Gender differences in risk aversion: Evidence from private pension system in Türkiye

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ARTICLE INFO

ABSTRACT

Evidence on gender differences in risk aversion is ambiguous. Using actual data of participants in the Individual Pension System in Türkiye, this study provides some evidence of the gender differences in investment decisions. The findings show that men are 17.6 % less likely to exhibit high-risk tendencies compared to women. Age demonstrates a positive association with risk-taking behavior. Also, married individuals have a 35 % higher chance of partaking in high-risk behavior. Nonetheless, this effect is 16 % lower for men than for women. Furthermore, college graduation raises the probability of high-risk behavior by 24 %, while income exhibits a negative impact, decreasing the likelihood of belonging to a high-risk group. When accounting for socioeconomic factors, the direct influence of gender on risk behavior diminishes. Notably, the presence of a higher proportion of women with college degrees and lower incomes contributes to risk-taking behavior independently of gender.

1. Introduction

Some studies (Byrnes et al., 1999; Charness & Gneezy, 2012; Croson & Gneezy, 2009; Eckel & Grossman, 2008) suggested that women are more risk-averse than men by highlighting the existence of gender differences in risk aversion. However, more recent studies (Filippin & Crosetto, 2016; Liu & Zuo, 2019; Sarin & Wieland, 2015) underscored that women and men make different decisions in risk aversion under different circumstances because of their different cultural backgrounds; so that does not indicate risk aversion due to gender differences. This article focuses on gender differences in risk aversion, specific to Türkiye's Individual Pension System (IPS), which is complementary to the existing public pension system to strengthen the relationship between life-long earnings and income in retirement.

Social security benefits may need to be more adequate for individuals with sufficient savings to achieve their retirement income goals due to possible future tax increases, so today's workers must be encouraged to make savings choices (Bajtelsmit & VanDerhei, 1995), which includes some risks. The demographic characteristics of individuals, like gender and marital status, greatly impact these choices. Neelakantan and Chang (2010) found that negative correlation between risk aversion and wealth accumulation, but not as strong as the unexpected portion of the gender gap in wealth. The studies (Arano et al., 2010; Bajtelsmit et al., 1999; Bajtelsmit & VanDerhei, 1995; Watson & McNaughton, 2007a, 2007b) on risk aversion in retirement investment systems by gender perspective agreed that women are more risk averse than men. This situation is mostly the result of more disrupted work patterns and lower incomes across their working lives (Speelman et al., 2013). Regarding marital status in retirement investment decisions, married women are more risk-averse than married men (Arano et al., 2010) and single women (Sundén & Surette, 1999). However, single women at a younger age are more likely to select lower-risk retirement investments (Gerrans & Clark-Murphy, 2004). On the other hand, education is also an important factor that affects retirement investment decisions (Gerrans & Clark-Murphy, 2004), such that higher financial literacy, awareness, and confidence lead to fewer gender differences in pension investments (Martenson, 2008). The requirement of spending a longer time on the decision of pension investments may be another factor why women prefer less risky investment choices that require less time, so time-efficient manner and services may help women discover more about investment choices (Joo & Pauwels, 2002).

While several studies examine the socio-economic determinants of

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the participation decision and the level of contributions, to the best of our knowledge, there is only one study that pays attention to the gender differences in the risk preferences of participants in IPS (Kara et al., 2015). The authors found that men have a higher tendency to allocate their accumulated contributions to riskier investments, and the difference in risk preferences between male and female participants diminishes as the level of education increases. It is against this background that this study examines the gender dimension of the risk decision of participants of IPS in Türkiye per se. We use actual data of the participants to provide detailed evidence of the gender differences in risk preferences. The next section discusses the private pension system in Türkiye, followed by a brief literature survey on the gender dimension of risk preferences and the relevant studies on IPS. Section 4 introduces the data and the method. Section 5 discusses the results. Finally, we summarize our findings in the conclusion.

2. Private pension system and gender in Türkiye

The Social Security Institution (SSK), established in 1946 for blue-collar workers employed in the public sector and all workers in the private sector, The State Retirement Fund for white collar employees in the public sector established in 1950 and the Social Security Institution of Craftsmen, Tradesmen and Other Self-Employed People (Bag-Kur), established in 1971, had been three main institutions for social insurance including retirement until were transferred to the Social Security Institution (SGK) in 2006. These institutions involve hierarchies and inequalities for beneficiaries. Also, the deficit of these institutions had been steadily increased in the 1990s (Elveren, 2008a). Therefore, structural reform was needed.

Two reforms were implemented in response to concerns about the sustainability of the pension system in the 1990s in Türkiye. The first reform, in 1999, made changes to contribution margins, retirement age, and the period required for retirement eligibility. It also introduced unemployment insurance and a forced saving system that allowed social security funds to be used by private fund managers in capital markets (Akyüz, 2011; Sarıtaş-Oran, 2017). The Individual Pension Program was established in 2001, followed by further structural changes. The second reform, enacted in 2006 and put into action in 2008 as the Social Security and General Health Insurance Law, introduced changes to the institutional structure and insurance branches. It raised the retirement age and equalized it at 65 for both men and women by 2048. The number of contribution days gradually increased to 9000 days by 2028, resulting in a lower income replacement rate. However, the financial crisis in Türkiye was caused by the structural transformation[1] in the labor market, not solely by the influence of an aging population on the pension system (Elveren, 2015; Gökbayrak, 2010).

