

Risk Profiles of Retirement Planners: Analysing Portfolio Risk Inclination Score (PRIS) and its key predictors using Ordinal Logistic Regression (OLR) Technique

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Abstract

In emerging economies like India, retirement planning faces hurdles like low financial literacy, limited institutional support, and varied risk preferences. This study uses the Portfolio Risk Inclination Score (PRIS) to classify retirement planners as risk-tolerant or risk-averse, based on survey data from Uttar Pradesh's higher education sector. Ordinal logistic regression reveals that higher income, financial stability, financial literacy, and risk tolerance boost risk tolerance. These factors shape an individual's risk profile. Risk-tolerant individuals typically have strong financial knowledge and confidence, while risk-averse ones have lower financial literacy and conservative finances. The model effectively explains PRIS variance, making it a reliable predictor of retirement risk behavior. This research offers a framework for assessing retirement readiness, providing insights into retirement planning in Uttar Pradesh, India, with implications for targeted financial education, advisory services, and policy-making. **Keywords:** Retirement planning, Portfolio Risk Inclination Score, Basic Financial Knowledge Index, Risk Tolerance, Ordinal Logistic Regression.

1. Introduction

Retirement preparedness is a growing policy and personal concern worldwide, especially in developing economies where public pension schemes are limited and social safety nets remain weak (OECD, 2022). In India, the increasing shift from defined benefit to defined contribution systems places greater responsibility on individuals to ensure adequate post-retirement income (World Bank, 2020). Central to this process is how individuals perceive and manage risk, which shapes both their investment decisions and long-term financial security (Grable & Lytton, 1999; Roszkowski & Grable, 2005). Although a substantial body of research has examined determinants of retirement planning, the interplay between risk preference, financial literacy, and financial soundness remains underexplored in the Indian context (Agarwalla et al., 2015; Kumar & Bhattacharya, 2020). To address this gap, the present study introduces the Portfolio Risk Inclination Score (PRIS) as a measure of risk categorization among retirement planners and investigates its determinants. Specifically, the study evaluates how income, financial soundness index, basic financial literacy index, and risk tolerance predict PRIS outcomes. Using ordinal logistic regression, the analysis interprets coefficients in terms of odds ratios (ORs) to assess the likelihood of individuals being risk-tolerant versus risk-averse.

By focusing on higher education employees in Uttar Pradesh—a group characterized by stable employment and high academic literacy—the study aims to uncover whether financial literacy and risk attitudes translate into better-informed retirement decisions. The findings have implications for financial advisors, policymakers, and individuals seeking to enhance retirement security in a rapidly changing economic environment.

The setup of the paper is structured as Section (2) Review of Literature, (3) Empirical Approach and Methodology, (4) Discussion of Regression Results, (5) Discussion, (6) Conclusion and Suggestion, followed by References

2. Review of Literature

2.1. Theoretical Framework. This study draws upon three complementary theories to explain how individuals' socio-economic and psychological characteristics shape retirement planning and portfolio risk inclination.

First, the Life-Cycle Hypothesis (LCH) posits that individuals make consumption and saving decisions to smooth income over their lifetime, with retirement savings playing a central role (Modigliani & Brumberg, 1954). In this context, income and financial soundness provide the economic capacity for retirement planning.

Second, insights from Behavioral Finance highlight that psychological factors and heuristics—such as risk aversion, overconfidence, and loss aversion—often influence investment choices beyond rational expectations (Thaler, 1999). Risk tolerance and financial literacy are thus critical in determining whether individuals are inclined toward riskier or safer retirement portfolios.

Third, Prospect Theory (Kahneman & Tversky, 1979) suggests that individuals evaluate financial outcomes relative to a reference point and are typically loss-averse, leading many to avoid risky investments even when potential gains are significant. This explains why risk-averse individuals may prefer low-yield retirement products, while risk-tolerant individuals are more likely to engage in market-linked instruments.

Together, these theories provide a framework for examining how income, financial soundness, financial literacy, and risk tolerance influence the likelihood of belonging to higher or lower Portfolio Risk Inclination Score (PRIS) categories.

2.2. Conceptual Framework. Based on the theoretical foundations, this study conceptualises Portfolio Risk Inclination Score (PRIS) as the dependent variable (DV) that classifies retirement planners into risk-averse, moderate, or risk-tolerant categories. Four predictors are proposed: Income → Higher income provides greater investible surplus, enhancing capacity for risk-taking.

