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Scale Development and Measurement Model of Behavioural Biases, Financial Capabilities, and Investment Decisions - A Study of IT Sector Employees in Bengaluru City

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Abstract:

This study examines the preliminary measurement structure of behavioural biases, financial risk tolerance and investment decisions among Information Technology (IT) sector employees in Bengaluru Urban, India. Drawing on behavioural finance theory, the study considers Narcissism Bias (NRB), Cognitive Dissonance Bias (CDB) and Heuristics Bias (HB), alongside Financial Risk Tolerance (FRT) and Investment Decisions (ID). Financial Literacy (FL) was included in the initial questionnaire but excluded from the exploratory and confirmatory factor analyses reported in this study and reserved for separate analysis. A structured questionnaire was developed with expert input and administered to 85 IT professionals in a pilot study conducted in June 2026. Exploratory Factor Analysis (EFA) using Principal Component Analysis (PCA) with Varimax rotation was conducted in IBM SPSS Statistics, followed by Confirmatory Factor Analysis (CFA) in IBM AMOS. The EFA produced a six-component solution explaining 67.69% of the total variance, with a Kaiser–Meyer–Olkin (KMO) value of 0.801 and a significant Bartlett's test of sphericity ($\chi^2 = 2171.429$, df = 595, $p < .001$). Three items (HB3, HB5 and CDB1) were removed during EFA. The CFA model comprised five constructs and 32 indicators. Its fit indices showed a mixed pattern ($\chi^2 = 479.252$, df = 451, $p = .173$; CMIN/DF = 1.063; RMSEA = .027; CFI = .790; IFI = .843; TLI = .769). Although the chi-square statistic, CMIN/DF and RMSEA indicated favourable fit, the incremental fit indices remained below the commonly used .90 benchmark. The EFA also suggested a two-component structure for CDB, whereas the CFA specified it as a single construct. Given the pilot sample size, model complexity and unresolved measurement issues, the findings should be interpreted as preliminary evidence for further instrument refinement rather than conclusive validation. Independent testing with a larger sample is needed to assess the stability and generalisability of the measurement model.

Keywords: Behavioral finance, Cognitive Dissonance, Heuristics Bias, Financial risk tolerance, Confirmatory Factor Analysis.

1. INTRODUCTION

1.1 Background of the Study

The rapid expansion of India's information technology (IT) industry has created substantial employment opportunities and improved the earning potential of professionals across the country. Bengaluru Urban occupies a prominent position in this development, with a concentration of technology companies, skilled employees and digitally connected financial consumers. The growing participation of salaried professionals in financial markets makes their investment behaviour an important area of research. Although IT employees may have access to regular incomes, digital investment platforms and financial information, these advantages do not necessarily ensure sound investment decisions. Recent studies indicate that investment choices may be influenced by psychological biases, individual financial knowledge, risk perception and investor experience [1]–[4]. Traditional financial approaches emphasise the evaluation of available information, expected returns and investment risks. Behavioural finance extends this understanding by examining how psychological tendencies influence financial judgement. Investors may interpret market information selectively, place excessive confidence in their own

abilities or depend on familiar decision-making strategies when evaluating investment opportunities. Such tendencies may affect investment choices even when relevant information is available. Recent empirical evidence from emerging markets demonstrates that behavioural biases are associated with investment decisions and that their effects may vary according to financial literacy, experience and perceived risk [1], [3], [4]. Consequently, investment behaviour needs to be examined through both financial and psychological perspectives. Three behavioural constructs are particularly relevant to the present study: Narcissism Bias (NRB), Cognitive Dissonance Bias (CDB) and Heuristics Bias (HB). Narcissism-related tendencies may encourage individuals to overestimate their judgement and attribute successful investment outcomes to personal ability. Cognitive dissonance arises when information conflicts with existing beliefs or earlier decisions, potentially encouraging selective information processing and the justification of previous choices. Heuristics involve simplified mental strategies that help individuals make decisions under uncertainty but may also lead to systematic judgement errors. Research on behavioural biases and investor decisions has demonstrated that psychological tendencies can influence investment choices, although the direction and strength of individual effects depend on the bias examined and the circumstances of the investor [1], [3], [4].