The IPS in Türkiye is not an alternative but a complement to the existing social security system. To be eligible, individuals must have contributed for ten years and be at least 56 years old. Initially, participation in the IPS was voluntary, but an automatic enrollment system was introduced in 2017 due to low desired enrollment. Both enrollment methods are currently in effect. The state's contribution to the system increased from 25 % to 30 % in January 2022. The goal was to use IPS funds for long-term investments, contributing to economic growth (Sarıtaş-Oran, 2017). Despite offering incentives to encourage enrollment, the IPS primarily appeals to high-income groups (Sarıtaş-Oran, 2017; Elveren, 2015; Akyüz, 2011).

Pension companies, portfolio managers, and regulating bodies work in the IPS. The pension companies oversee using accumulated funds as investments in financial markets. Returns to these investments constitute retirement incomes or exit income in case of early withdrawal from the system. In the contract acted with the pension company when enrolling on the system, the participant chooses a retirement plan in line with their risk and income preferences. In contrast, the company agrees with the portfolio manager, who manages pension funds according to these preferences (Sarıtaş-Oran, 2017).

Participants in the IPS have the flexibility to adjust their contribution amounts or temporarily suspend contributions. They also have the option to transfer their accumulated contributions from one company to another, provided they have been with the former company for at least one year. There are various alternatives available for participants to increase the value of their pension contributions. They can choose to allocate their funds to these options or create customized portfolios with preferred ratios (Kara et al., 2015). Initially, participants tend to allocate their contributions to 'standard funds,' which offer relatively low returns (Sarıtaş-Oran, 2017). The retirement income in the IPS is determined based on individual contributions made to the system, which operates on defined contributions (Elveren, 2008a). It is important to note that the IPS does not guarantee future income, as the income is directly influenced by the market performance of the assets (Babat et al., 2020; Şahin & Elveren, 2014). Consequently, income disparities in the IPS stem from differences in individuals' saving capacity (Babat et al., 2020). Due to the characteristics of the Turkish labor market, access to retirement rights remains limited for disadvantaged groups such as women and migrants. These groups are often excluded from public pension programs and have insufficient coverage in the private pension system due to irregular and low incomes. In fact, women's participation in individual pension programs in Türkiye is lower than that of men. Men constitute 59.3 % of IPS participants, while women account for 40.7 % (EGM, 2021). The employment characteristics associated with women are the main factors contributing to this situation (Gökbayrak, 2011).

Since women's participation in the labor force is mostly in the secondary sector, they are excluded from pension systems (Durmaz-Bodur, 2020; Elveren, 2015; Elveren & Hsu, 2007; Kalleberg et al., 2000; Mercan, 2020). Due to their low earnings, many women fail to meet the required number of contribution days for public pension schemes, thus preventing them from participating in the IPS. Moreover, women enrolled in the system face challenges in making regular contributions (Elveren, 2008b; Şahin et al., 2010a, 2010b). Additionally, the gender pension gap[2] in retirement income significantly widens between public and complementary pension systems. Individual pension systems exhibit a wider gender gap compared to public systems (SPC and DG EMPL, 2018).[3]

The duration of employment and individual employment status plays a significant role in determining the gender gap in retirement income. A shorter career background leads to a wider gender gap in retirement. On average, women work for 33.9 years compared to men's 38.7 years in the EU (Eurostat, 2021), resulting in a 4.8-year gap in employment duration. This gap is greater in Türkiye. On average, men work for 37 years compared to women's 17.1 years (Eurostat, 2021), which equals almost 20-year gender gap. The shorter employment duration for women can be attributed to spending five more years on childcare than men (SPC and DG EMPL, 2018). Another important factor contributing to the gender gap in retirement income is the type of employment, particularly full-time or part-time. Part-time employment, often associated with low-paid and insecure jobs without social security, disproportionately affects women. This can lead to either exclusion from the IPS due to low earnings or irregular contributions. Part-time employment has a

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[1] In the 1980s, Türkiye embarked on a transition from import substitution to export-oriented economic policies, placing a strong emphasis on global competitiveness. To enhance capital profitability, the promotion of informal employment became a prevalent strategy in Türkiye. This shift has resulted in a reduction in contributions to the social security system.

[2] *Gender pension gap* is calculated by comparing the average monthly pensions of women and men (SPC and DG EMPL, 2015).

[3] For detailed information about gender in retirement incomes in EU member countries, see (SPC and DG EMPL, 2015, 2018).

negative impact on women, widening the gender gap in retirement income (Kayam et al., 2013). The prevalence of part-time employment in the OECD average for 2020 is 25.1 % for women and 9.9 % for men (OECD, 2020a). Similarly, in Türkiye, on average, part-time employment for women is 18.3 % compared to 7.8 % for men (Eurostat, 2021). Inequalities in working life, such as women's concentration in part-time, informal, and precarious jobs in the secondary labor market due to childcare responsibilities and lower wages compared to men, contribute to gender gaps in retirement income (Levitas, 1996; OECD, 2020b; Reich et al., 1973; Shilton, 2013). These labor market disparities serve as the underlying cause of gender-based inequalities in retirement incomes (Elveren, 2015). Inadequate or costly childcare and unpaid labor further exacerbate the gender gap in retirement if public services are lacking or of low quality (SPC and DG EMPL, 2018).

IPS does not effectively address gender-based inequalities in retirement security but rather contributes to the widening socioeconomic gap among different groups of women (Babat et al., 2020; Elveren, 2015).