Financial Soundness Index (FSI) → Stronger financial stability supports willingness to invest in riskier but potentially higher-return instruments.

Basic Financial Literacy Index (BFLI) → Greater knowledge of interest, inflation, and diversification fosters more informed portfolio choices.

Risk Tolerance → Higher psychological risk tolerance increases the likelihood of belonging to higher PRIS categories.

The conceptual model assumes that these predictors jointly influence retirement planners' categorization, tested empirically using ordinal logistic regression, with odds ratios providing the strength and direction of influence.

2.3. Review of some Empirical Work. Some empirical work has been done to capture two broader determinants responsible as major determinants of retirement planning behaviour and portfolio risk inclination towards retirement-related investments. Which are as follows

2.3.1 Behavioural Determinants

2.3.1.1 Risk Tolerance and Investment Behaviour. Risk tolerance is widely recognized as a primary determinant of investment and retirement planning (Grable, 2000; Hallahan et al., 2004). Individuals with higher risk tolerance are more likely to allocate funds to equities and growth-oriented assets, while risk-averse individuals prefer low-risk instruments such as fixed deposits or provident funds (Roszkowski & Grable, 2005). In the Indian context, cultural conservatism and fear of capital loss often reinforce risk-averse behaviors (Saluja & Singh, 2018).

2.3.1.2 Financial Literacy and Retirement Preparedness. Financial literacy enables individuals to evaluate financial products, assess risks, and make informed retirement decisions (Lusardi & Mitchell, 2014). Low levels of financial literacy are consistently associated with inadequate retirement savings across countries (Lusardi & Mitchell, 2017). Indian studies highlight that even highly educated employees often lack sufficient applied financial knowledge, which

hampers effective retirement planning (Agarwalla et al., 2015; Kumar & Bhattacharya, 2020). Behavioral finance research further shows that cognitive biases—such as procrastination and loss aversion—exacerbate the consequences of limited financial literacy (Thaler & Benartzi, 2004).

2.3.2 Socio-Economic Determinants

2.3.2.1 Financial Soundness Effects .Financial soundness, reflected in debt management, asset holdings, and cash flow stability, provides individuals with greater confidence and flexibility to pursue riskier but higher-return retirement investments (Chaudhary & Pathak, 2021). Conversely, financially unsound households prioritize short-term obligations, delaying or neglecting retirement savings (Bhattacharya & Roy, 2021).

2.3.2.2 Income Effects .Income and financial soundness are structural factors influencing the ability to save and invest. Higher income enhances retirement planning by expanding investible surpluses (Clark et al., 2012).

Retirement Planning in India

Despite rapid financial sector reforms, India lags behind advanced economies in terms of retirement readiness (OECD, 2022). Only 19% of adults in developing economies, including India, save for old age compared to 53% in high-income economies (World Bank, 2020). Most Indian employees continue to rely heavily on provident funds, insurance, and traditional savings instruments, with limited exposure to diversified retirement portfolios (Sharma & Kumar, 2019). Research exploring retirement planning through the lens of risk categorization and odds-based modelling remains scarce, particularly among higher education employees—a sector assumed to have high awareness yet often constrained by conservative investment attitudes.

Research Gap: Although a substantial body of research has examined determinants of retirement planning, the interplay between risk preference, financial literacy, and financial soundness remains underexplored in the Indian context (Agarwalla et al., 2015; Kumar & Bhattacharya, 2020).

While global literature highlights income, literacy, and risk attitudes, there is **limited empirical evidence from India** that categorizes retirement planners by risk inclination, especially among higher education employees. Existing studies often examine saving levels or product preferences but rarely quantify **risk categories using an Score-based measure** (Kapur, 2023). This study addresses this gap by operationalizing PRIS and empirically testing its determinants.

3. Empirical Approach and Methodology

3.1. Objectives and Hypotheses

Study Objective.To categorize retirement planners into risk-tolerant and risk-averse groups using the Portfolio Risk Inclination Score (PRIS) and to empirically examine how income, financial soundness, basic financial literacy, and risk tolerance influence the likelihood of individuals belonging to higher PRIS categories among higher education employees in Uttar Pradesh.

Rationale.Risk preference is central to retirement planning, yet individuals differ significantly in their inclination to take risks. The Portfolio Risk Inclination (PRIS) provides a structured way to classify retirement planners along the risk continuum. By applying ordinal logistic regression, this study estimates the odds of being more risk-tolerant as a function of socio-economic (income, financial soundness) and behavioral (financial literacy, risk tolerance) determinants.

