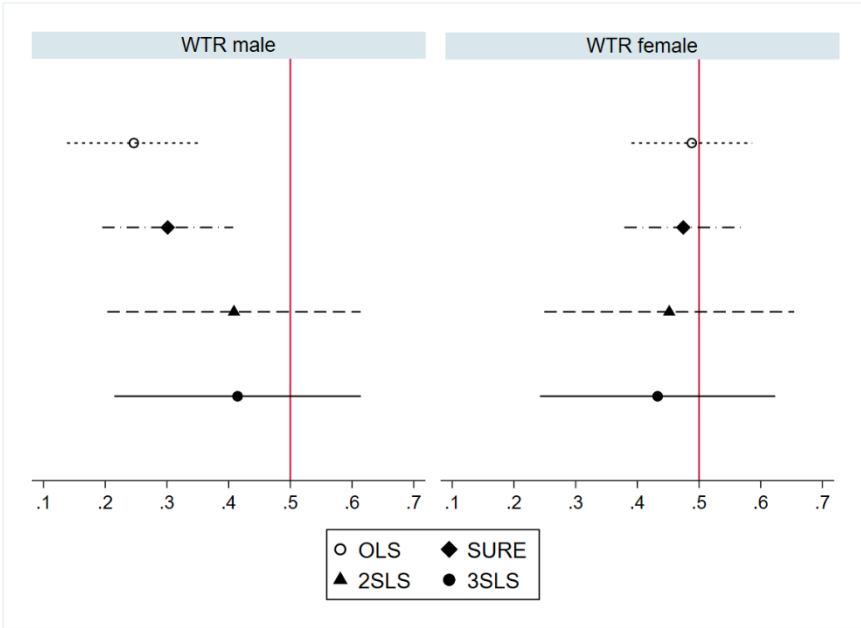
Model	(1) OLS	(2) SURE	(3) 2SLS	(4) 3SLS
<i>Couple WTR</i>				
WTR (female)	0.488*** (0.050)	0.474*** (0.049)	0.452*** (0.103)	0.433*** (0.097)
WTR (male)	0.246*** (0.055)	0.301*** (0.054)	0.409*** (0.104)	0.415*** (0.102)
Recent relationship	0.341 (0.277)	0.298 (0.272)	0.183 (0.317)	0.229 (0.302)
Constant	1.366*** (0.388)	1.152** (0.380)	0.727 (0.624)	0.772 (0.607)
<i>Individual (female) WTR</i>				
Openness	1.011*** (0.294)	1.021*** (0.282)	1.011*** (0.294)	1.044*** (0.282)
Conscientiousness	-0.150 (0.248)	-0.164 (0.238)	-0.150 (0.248)	-0.169 (0.237)
Extraversion	0.060 (0.243)	0.062 (0.233)	0.060 (0.243)	0.060 (0.233)
Agreeableness	0.193 (0.223)	0.184 (0.214)	0.193 (0.223)	0.171 (0.213)
Neuroticism	0.339 (0.264)	0.344 (0.253)	0.339 (0.264)	0.339 (0.253)
Age	-0.028 (0.031)	-0.028 (0.029)	-0.028 (0.031)	-0.028 (0.029)
Children	-0.294 (0.907)	-0.269 (0.870)	-0.294 (0.907)	-0.227 (0.869)
College	0.043 (0.570)	0.041 (0.547)	0.043 (0.570)	0.059 (0.546)
High income	0.420 (0.608)	0.398 (0.583)	0.420 (0.608)	0.332 (0.582)
Constant	-1.573 (1.953)	-1.555 (1.872)	-1.573 (1.953)	-1.577 (1.871)
<i>Individual (male) WTR</i>				
Openness	0.884*** (0.218)	0.887*** (0.208)	0.884*** (0.218)	0.876*** (0.201)
Conscientiousness	-0.587** (0.191)	-0.592*** (0.182)	-0.587** (0.191)	-0.598*** (0.175)
Extraversion	-0.152 (0.189)	-0.143 (0.180)	-0.152 (0.189)	-0.137 (0.172)
Agreeableness	0.404 (0.211)	0.406* (0.201)	0.404 (0.211)	0.427* (0.193)
Neuroticism	0.435* (0.207)	0.435* (0.198)	0.435* (0.207)	0.434* (0.190)
Age	-0.057* (0.023)	-0.056** (0.022)	-0.057* (0.023)	-0.052* (0.021)
Children	1.161 (0.731)	1.132 (0.697)	1.161 (0.731)	1.000 (0.667)
College	-1.203** (0.399)	-1.213** (0.381)	-1.203** (0.399)	-1.184*** (0.367)
High income	0.668 (0.492)	0.682 (0.468)	0.668 (0.492)	0.643 (0.448)
Constant	2.507 (1.690)	2.461 (1.611)	2.507 (1.690)	2.333 (1.553)
F-test WTR (female)=WTR (male)	9.43 [0.002]	5.05 [0.025]	0.07 [0.800]	0.01 [0.909]
F-test WTR (female)+WTR (male)=1	14.62 [0.000]	10.89 [0.001]	1.31 [0.253]	1.68 [0.196]
Chow test equal coeffs. ind. eqs.	0.94 [0.493]	1.01 [0.432]	0.94 [0.493]	1.00 [0.443]
Breusch-Pagan test independent eqs.	1.77 [0.621]	1.77 [0.621]	13.06 [0.005]	13.06 [0.005]
R-squared couple WTR	0.563	0.559	0.531	0.526
R-squared WTR (female)	0.242	0.242	0.242	0.241
R-squared WTR (male)	0.354	0.354	0.354	0.354
Observations	126	126	126	126