3. IPS enrolment: socioeconomic characteristics of participants, contributions and ways of risk assessment

When individuals assess their personal pension investments, they also consider their portfolio choices. The willingness of individuals to take financial risks affects their portfolio distribution and returns to their investment. People are motivated to take risks to potentially increase returns or mitigate potential losses (Finke & Huston, 2003). In the context of retirement plans, the amount and allocation of contributions determine the long-term income individuals will receive. Therefore, individuals investing in retirement plans must determine the level of risk they are comfortable with (Watson & McNaughton, 2007a, 2007b). Understanding factors such as who is more inclined to take financial risks, the extent of risk taken, and the determinants of individuals' risk-taking behavior are all crucial considerations in this regard (Yao et al., 2011).

Financial risk tolerance is a key factor influencing individuals' risk-taking behavior. It refers to the level of uncertainty an investor can handle when making financial decisions (Grable, 2000). Risk aversion is negatively correlated with financial risk tolerance, meaning more risk-averse individuals have lower financial risk tolerance, and vice versa (Faff, 2008). Empirical studies show that sociodemographic characteristics can also influence individuals' propensity for risk-taking (Barak, 2006; Carson et al., 2011; Deaves et al., 2007; Kahyaoğlu, 2011): Changes in marital status, such as marriage, divorce, or having a child, may impact individuals' risk aversion behavior. In the United States, some studies indicate that having children tends to deter individuals from taking risks (Grable & Lytton, 1998), while others suggest that in households with dual-income earners, there is a positive inclination towards high-risk investments to cover child-rearing expenses (Xiao & Anderson, 1997).

Romer (2001) suggested that individuals tend to save more when there are uncertainties about their future income, so women might have a higher inclination to save through individual pension systems. Furthermore, women have a longer life expectancy than men, which increases their likelihood of facing health issues in old age and being at risk of experiencing poverty in retirement. An empirical study conducted in Britain suggested that women's participation in private pension systems may contribute to the increase in their welfare as a way of taking more responsibility (Peggs, 2000). Thus, women's economic dependency on the men in the household will decrease. In another empirical study in the United States, examining saving and investment decisions among university personnel, Deaves et al. (2007) found that women tended to save more than men. It is worth noting that this higher propensity to save among women may be influenced by the study's specific context, which focused on the upper-middle-income group with a high level of education.

Numerous studies (Gibson et al., 2013; Clark & Strauss, 2008; Grable & Lytton, 1998; Morse, 1998; Sunden & Surette, 1998; Sung & Hanna, 1996; Watson & McNaughton, 2007a, 2007b) indicate that women generally have lower financial risk tolerance compared to men. Financial risk tolerance also varies based on various demographic factors. Grable and Lytton (1998) found that elderly individuals and married individuals tend to have lower financial risk tolerance, while professionals, independent workers, higher income groups, whites, and individuals with higher education tend to have higher financial risk tolerance by an empirical study in the United States. The relationship between age and risk-taking behavior is debated, with some studies suggesting that risk aversion decreases with age, especially among higher education groups in Australia (Bateman et al., 2014), while others find for example in the United States (Dulebohn, 2002; Hawley & Fujii, 1993) and Sweden (Palsson, 1996) that risk aversion increases with age. Dulebohn (2002), in his study using a field survey implemented to 795 higher education employees in the United States, argued that individuals become more risk-averse as they age due to concerns about potential investment losses and prefer safer investment options for their retirement savings. Chaulk et al. (2003) highlighted that factors such as gender, age, or marital status have a limited impact on risk tolerance in Canada, but having children has a significant and negative effect on risk tolerance. They also find that younger men are more inclined to take risks than women, but as men age, their risk tolerance decreases, while women's risk tolerance increases slightly. Married individuals tend to have lower risk tolerance in younger age groups but higher risk tolerance in older age groups. Having children reduces risk tolerance in low-income households but increases it in higher-income households. Overall, it can be concluded that factors influencing risk tolerance interact with each other.

Apart from sociodemographic characteristics, behavioral factors also play a role in differences in risk-taking (Grable, 2000; Hershey, 2004). Grable's (2000) study revealed that demographic, socioeconomic, and attitudinal factors explain only 22 % of an individual's risk tolerance. Hershey (2004) addresses the psychological factors affecting investors in pension. While the psychological factors represent proximal influences that have a direct effect on savings decisions; demographic factors are the distal influences that lead individuals to think about saving in predictable ways (Hershey, 2004). Similarly, other empirical studies have shown that financial literacy, such as understanding financial concepts and decisions, has an impact on retirement planning in the United States and Sweden (Lusardi & Mitchell, 2008; Hauff et al., 2020). Moreover, having a clear retirement objective significantly influences financial planning and the propensity to save in the United States (Stawski et al., 2007).

Furthermore, Alserda et al. (2019) mention that the impact on risk preferences of the sociodemographic characteristics is measured as 5.6 % within the IPS in the Netherlands. They emphasize that considering the retirement plan characteristics and market expectations is crucial in understanding the risk preferences.

Gender-related factors affect contributions to the Individual Pension System (IPS) in Türkiye. Women tend to contribute less regularly due to their more pessimistic outlook on the future. Being married, living in Istanbul, declaring higher payments, and having a longer enrollment duration are more likely to contribute regularly (Yıldız et al., 2016). Education level positively influences contribution amounts (Şahin et al., 2010a, 2010b). A study (Bozkuş & Elveren, 2008) found no significant difference between men and women in regular contributions, attributing it to similar trades and upper-middle-income status. However, men in high-status professions contribute more regularly. Women would require larger pension subsidies if a minimum pension guarantee were implemented (Şahin & Elveren, 2014).

Babat et al. (2020) studied savings decisions in Türkiye based on socioeconomic and demographic factors using data from an individual pension company. They found that single women contribute 1.26 % less than single men, while married women contribute 3.48 % more than married men. Contributions increase with age, income, and education.