Financial Literacy (FL) represents another important dimension of investment behaviour. It concerns the knowledge and understanding required to evaluate financial products, interpret investment information and make informed financial choices. Financially literate individuals may be better equipped to compare alternatives and assess the implications of uncertainty. However, financial knowledge alone cannot guarantee rational investment decisions because individuals may continue to rely on psychological shortcuts or emotional responses. Research involving Indian investors has identified relationships between financial literacy, behavioural biases and investment decisions, indicating that financial knowledge should be examined alongside psychological influences rather than treated as a complete explanation of investor behaviour [2], [3], [5].

Financial Risk Tolerance (FRT) is equally relevant because investors differ in their willingness to accept uncertainty in pursuit of potential financial returns. Risk tolerance influences the types of investments individuals are prepared to consider and the degree of uncertainty they are willing to accommodate. Nevertheless, risk tolerance should be distinguished from risk perception and actual investment behaviour. An individual may be willing to accept substantial risk without fully understanding the financial consequences, while another may possess considerable financial knowledge but prefer comparatively conservative investments. Research on Indian millennials has shown that financial literacy can alter the relationship between risk tolerance and risky investment intentions, supporting the examination of these constructs together [5]. The relationship between behavioural biases, financial literacy and risk tolerance is particularly relevant to IT employees because occupational exposure to technology and digital information does not necessarily correspond to equivalent financial competence. Employees may encounter investment opportunities through online platforms, workplace discussions and digital financial content, but their decisions can still be affected by confidence, selective interpretation and simplified judgement. Evidence from Indian retail investors suggests that behavioural biases and financial literacy can jointly influence investment decisions, while investor experience may also affect these relationships [2]–[4]. These findings provide a basis for examining the proposed constructs within a specific occupational group rather than assuming that results from general retail-investor samples apply equally to IT employees. Despite the increasing attention given to behavioural finance, the simultaneous measurement of Narcissism Bias, Cognitive Dissonance Bias, Heuristics Bias, Financial Literacy, Financial Risk Tolerance and Investment Decisions remains an important research task. Existing studies have examined several combinations of behavioural biases and financial characteristics, but differences in research populations, measurement instruments and analytical approaches make direct comparisons difficult [1]–[5]. A context-specific measurement framework is therefore necessary to determine whether the selected questionnaire items adequately represent the intended constructs and whether these constructs can be empirically distinguished.

Against this background, the present study develops and preliminarily validates a measurement model for examining behavioural biases, financial literacy, financial risk tolerance and investment decisions among full-time IT employees in Bengaluru Urban, Karnataka. A pilot survey involving 85 valid responses was conducted in June 2026. Exploratory Factor Analysis (EFA) was used to examine the preliminary factor structure and identify items requiring refinement, while Confirmatory Factor Analysis (CFA) was employed to assess the proposed measurement model. The pilot study is intended to support the development of a more reliable instrument for subsequent large-scale research using Structural Equation Modelling (SEM). Given the limited pilot sample, the findings are interpreted as preliminary evidence concerning measurement suitability rather than conclusive proof of the proposed relationships.

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Hal 622-637

1.2 Review of Related Literature

1.2.1 Investment Behaviour as a Multidimensional Construct

Investment behaviour involves the evaluation of financial information, selection of investment alternatives, assessment of uncertainty and implementation of financial decisions. Recent literature recognises that these activities are influenced by cognitive processes, personality characteristics, financial knowledge and individual circumstances. A systematic review of behavioural biases identified numerous psychological tendencies associated with individual investment decisions, highlighting the need to examine investment behaviour through an integrated rather than isolated perspective [6]. Similarly, research on personality differences demonstrates that individual characteristics are associated with investment preferences, beliefs and risk-taking behaviour [7]. These findings support the conceptualisation of investment decisions as a multidimensional construct.

1.2.2 Behavioural Finance and Investment Decision-Making

Recent empirical studies have examined how behavioural biases influence investment decisions across different financial markets. Adil et al. investigated the relationship between behavioural biases and investment decisions among Indian investors, examining financial literacy as a moderating factor [8]. Their findings indicate that the relationships between particular biases and investment decisions may vary across investor groups. Research on Indian retail investors has also identified the influence of anchoring, availability, herding and other behavioural tendencies on investment intentions, with the persistence of existing choices emerging as an additional consideration [9]. These findings suggest that investment decisions cannot be explained exclusively through expected returns and financial information. Evidence from European markets provides further support for this interpretation. A study of Croatian stock market investors found that several behavioural and psychological factors were associated with investment decisions and that investment choices were related to investment performance satisfaction [10]. Although these findings provide a broader understanding of behavioural finance, differences in national settings and investor characteristics mean that their applicability to Indian IT employees requires separate empirical investigation.