Note: Robust standard errors in round parentheses; p-values in squared parentheses;

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Figure 5 summarizes the coefficients of male and female WTR estimated in the models of Table 1. Altogether, it seems that the apparently greater weight of females' WTR on the joint measure from OLS and SURE is just driven by common unobservables. Indeed, once we account for correlated unobservables between individual and couple WTRs, 2SLS and 3SLS estimates indicate that partners compromise so that the couple WTR is the simple average of partners' individual risk tolerance. Both partners thus exert about the same influence. Given the notable variability in individual WTR within couples (Figure 2), this implies that when preferences diverge, partners compromise to find an in-between solution; the risk-averse (risk-tolerant) partner becomes more (less) willing to take risks in general when coupled with his/her more risk-tolerant (risk-averse) partner. Some additional results and robustness checks are presented in the Online Appendix, Section D.

Figure 5. Contribution of individual WTR to couple WTR



Note: The figure reports estimates and confidence intervals of the coefficients on male and female WTR from the models in Table 1.

4. CONCLUSIONS

We have examined the influence of partners' individual willingness to take risks on couple WTR. Although there is ample research on the determinants of individual risk attitude and the potential assortative matching in risk preferences between partners, less is known yet about how divergent individual risk preferences are combined to form the WTR of the couple. We have analyzed partners' individual and joint WTRs elicited sequentially and separately in a lab experiment with 126 couples from Spain. We have estimated models in which individual and couple risk attitudes are jointly modelled. Socio-demographic variables and personality traits are used to explain individual WTR while the length of the relationship is included as a control in the couple risk equation.

We document that personality traits are important predictors of the individual WTRs and that the couple WTR is a convex combination of the male and female WTRs, with both partners exerting about the same influence. This implies that, when individual WTRs differ, partners compromise to find an in-between solution. As a result, the risk-averse (risk-tolerant) partner appears to be willing to take more (less) risk when behaving with the partner than he/she would like when behaving individually. Contrary to other studies showing that either partner (Abdellaoui et al., 2013; Carlsson et al., 2013; De Palma et al., 2011) usually attains greater influence in driving couple risk attitudes, our estimates point to an equal balance of power. Interestingly, the weights sum to one so that there is evidence of neither risk aversion nor risk tolerance premium when behaving as a couple.

Our results have important implications for a better understanding of household economic decisions involving risk. Household investment in risky assets could be driven by the risk preferences of either partner in a benevolent dictator sense. However, partners in our dataset appear to pool their risk attitudes and find an agreed joint WTR falling around the midpoint of their separate individual risk preferences. This evidence is in line with the most efficient

scenario in Van Raaij et al. (2020) who, in a different context, argue that syncratic decisions of the partners generally improve the quality of financial management.

An important aspect of our analysis is that we propose a model jointly describing individual and couple WTRs. This approach does not impose the assumption that individual risk attitudes enter exogenously into the couple risk formation function. In this vein, the greater influence of females in couple WTR documented in OLS regressions, and in line with previous literature (for instance Abdellaoui et al., 2013) vanishes in 2SLS and 3SLS regressions. Therefore, future studies concerned about the influence of individual attitudes on joint preferences need to consider potential endogeneity stemming from common unobserved factors.

Our study has some limitations that may be taken as avenues for future research. The analysis considers generic risk attitude. It could be interesting to explore whether the influence of males and females on the couple risk attitude is also the same in specific domains like financial or health risks. Similarly, longitudinal data could allow to investigate whether each partner's influence on the joint risk remains constant or evolves over time. In addition, both individual risk attitudes and couple micro-norms are highly dependent on culture. Our analysis could be repeated using data from a culturally different country to see whether our findings hold. Finally, from a broader perspective, comparing the risk preferences of coupled individuals with those of singles could help to explore potential marital gaps in risk taking (Borau et al., 2022).

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