Marital status has a diminishing effect of 1.25 % on men's contributions but increases women's contributions by 3.49 %. Married women contribute more monthly, possibly due to their limited access to public pension systems.

Kayam et al. (2013) found that women have a lower tendency to withdraw from the IPS compared to men once they become participants. The likelihood of leaving the IPS decreases with a higher number of contributions, indicating a stronger commitment. Higher education is associated with a higher probability of remaining in the system, suggesting that education plays a role in retention. Individuals who contribute above a certain level, such as 500 TL per month for the year 2013, are more likely to stay within the IPS. However, regardless of the contribution amount, divorced participants or those who experience a loss of household income after the death of a spouse are more likely to leave the system or use accumulated funds for other purposes. The sector and profession of individuals also impact the decision to withdraw from the IPS. Workers and technicians have a lower tendency to leave compared to freelancers. Income levels do not significantly affect the decisions of housewives, unemployed individuals, engineers, and architects, but employees in the finance sector are more likely to withdraw as their income increases. Lastly, individuals living in more developed regions of Türkiye have a lower probability of leaving the IPS.

Kara et al. (2015) investigated the risk preferences of participants in the individual pension system. Their analysis revealed that men, individuals with higher education, those with shorter enrollment periods, participants making higher contributions, and married individuals have a higher tendency to allocate their accumulated contributions to riskier investments. Age was found to be insignificant in the model, indicating it does not affect risk preferences. The study also found that higher education has a greater impact on reducing risk-taking among men compared to women. As the level of education increases, the difference in risk preferences between male and female participants diminishes.

Türkmen and Kılıç (2021) found no significant correlation between the level of financial literacy and enrollment in the IPS based on their survey in Türkiye. However, they observed that perceived consumer risks do influence decisions to enroll in the IPS. Canöz and Baş (2020) surveyed 405 academics and discovered that academics in state universities are more likely to join the IPS. They also exhibited more advanced saving and investment behavior, higher financial literacy levels, concerns about the future, and longer tenures.

Regarding investment choices, survey data from Aren et al. (2015: 44) in Türkiye show that individuals who predominantly choose retirement bonds are less concerned about their choice, whereas those who choose equity certificates have relatively more worries. Bonds offer fixed returns, providing a sense of security, especially for long-term investments like retirement. Individuals who choose bonds are less worried compared to others (Aren et al., 2015: 44). Those who prefer equity-based and bond-based funds are more inclined to enroll in the system, while individuals who opt for equally weighted funds show less interest, possibly due to lower financial literacy levels (Aren et al., 2015: 45).

The above-mentioned studies on different countries suggest that women are disadvantaged by such indicators as IPS enrolment, retention in the system, and inclusion in pension plans with higher returns as a result of their level of education, labor market position deriving from the gender-based division of labor and forms of employment.

4. Data and method

The Pension Monitoring Center (PMC) of Türkiye provides data. The original data set consists of 95,479 members who participated in the system between 2004 and 2020. The data set covers demographic and socio-economic aspects of the members as well as their risk-taking behavior, membership duration, and contribution level (see Table 1).

The demographic aspects of participants are mostly self-declared information, gathered during the membership process. Even though

Table 1
Definitions of independent and dependent variables.

Variables	Variable type	Definition	Measurement
Gender[a]	Nominal	Gender of participants	1 = Female 2 = Male
Age	Ratio	Age of participants	Discrete Variable
Metropol	Dummy variable	Living in 3 biggest provinces (Istanbul, Ankara, Izmir) or in other provinces	0 = Other Provinces, 1 = Top 3 provinces
Housewife	Dummy variable	Being a housewife or not	0 = Not a Housewife, 1 = Housewife
Married	Dummy variable	Being married or not	0 = Single/ Divorced, 1 = Married
College graduate	Dummy variable	Being a college graduate or not	0 = Not a college graduate, 1 = College graduate
Income	Ordinal variable	Income levels	1 = Min Wage 2 = Min Wage*2 3 = Min Wage*3 4 = Min Wage*6 or more
Contribution	Ratio	Contribution made for IPS (TRY)	Discrete variable
Membership duration	Ratio	Number of months stayed in IPS	Discrete variable
Risk-taking behavior	Ordinal variable	Risky investment choice made by participants	1 = Not Risky 2 = Low Risk 3 = Risky 4 = High Risk
Risk-taking behavior (2)	Dummy variable	Risky investment choice made by participants	0 = Not risky or low-risk 1 = Risky or high risk

[a] During the design of the model, it had been decided to code gender variable as "1" and "2". Main reasoning was the fact that gender variable was going to be crossed with other independent variables, to create interaction variables. Coding it as "0" and "1" would lead to an interaction variable where "0" would involve a few subgroups at once. Thus, since gender variable is a common partner of many interaction variables, it was coded as "1" and "2", to enrich its explanatory capacity.

the age and gender of participants are certified via ID cards or other credentials, socio-economic variables such as income and education may or may not involve any official proof.

Thus, we employ secondary data collected by PMC itself. That way we had access to the data representing the whole universe. Other methods (surveys, etc.) would not only be time and budget-consuming but also would create generalizability issues, as well as raise validity and reliability concerns.

While we are constrained by the data set, the discussion in the previous section shows that the variables (i.e., income level, education level, age, and marital status, etc.) we utilize are in line with what the literature suggested.

When we exclude the missing values, the sample becomes 34,404. *Risk-taking behavior* is our dependent variable. It is measured and labeled by the PMC, depending on participants' preference of the risky fund/ investment choices with higher possible returns, instead of funds/investment options with lower risk and lower possible returns. This variable has four subcategories, varying from preferring not risky investment options to other options with higher risk, defined by the PMC.