Understanding these predictors is important because:

Income and financial soundness directly shape the capacity to invest and sustain retirement savings.

Basic financial literacy determines whether individuals can evaluate risks and choose appropriate retirement products.

Risk tolerance reflects psychological willingness to assume financial risks, which may amplify or constrain retirement planning strategies.

Thus, the study contributes to retirement planning research in India by identifying the forces that push individuals toward either risk-averse or risk-tolerant investment behaviors.

Hypotheses.Based on theory and past empirical findings, the following hypotheses are formulated:

H1: Higher income levels significantly increase the odds of being in a higher PRIS category (more risk-tolerant).

H2: Greater financial soundness significantly increases the odds of being in a higher PRIS category.

H3: Higher basic financial literacy significantly increases the odds of being in a higher PRIS category.

H4: Higher risk tolerance significantly increases the odds of being in a higher PRIS category.

Null Hypotheses (H0): For each predictor, there is no significant association with PRIS category.

3.2. Survey Design and Sampling.The data were collected through a structured survey of higher education employees (academic and non-academic) in Uttar Pradesh, India, between April 2024 and January 2025. The target group was chosen for their steady income, heterogeneity in job type (public/private, permanent/contract), and policy relevance as financially literate trendsetters. Surveys were distributed online and in paper form across central, state, private universities, and autonomous institutes, with voluntary and anonymous participation. After cleaning incomplete cases, a final sample of 598 usable responses was retained from 652 received, ensuring reliable coverage for analysis.

3.3. Questionnaire and Key Measures

Dependent Variable

Measurement of Portfolio Risk Inclination Score (PRIS)Portfolio Risk Inclination Score(PRIS): Respondents identified a maximum of five investment instruments prioritized for retirement planning and assigned each a rank from 1 (lowest allocation) to 5 (highest). A weighted score was computed based on the risk-return profile and retirement suitability of each instrument (such as liquidity, capital preservation, stable returns, etc.), with weights assigned in accordance with regulatory guidelines from SEBI, IRDAI, and PFRDA. The factors guiding the selection of weights of different asset classes are given in Table 2, while various types of investment instruments along with their respective weights are given in Table 3. The total score reflects the respondent’s inclination toward higher-risk or lower-risk retirement investment portfolios.

PRIS normalized to 5-point scale, reflecting Risk Tolerant (High Risk) risk) to Risk Averse (Low Risk) Retirement Portfolio

Table. 1. Portfolio Risk Inclination Score(PRIS)

Dependent Variable	Description & Scoring Method(PRIS)	Portfolio Risk Inclination Score(PRIS)
Portfolio Risk Inclination Score(PRIS)	Based on ranking of five preferred retirement instruments, weighted by risk–return suitability (as per SEBI, IRDAI, PFRDA guidelines).	Portfolio Risk Inclination Score(PRIS),Normalized to 5-point scale, reflecting Risk Tolerant(High Risk) risk) to Risk Averse(Low Risk)Retirement Portfolio

Calculated using Questionnaire Response & Table.2. (Factors Guiding the Selection of Weights of Asset Classes) & Table.3. (Investment Instruments Along with Their Respective Weightings

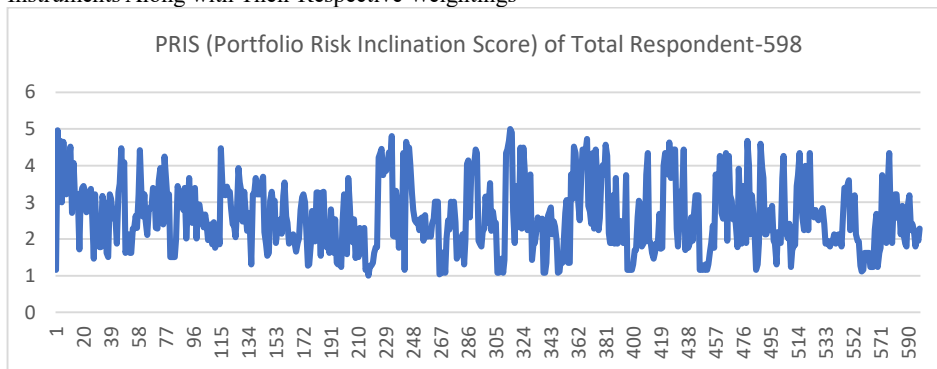


Figure.1 Portfolio Risk Inclination Score(PRIS)