1.2.3 Narcissism Bias and Investment Decisions

Narcissism Bias is relevant to investment behaviour because excessive self-confidence and an inflated assessment of personal ability may affect how investors interpret market information. Individuals who overestimate their financial judgement may place greater reliance on personal opinions and give insufficient consideration to contradictory evidence. Research examining personality differences and investment decisions has demonstrated that individual psychological characteristics are associated with financial preferences and investment choices [7]. However, personality characteristics and narcissistic tendencies are not interchangeable. Therefore, evidence concerning general personality traits cannot, by itself, establish the specific effect of Narcissism Bias. The present study treats NRB as a distinct construct requiring appropriate measurement and empirical assessment.

1.2.4 Cognitive Dissonance Bias and Investment Decisions

Cognitive Dissonance Bias concerns the difficulty individuals may experience when new information conflicts with their existing beliefs or previous decisions. In investment settings, this conflict may encourage investors to defend earlier choices, selectively interpret financial information or postpone reconsideration of an unsuccessful investment. Recent research on retail investment behaviour has identified status quo preferences, regret avoidance and sunk-cost considerations as relevant influences on investment intentions [9]. Such findings provide a contemporary basis for investigating the persistence of investment choices. Nevertheless, these related tendencies should not be treated as direct measures of cognitive dissonance without appropriate theoretical and empirical justification. Accordingly, the present study examines CDB as a separate behavioural construct.

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ISSN 2774-809X (media online)
Hal 622-637

1.2.5 Heuristics Bias and Investment Decisions

Heuristics are simplified mental strategies that enable individuals to make judgements when information is incomplete or decisions are complex. Although these strategies can reduce the effort required to evaluate alternatives, they may also produce systematic errors when investors rely excessively on familiar patterns, recent information or readily available examples. The systematic review of behavioural biases identifies heuristics among the important themes in research on individual investment decisions [6]. Empirical evidence from Indian investors also suggests that heuristic influences can affect investment decisions, although their effects may depend on financial literacy and investor experience [8]. These findings indicate that heuristics should be examined separately rather than combined indiscriminately with other behavioural biases.

1.2.6 Financial Literacy and Investment Decisions

Financial literacy is an important financial capability that enables individuals to understand financial concepts, evaluate investment alternatives and interpret financial risks. Arora and Chakraborty examined financial literacy and investment choices using evidence from India, demonstrating the relevance of financial knowledge to participation in financial assets [11]. Research on young adults has further indicated that financial literacy is associated with investment behaviour and that confidence in financial decision-making can influence investment participation [12]. The measurement of financial literacy also requires careful consideration. Recent research using confirmatory factor analysis has examined financial literacy as a multidimensional construct encompassing financial knowledge, attitudes and behaviour [13]. This approach is relevant to the present study because objective knowledge questions and subjective self-assessment items may capture different aspects of financial competence. Consequently, the inclusion of both objective and subjective items requires empirical assessment of their measurement properties.

1.2.7 Financial Risk Tolerance and Investment Decisions

Financial Risk Tolerance refers to an individual's willingness to accept uncertainty in financial outcomes. It influences the types of investments an individual may consider and the level of potential loss that the individual is prepared to accommodate. Islam et al. examined financial risk propensity as an explanatory mechanism linking behavioural biases with investment decisions. Their findings indicated that selected behavioural dimensions influenced risk propensity and that risk propensity was associated with investment decisions [14]. This provides direct support for examining the relationship between behavioural biases, financial risk-related characteristics and investment choices. Research also indicates that financial risk tolerance should be distinguished from financial risk aversion. A recent study demonstrated that these concepts can operate as complementary rather than interchangeable factors in explaining household investment portfolios [15]. Additional evidence suggests that risk tolerance and portfolio allocation are influenced by investment knowledge, experience and perceptions of financial uncertainty [16]. These findings reinforce the importance of measuring FRT as a separate construct rather than inferring it directly from investment preferences or demographic characteristics.