Risk-Taking Behavior 2 is also created and added to the model, where sub-categories were shrunk into 2. Participants preferring not risky or low-risk investment options are categorized as "not risk takers" whereas risky or high-risk investors were seen as risk takers.

We control the effects of demographic, socio-economic, and

investment choice variables on the dependent variable.

We employ an ordered logistic method. The ordered logistic method was preferred due to several statistical or empirical reasons. First of all, ordered logistic regression is suitable when dependent variable with two or more ordered categories is chosen. Since we have an ordinal dependent variable, we found it optimal to employ such a technique.

Also, ordered logistic regression provides odds ratios, which proves quite handy when it comes to the interpretation of results, especially the effect of predictors on different levels of the dependent variable.

5. Results and discussion

5.1. Descriptive analysis

Table 2 provides a summary of the frequencies for the dependent and independent variables for both men and women.

At first glance, data suggests that there is no or minimal gender gap in terms of risk-taking behavior in IPS. No matter if it is structuralized as a categorical or dummy variable, men and women have similar tendencies in their risk-taking behavior as both groups' average for the risk-taking behavior variable is 2.5. Also, 79 % of men prefer risky or high-risk investment options, whereas it is 82 % of women, quite similar. Men and women have also similar investment decisions in terms of portfolio management. Their contribution levels are the same. This may be due to the "default effect", which we will discuss below. Also, men and women have a similar membership period.

Men's labor force participation rate is higher than that of women, which is not unexpected, because of the separate categorization of housewife for women. Men included in the IPS system are categorized either as employed, student, retired, or unemployed. Thus, the data architecture of IPS assumes that unless a man is "officially" a student or retired, he is still in the labor force. However, women can also be categorized as a housewife, which decreases their labor force participation rate vis a vis man. On the other hand, the actual rate of employment is 27 % higher for men than women, which is quite different from the national average where the labor force participation rate of the former doubles of the latter.

It is also important to note that women in our dataset (i.e., members of IPS) are not representative of all women nationwide. This is because only white-collar workers with a certain income level have an opportunity to participate in IPS. This nationwide participation ratio for women is as low as 10 %. Therefore, it is worth noting that our results cannot be generalized to draw conclusions based on the entire population. However, the findings are still relevant as they can complement the early findings in the literature focusing on high-income groups.

5.2. Regression results

We employ an ordered logistic regression model to investigate if there is a gender difference in risk-taking behavior among IPS members. We have two alternative categorizations for the dependent variable, as

Table 2
Gender differences for certain variables.

Criteria	Women	Men	Diff.
Contribution (TRY)	207.0	207.5	0 %
Membership period	96.9	88.8	−8 %
Risk-taking behavior	2.5	2.5	0 %
Risk-taking behavior (2)	0.82	0.79	−4 %
Metropol	59 %	50 %	−14 %
College graduation	33 %	33 %	1 %
Age	39.0	38.5	−1 %
Employment	64 %	81 %	27 %
Unemployment	0 %	0 %	0 %
Housewife	15 %	0 %	−99 %
Income	2.1	2.5	17 %
Married	70 %	73 %	5 %

mentioned earlier. The first categorization measures risk-aversion behavior by four levels: "1" represents the lowest risk-taking behavior and "4" represents the highest (see Table 1). The second definition includes only two levels, where the lower two levels of the previous definition and the higher two levels are categorized as "low risk-taking" and "high risk-taking" behavior, respectively. Thus, we have two different dependent variables, both focusing on the risk-taking motives of IPS members. However, the former measures the level of risk-taking while the latter reveals the existence of high risk-taking behavior. To save space, we present the results of the second categorization of the dependent variable. The intuition based on the other variable is quite the same. The results may be provided upon request.

Table 3 provides all the alternative model specifications. Since our main concern is how gender differences affect the risk aversion behavior of IPS members, we start our analysis with the *Gender* variable.

Model 1 summarizes the effect of *Gender*. It shows the effects of being a male on the odds of being a high-risk taker. Since the coefficient is the odds ratio, it suggests that the odds of risk-taking in IPS for men is 0.824 times that of women. The effect remains the same when we add *Age* in Model 2. Since *Age* is a continuous variable, as explained in Table 1 earlier, the coefficient suggests that each year's increase in one's age raises the odds of being a high risk-taker by 0.5 %.

In Model 3 includes *Metropol* (i.e., living in the top 3 provinces of Türkiye, namely Istanbul, Ankara, and Izmir), and Model 4 incorporates *Housewife*. Neither variable has a statistically significant effect on the odds of being a high-risk taker. Yet, we keep them in our model specifications anyway because they represent two major aspects of participants.

Model 5 shows the effect of marital status and its interaction with gender. *Gender* not only loses half of its effect on the odds of risk-aversion behavior but also becomes less significant. The Model reveals the gender-specific effects of marital status. *Married* people have 35 % higher odds of taking high risks in IPS. However, that effect is 16 % lower for men, compared to women. Graph 1 summarizes the risk-taking behavior inclination of four different groups.

If we set the odds of single women's risk-taking behavior to an index of 100, marriage itself increases the odds of high-risk-taking by 13 %. Note that the odds of risk-taking for single men (compared to single women) are 9 % less. The effect of marriage on men's risk-taking behavior is the opposite of the one for women. Once men get married, their odds for risk-taking are 5.5 % smaller. It is worth noting that this gender gap in risk-taking behavior is valid throughout the model specifications, with a minor decline in magnitude.