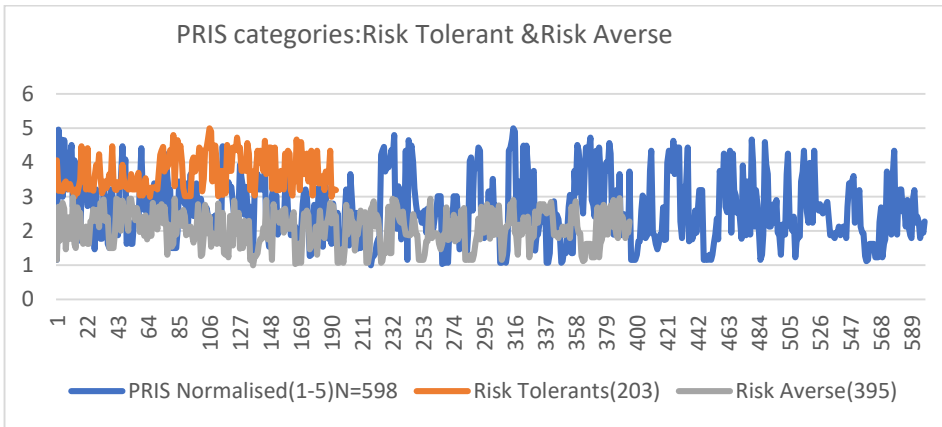


Figure.2 (PRIS) Risk Tolerant and Risk Averse as a categories of Respondents

Source: Figure 1 & 2, Authors' sketch using survey responses.

Table. 2. Factors Guiding the Selection of Weights of Asset Classes

Factor	How it affected weighting
Risk	Higher risk → higher weight (equity, real estate)
Capital Protection	Higher protection → lower weight (FDs, bonds)
Liquidity	Lower liquidity → moderate weight (real estate, physical gold)
Inflation Protection	Higher protection against inflation → moderate-to-higher weight (equities, gold)
Suitability for Stable Retirement Income	Safer schemes preferred for guaranteed incomes → lower weights (SCSS, GPF, PPF)

Source: Employees Provident Fund Organisation (n.dd), Government of India (2019), Insurance Regulatory and Development Authority of India (2022), Pension Fund Regulatory Development Authority (2021), Reserve Bank of India (2022), Securities and Exchange Board of India (2023), Securities and Exchange Board of India (2017).

Table.3 Investment Instruments Along with Their Respective Weightings

S.No.	Instrument Category	Risk Level	Suggested Weighting	Justification
1.	Direct Equity (shares)	Very high	1.00	This high-risk category is suitable for young investors, not core for retirees (SEBI, 2023).
2.	Equity Mutual Funds	Moderate-to-high risk	0.75	Diversification lowers risk, SIPs recommended for long-term retirement (SEBI, 2023).
3.	ULIPs, Traditional Endowment Policies, Annuities	Low-to-moderate	0.30	These instruments have capital protection elements, but returns are moderate (IRDAI, 2022).
4.	GPF/EPF	Very low	0.10	Government-backed, safest savings instruments, cornerstone of retirement corpus (EPFO, n.d.).
5.	NPS	Low-to-moderate (based on allocation)	0.40	PFRDA allows equity cap of 75%; gradual shift to bonds over time (PFRDA, 2021).
6.	APY/SY	Very low	0.10	Primarily government-guaranteed annuity products (PFRDA, 2021).
7.	Real Estate	Medium	0.50	This investment asset carries liquidity risks, therefore, not considered ideal for retirement income generation (RBI, 2022).
8.	POSS/FDs/PPF	Very low	0.10	Fixed-return Government-backed schemes, highly preferred for generating retirement corpus (SEBI, 2021; RBI, 2022).
9.	SCSS, Government Bonds	Extremely low	0.05	Primarily meant for retirement stability (Government of India, 2019).
10.	Gold (physical, SGBs, ETFs)	Low-to-medium	0.50	Considered inflation-hedge, but volatile, thus moderate weight (SEBI, 2017).

Source: Same as for Table 2.