Once socio-economic variables are also added to our model in Models 6 & 7, not only do demographic variables (except for *Age*) begin losing their significance on the dependent variable, but also these independent variables almost triple the Pseudo R^2. *College Graduation* eliminates the direct effect of *Gender* in risk-taking, which is not unexpected in line with the literature on the effects of education on gender gaps in general. That is, education is a major factor that reduces the gender gap, which has been suggested by various studies across a wide range of gender studies. In addition, IPS members with a college degree have 24 % higher odds of taking high risks. However, *Income* has a negative effect on our dependent variable. Each increase in income group decreases the odds of belonging to a high-risk group by 10.2 %. Thus, the group with the highest income cumulatively has 27.6 % smaller odds of taking higher risks than the group with the lowest income.

After adding *Income* in Model 7, the coefficient (odds-ratio) of marital status has declined from 1.347 to 1.228. This means the impact of marital status on the odds of risk-taking behavior declines by 10 %. Also, the coefficient of the *Marital Status*Gender* interaction variable has increased by 3 %, which decreases the gender gap itself. Lastly, the positive effect of *College Graduation* on risk behavior has slightly increased once we control income. As a result, we can argue that the effect of the level of education may vary depending on the income level

Table 3

Ordered logistic regression results for high risk-taking behavior (coefficients are odds ratios).

Independent variables	Dependent variable: risk-taking behavior (2) Standard error terms are provided within the parentheses									
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Gender	0.824*** (0.024)	0.826*** (0.024)	0.824*** (0.024)	0.819*** (0.026)	0.912* (0.045)	925 (0.046)	0.943 (0.046)	0.935 (0.046)	0.932 (0.046)	0.959 (0.048)
Age		1.005** (0.001)	1.005** (0.001)	1.005** (0.001)	1.005** (0.001)	1.005** (0.001)	1.006*** (0.001)	1.006*** (0.001)	1.004** (0.001)	1.003** (0.001)
Metropol			0.978 (0.028)	0.977 (0.028)	0.978 (0.029)	0.953 (0.028)	0.96 (0.028)	0.962 (0.028)	1.051 (0.059)	1.064 (0.060)
Housewife				0.974 (0.052)	0.941 (0.052)	0.994 (0.055)	0.992 (0.055)	1.005 (0.056)	0.978 (0.055)	0.983 (0.055)
Married					1.347** (0.140)	1.347** (0.140)	1.228** (0.129)	1.213** (0.127)	1.215** (0.128)	1.228** (0.130)
Married*Gender					0.836** (0.052)	0.833** (0.052)	0.860** (0.054)	0.869** (0.055)	0.865** (0.054)	0.874** (0.056)
College Grad.						1.244*** (0.039)	1.307*** (0.042)	2.022*** (0.161)	1.965*** (0.157)	2.032*** (0.164)
Income							0.898*** (0.012)	0.953** (0.016)	0.948** (0.016)	0.955** (0.016)
College*Income								0.843*** (0.024)	0.841*** (0.024)	0.839*** (0.024)
Contribution									1.003*** (0.0004)	1.003*** (0.0004)
Metropol*Contribution									0.999** (0.0002)	0.999* (0.0002)
Contributition^2									0.999*** (0.0000)	0.999*** (0.0000)
Membership duration										1.022*** (0.001)
Membership duration^2										0.999*** (0.0000)
Pseudo R2	0.0014	0.0018	0.0018	0.0018	0.0021	0.0037	0.0057	0.0069	0.0095	0.023
Observations	30,446	30,446	30,446	30,446	30,446	30,446	30,446	30,446	30,446	30,446

Standard errors are in parentheses. ***, **, * denote 1, 5, and 10 % confidence levels, respectively.
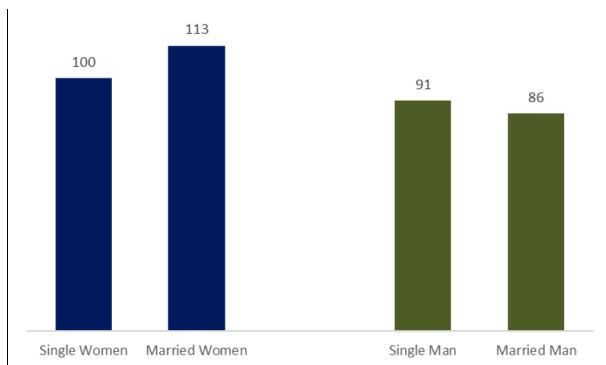
Graph 1. Variance in high risk-taking inclination of men and women, with respect to marital status (Model 5).

itself. To check the last point, we incorporate *College*Income* in Model 8.

Model 8 shows the significant effect of the interaction variable of college and income. Accordingly, people with higher income levels have limited risk-taking behavior. Also, once income level begins increasing, the positive effect of *College Graduation* on the dependent variable diminishes. To see this point clearly, Graph 2 demonstrates the risk-taking inclination index of people with respect to their income and education levels. The base category of people with no college degree takes the value of 100. We then calculate the odds-ratio index for all other groups with respect to their income and education levels. Put simply, people with a college degree with the lowest income have 70 % higher odds of taking higher risks in IPS, compared to those who are in the lowest income group with no college education.

Graph 2 underlines the fact that income has a stronger negative correlation with high risk-taking behavior for those with a college degree. Also, if an individual belongs to the highest income group, the existence of a college degree does not make any difference in terms of risk-taking behavior. The reasons for diminishing returns of education level on risk-taking behavior are beyond the scope of this paper. However, we can speculate, from a psychological perspective, that college graduates who still suffer from poverty despite their high education levels may take more risks to reach higher welfare in the future.

Model 9 includes the amount of contribution to the system and the duration of membership. *The contribution* variable has a positive effect on risk-taking behavior. It makes sense because people who are eager to make the most of the IPS will also be those who contribute more. Note that the coefficient is small, but it is a continuous variable with a mean of 225 TL. We consider two more variables to understand the true nature of the relationship between contribution levels and risk-taking behavior: *Contribution^2* and *Metropol*Contribution.*

The relationship between the contribution and risk-taking behavior probability is non-linear. We control this with *Contribution^2* which is the square value of *Contribution* variable. The negative effect is statistically significant yet marginal: Only after 377 TL of *Contribution* we can talk about *less* amount of *increase* in the odds of high-risk taking by marginal unit raise (Only 14 % of the sample has a contribution level higher than 377 TL).

Second, the purchasing power parity among Turkish provinces varies significantly. Thus, the same amount of contribution does not refer to the same amount of will of investment or risk-taking in developed and underdeveloped parts of the nation. To control this impact, we added an interaction variable, *Metropol*Contribution.* This interaction variable's coefficient is less than 1, which means that in the top 3 provinces, every unit increase in contribution has a smaller positive effect on the odds of risk-taking. In other words, the same amount of increase in contribution leads to a smaller increase in the odds of risk-taking behavior in three major provinces since the same amount of contribution is valued *less* in those provinces than in the less developed rest of the nation. In the top 3
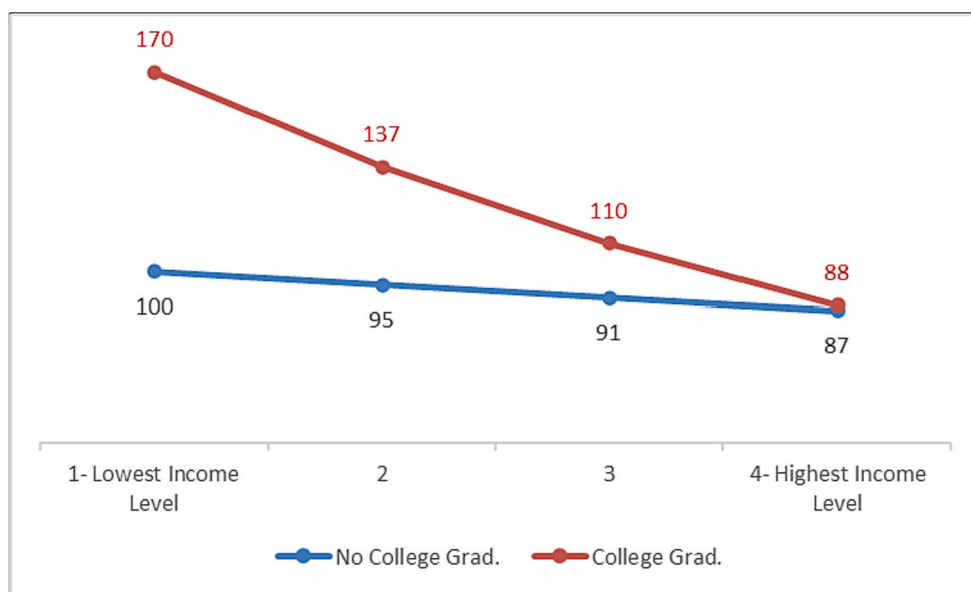
Graph 2. Risk-Taking Inclination of IPS members with respect to income and education levels (Model 8 – Index = 100).

provinces purchasing power of a certain level of investment is smaller. Thus, it turns out that if higher levels of contribution to the system lead to higher levels of odds for risk-taking behavior, that amount should be higher in the top 3 provinces to have the same positive effect on risk-taking. Note that Pseudo[4] R^2 in Model 9 reached 0.0095, which is 38 % higher than the one in the previous model.

Finally, we add *Membership Duration* in Model 10, which has a highly significant effect on the explanatory powers of the model, increasing the previous Model's Pseudo R^2 2.5 times more. The coefficient of *Membership Duration*^{2} suggests that whereas each year of membership increases the odds for risk-taking behavior by 2.2 %, it slightly diminishes as one remains longer in the system. This is in line with the effect of *contribution*, a longer membership period results in higher odds of risk-taking behavior.

Overall, our findings suggest that when socio-economic variables such as income and education are considered, the direct effect of gender differences on risk behavior diminishes. An interesting finding emerges wherein higher income is associated with decreased risk-taking, but college graduates with lower income tend to take higher risks. This effect mitigates the influence of gender alone, as the proportion of women with college degrees and lower income is significantly higher than that of men. This finding is illustrated in Graph 3.

Graph 3 demonstrates that over 20 % of women have college degrees and belong to lower-income groups, while this ratio is below 15 % for men. The presence of more women with a college degree and low income, relative to men, leads to risk-taking behavior independent of gender.