Table.4. Independent Variables

Monthly Income (₹ lakh)	Net monthly income in lakh ₹ (1 lakh = ₹100k), continuous, Mean = 1.16 lakh (₹116k), Median: ₹100,000–₹150,000 1–5 scale (<₹50,000: 50000-100000: 100000-150000: 150000-200000:>200000)
Financial soundness index	1–5 scale (higher = better current financial health), Continuous (midpoint %), Avg. of 4 items ($\alpha=0.75$), Mean = 3.54 ($\sigma=0.62$)
Financial knowledge index	Index (avg. of 9 literacy items)($\alpha=0.74$), 0–9 score (count of correct answers on literacy quiz), Mean = 6.23 ($\sigma=2.21$)
Risk tolerance	1–5 scale (5 = strongly agree comfortable taking risk), Mean = 2.73 ($\sigma=0.92$)

Calculated Using Questionnaire responses

3.4. Analytical Method: Ordinal Logistic Regression

As the DV (PRIS) is ordinal in nature, the study employs ordinal logistic regression (OLR) to estimate the probability of individuals being in higher versus lower PRIS categories, conditional on the predictors. The general form of the model is:

$$\ln \frac{P(Y>j)}{P(Y\leq j)} = \alpha_j - \beta_1(\text{Income}) + \beta_2(\text{FSI}) + \beta_3(\text{BFKI}) + \beta_4(\text{Risk Tolerance})$$

- Y = PRIS category (ordered response).
- j = threshold for cumulative odds.
- α_j = cut-off point for category j.
- β = coefficients of independent variables.

Interpretation of Coefficients. Model coefficients were exponentiated to derive odds ratios (ORs), which indicate the likelihood of being in a higher PRIS (more risk-tolerant category) relative to the baseline. For example:

- An OR > 1 for *income* suggests that higher income levels increase the odds of being risk-tolerant.
- An OR < 1 for *financial soundness* would indicate that financially unsound individuals are more likely to remain risk-averse and in case OR>1 explain the financial sound and more likely risk tolerant.
- Similarly, ORs for *BFLI* and *risk tolerance* provide behavioral insights into retirement planning choices.

3.5. Data Quality and Diagnostics. Before analysis, data were checked for consistency and missing values. We achieved a clean dataset of 598 as mentioned earlier. We also conducted reliability tests for any multi-item constructs. For instance, the 4 financial soundness index has a Cronbach's alpha of 0.75, the 9-item

financial literacy quiz has a Cronbach's alpha of 0.74, Both indicating acceptable internal consistency for a financial soundness and basic financial knowledge measure.

Proportional Odds Assumption. The Brant test results of the proportional odds assumption confirmed that the model's coefficients are stable across the ordinal cut points. Both per-variable and global chi-square tests showed no significant violations, supporting the use of the ordered logit specification over a multinomial logit. The proportional odds assumption (that the relationship between predictors and the log-odds of being in higher versus lower categories is constant across outcome thresholds) was tested using a Brant test. The tests did not reveal any significant violations for our main models ($p > 0.05$ for all variables, implying the proportional odds assumption holds).

Multi-Collinearity Diagnostics. Variance Inflation Factors (VIFs) for all predictors ranged between 1.35 and 1.88, well below standard thresholds of 5 or 10. This demonstrates that multicollinearity is not a concern, and the distinct effects of predictors are reliably estimated.

4. Discussion of Regression Results

Table.5. Ordered Logistic Regression Model Output (PRIS as DV & Income, FSI, BFKI, RT as IV)

Variable	OR	Z(95%.lower)	Z(95%.upper)	p-value
Income	1	1	1	0.041604
Financial Soundness	1.8717	1.3128	2.6686	0.000532
Basic Financial Knowledge	11.0958	5.8819	20.9317	0
Comfort Financial Risk(Risk Tolerance)	2.8302	2.2819	3.5103	0
1/2	498298.5	55015.23	4513320.924	0
2/3	2.2648	2.0004	2.5642	0
3/4	2.2084	1.8949	2.5738	0
4/5	4.6748	3.0562	7.1505	0

Table.6. Model Fit LR Test

N	Log-Likelihood (model)	Log-Likelihood (null)	LR chi2	df (LR)	p-value (LR)	McFadden Pseudo R ²	Nagelkerke Pseudo R ²
598	-601.712369	-787.331121	371.238	4	0	0.235757	0.498285

Table.7. Brant Test Summary

Variable	Chi-square	Df	p-value
Income	550.965079	3	0
Financial Soundness	509.759109	3	0
Basic Financial Knowledge	497.956081	3	0
Comfort Financial Risk	504.742408	3	0
GLOBAL	2063.422677	12	0