The results also suggest that the effect of *Marriage* has a gender-specific effect on risk-taking behavior. In Model 5 we have already witnessed *Gender* lose half of its effect on the dependent variable once

we controlled for marital status. Why marriage itself has a diverse effect on the risk-taking behavior of men and women is a very interesting issue. However, we can quantify the fact that since women get married younger than men, they start earlier to enjoy such positive benefits. For instance, the frequency of marriage among women between the ages of 18–24 is 45 %. However, only 19 % of men of the same age group are married.
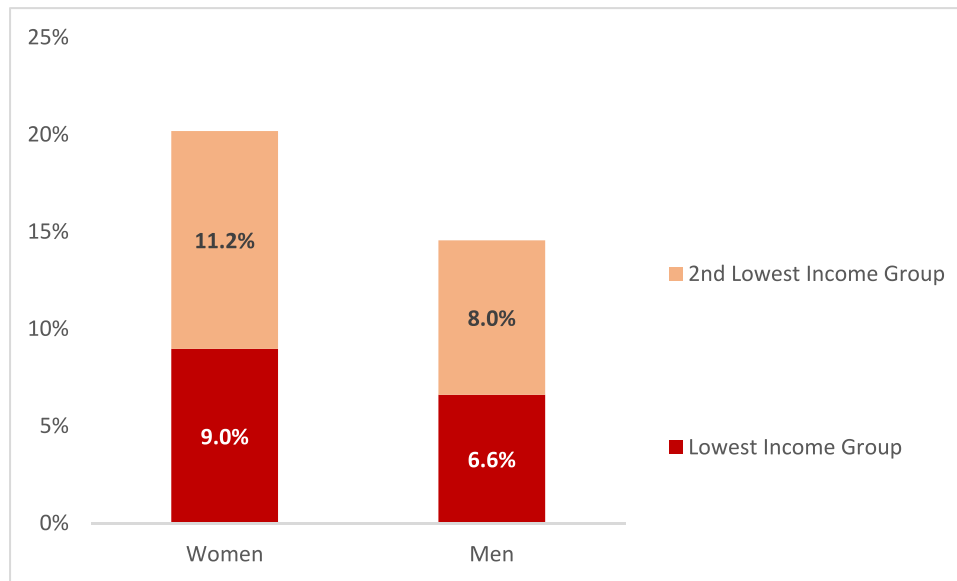
6. Conclusion

The goal of this paper was to provide original evidence on the gender dimension of risk-taking behavior within the private pension system in Türkiye. To achieve this, we utilized original data from participants in the system between 2004 and 2020. The findings offer valuable insights into the gender gap in risk-taking behavior.

The study employs an ordered logistic regression model to explore gender differences in risk-taking behavior among IPS (Individual Pension System) members. The researchers categorize the dependent variable into two definitions: one measuring the level of risk-taking and the other indicating the presence of high risk-taking behavior. The results reveal that the odds of risk-taking for men is 0.824 times that of women. Additionally, age shows a positive association with high risk-taking behavior, with each year's increase raising the odds by 0.5 %. However, variables like living in metropolitan areas and being a housewife do not significantly affect the likelihood of high-risk behavior.

The study also examines the interaction between marital status and gender, finding that married individuals have a 35 % higher chance of engaging in high-risk behavior. However, this effect is 16 % lower for men compared to women. Further analysis incorporates socioeconomic variables, revealing that college graduation increases the chances of high-risk behavior by 24 %, while income has a negative impact, decreasing the likelihood of belonging to a high-risk group. Interestingly, the effect of education varies depending on income levels.

Furthermore, the study investigates the relationship between contribution levels, membership duration, and risk-taking behavior. It is found that higher contribution amounts positively influence risk-taking behavior, and longer membership periods are associated with higher odds of engaging in risky behavior. Ultimately, the study highlights that when socioeconomic factors are considered, the direct effect of gender on risk behavior diminishes. Additionally, the presence of more women

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[4] Pseudo R-Squared, taking values between 0 and 1, measures the proportion of the variation in risk taking behavior, our dependent variable. It indicates the explanatory power of the model. It is different from the R-squared which is used in linear regression. Pseudo R-squared is adapted when the dependent variable is categorical, as in our case. If Pseudo R-Squared is 0, the model does not explain any of the variability in the dependent variable. On the other hand, if it is 1, it means that the model perfectly explains all variance in the dependent variable, even though it is a very rare case. An increase in the pseudo R-squared value indicates that the inclusion of independent variable(s) increased the model's ability to explain the outcome.

Graph 3. Share of college graduates with low income within gender groups.

with college degrees and lower incomes contributes to risk-taking behavior independent of gender.

The central insight from our research underscores the significance of recognizing the "default effect," as elaborated below. This recognition has the potential to enhance system efficiency and increase returns for participants, irrespective of their socio-economic status. Additionally, private pension companies can improve their services by acknowledging the factors contributing to variations in risk-taking behavior.

We acknowledge that there are some limits to our analysis. First, IPS members do not represent the entire Turkish population. The proportion of college graduates is 33 %, for both men and women. This is double and triple the national averages, respectively. Moreover, 64 % of women in our data are full-time employees. However, female labor force participation in Türkiye is around 35 % (TUIK Labor Stat, 2022).

Secondly, the gender differences in risk-taking behavior that we captured may be because of the "default effect" (Thaler & Sunstein, 2008). The default effect reveals the human inclination not to change a default option. Theory mentions the possibility of correcting negative results of human irrationality by making the correct option (eating healthier food, blood donation, contributing more to IPS, etc.) a default one. Accordingly, people may still have the liberty to change it, but subconsciously we are inclined to keep it unless it is absolutely necessary.

Consequently, if contribution levels have been provided as default, many people -independent from their demographic, socio-economic, or other characteristics- will keep the default choice, which in turn leads to an underrepresentation of the effects of our independent variables on the dependent one. Since it was compulsory after 2017, many people may not be even aware that they can make changes in their contributions.

Perhaps, the most critical shortcoming of this analysis is that it may be supported by other methods such as in-depth interviews to better understand the gender differences in risk-taking behavior. For example, our analysis does not answer who makes the decision when it comes to investment. In other words, some additional research could reveal if married women can decide on how to invest in IPS independent of their spouse or if is it the husbands that decide on the behalf of their wives. We hope that further studies can investigate to find the answers to such important questions.

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