Table.8. Brant Cut points coefficient

Variable	beta(> 1)	se(> 1)	beta(> 2)	se(> 2)	beta(> 3)	se(> 3)	beta(> 4)	se(> 4)
Const	-14.0587	1.601454	-15.83078	1.949485	-12.02297	3.031557	-1068.744	46.1704
Income	0.000006	0.000003	-0.000002	0.000002	0.000009	0.000004	0.003729	0.00016
FSI	0.571193	0.236013	0.392702	0.259513	0.813201	0.452321	-228.1265	10.1332
BFKI	2.933177	0.466842	2.771374	0.509766	-0.483112	0.762036	109.93006	4.89309
Risk Tolerance	0.642483	0.13664	1.268768	0.156069	2.238024	0.355347	164.51129	7.44

Table.9. VIF Test Results

Variable	VIF
Const	134.861
Income	1.6952
Financial Soundness	1.88
Basic Financial Knowledge	1.5994
Comfort Financial Risk(Risk Tolerance)	1.3538

The ordered logit model was estimated with PRIS Normalised (1–5) as the dependent variable and Income, Financial Soundness, Basic Financial Knowledge, and Comfort with Financial Risk as predictors. Odds ratios and their 95% confidence intervals are reported for ease of interpretation.

All four predictors were statistically significant and positively associated with higher PRIS. The odds ratio for Income was very close to one ($OR \approx 1.00$, $p < 0.05$), indicating that while higher income slightly increases the odds of being in a higher PRIS category, the substantive effect is modest. By contrast, Financial Soundness had an odds ratio of 1.87 (95% CI: 1.31–2.67, $p < 0.01$), suggesting that each unit increase in financial stability nearly doubles the odds of improved PRIS. The strongest predictor was Basic Financial Knowledge, with an odds ratio of 11.10 (95% CI: 5.88–20.93, $p < 0.001$). This indicates that respondents with stronger financial knowledge have odds of higher PRIS categories that are more than ten times greater compared to those with lower knowledge, highlighting the pivotal role of literacy in retirement planning. Comfort in taking financial risk also had a large effect, with an odds ratio of 2.83 (95% CI: 2.28–3.51, $p < 0.001$), implying that each additional unit of risk tolerance increases the odds of higher PRIS nearly threefold.

Model fit statistics support the robustness of these findings. The log-likelihood for the model was -601.71, with an LR χ^2 of 371.1 (df = 4, $p < 0.001$) compared to the null model. McFadden's pseudo-R² was 0.236, and Nagelkerke's pseudo-R² was 0.49, indicating strong explanatory adequacy for survey-based behavioral research.

5. Discussion

The odds ratio results reveal that knowledge-based and attitudinal factors play a more decisive role in shaping retirement preparedness than income alone. While income matters, its effect is modest compared to the dramatic impact of financial literacy and risk tolerance. In particular, respondents with strong financial knowledge have odds of investing in more risky portfolios for their retirement that are more than ten times greater than their less knowledgeable counterparts. This suggests that financial education initiatives could have disproportionately large payoffs in promoting retirement readiness. Equally important, risk tolerance and overall financial soundness substantially elevate portfolio risk inclination odds, pointing to the need for interventions that build both household resilience and psychological readiness to engage with financial markets. The proportional odds assumption being satisfied confirms the robustness of these findings, while the absence of multicollinearity enhances confidence in their stability. Together, the results highlight that fostering retirement preparedness in India in terms of more risky assets in investment portfolio requires a multi-pronged strategy: raising financial literacy, strengthening household financial security, and cultivating confidence in managing financial risk — alongside policies that address income constraints.

6. Conclusion and Suggestions

This study provides new evidence on the determinants of retirement portfolio risk inclination among higher education employees in Uttar Pradesh. Ordered logistic regression results reveal that financial soundness, basic financial literacy and risk tolerance are far stronger predictors of PRIS than income alone. These insights reinforce the behavioral finance argument that knowledge and psychology, rather than just economic means, coupling economic enablers such as income, financial soundness and attitudinal factor as basic financial literacy, risk tolerance shape better retirement outcomes. Policies and interventions that promote financial literacy, encourage appropriate risk-taking, and integrate institutional support are critical for strengthening retirement readiness in India. Some Suggestions are as follows

Enhancing Financial Literacy: Workplace-based financial education and national campaigns

should emphasize basic literacy concepts—such as the time value of money, compounding, inflation, risk-adjusted return, and diversification—given their strong predictive power.

Risk-Based Advisory Services: Financial institutions should segment employees according to PRIS categories and provide customized investment products that match risk appetite.

Policy Interventions: Governments and higher education institutions should incentivize retirement savings via tax benefits, employer contributions, and subsidized pension schemes that encourage risk-adjusted investing.

Conflict of interest:

“The authors declare no conflict of interest.”

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