1.2.8 Interrelationships among Behavioural Biases, Financial Literacy and Risk Tolerance

Recent research increasingly examines behavioural biases alongside financial knowledge and risk-related characteristics. Mohta and Shunmugasundaram found that financial literacy moderated the relationship between risk tolerance and risky investment intentions among Indian millennials [5]. Mahmood et al. likewise investigated financial literacy as a moderator of the relationship between behavioural biases and investment decisions, identifying meaningful relationships among these variables in an emerging-market setting [3]. A more recent study examined behavioural biases, risk perception and financial literacy within an integrated model of investment decision-making [17]. Together, these studies support the examination of financial literacy and risk-related constructs alongside psychological tendencies. However, the evidence does not establish that financial literacy eliminates all behavioural biases. Investors may possess relevant financial knowledge while continuing to rely on simplified judgements or personal beliefs. Research on financial knowledge and risky investment intentions has also demonstrated the importance of considering the psychological and behavioural mechanisms through which

knowledge may influence financial choices [18]. Therefore, the present study treats financial literacy and financial risk tolerance as distinct constructs whose relationships with behavioural biases and investment decisions require empirical examination.

1.3 Research Gap

The reviewed literature establishes that behavioural biases, financial literacy and financial risk-related characteristics are relevant to investment decisions. Nevertheless, the reviewed studies differ in their populations, constructs, measurement instruments and analytical approaches [6], [8], [11], [14]. Evidence concerning retail investors and other occupational groups cannot automatically be generalised to full-time IT employees in Bengaluru Urban. Furthermore, the specific measurement of Narcissism Bias, Cognitive Dissonance Bias and Heuristics Bias alongside Financial Literacy, Financial Risk Tolerance and Investment Decisions requires systematic validation. The present study addresses this measurement-related gap through a pilot investigation involving 85 IT employees. EFA is employed to examine the preliminary factor structure, while CFA is used to assess the proposed measurement model. The study therefore focuses on the initial reliability and validity of the instrument rather than claiming to establish causal relationships among the constructs. Its contribution lies in developing a measurement foundation for subsequent large-scale investigation of investment decisions among IT employees in Bengaluru Urban.

1.4 Conceptual Framework and Hypotheses

The conceptual framework draws on behavioural finance theory and Dual-Process Theory (Kahneman, 2011) to propose relationships among behavioural biases, financial literacy, financial risk tolerance and investment decisions. Narcissism Bias, Cognitive Dissonance Bias and Heuristics Bias are considered potential influences on financial judgement and decision-making, while Financial Literacy and Financial Risk Tolerance are included as related financial capability constructs. The framework proposes that these constructs may be associated with investment decisions, including possible indirect relationships through financial literacy and financial risk tolerance. However, the present pilot study focuses on questionnaire development and preliminary assessment of the measurement model. The proposed direct and indirect relationships are theoretical propositions and have not been empirically tested through mediation analysis in this study.

The research paper focuses on the development of instruments and the evaluation of the measurement model's validation. The following measurement hypotheses will be considered:

H1: The items developed load significantly onto their respective latent factors.
H2: The five-factor CFA model achieves acceptable fit with the pilot study data.
H3: Inter-construct correlations are moderate, providing preliminary evidence of discriminant validity.

2. RESEARCH METHODS

2.1 Research Design

A quantitative, cross-sectional survey design was adopted to examine the relationships among the selected research constructs. A structured questionnaire was developed through a systematic review of relevant literature and subsequently validated and cognitively pre-tested by a panel of experts to ensure clarity, relevance and suitability. The study was conducted in two consecutive phases. Exploratory factor analysis (EFA) was initially employed to reduce the number of items and identify the underlying factors, followed by confirmatory factor analysis (CFA) to validate the proposed measurement structure.

2.2 Questionnaire Development

Data analysis was conducted in two stages using IBM SPSS Statistics and IBM AMOS. In the first stage, exploratory factor analysis (EFA) was performed in IBM SPSS Statistics using Principal Component Analysis

(PCA) with Varimax rotation and Kaiser normalisation to examine the preliminary factor structure and identify items requiring refinement. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used to assess the suitability of the correlation matrix for factor analysis. Items with factor loadings below 0.50 or problematic cross-loadings were considered for removal. In the second stage, confirmatory factor analysis (CFA) was conducted in IBM AMOS using Generalised Least Squares (GLS) estimation to assess the proposed measurement model. Model fit was evaluated using the chi-square statistic (χ^2), CMIN/DF, Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Comparative Fit Index (CFI), Incremental Fit Index (IFI), Tucker–Lewis Index (TLI), Akaike Information Criterion (AIC) and Expected Cross-Validation Index (ECVI). Standardised factor loadings and critical ratios (C.R.) were examined where estimable. Three correlated residuals were included in the reported CFA model following consideration of modification indices; their substantive justification and effect on model fit require careful evaluation. The sample comprised 85 respondents, while the CFA model included 32 indicators and 77 free parameters. KMO, RMSEA and Hoelter's critical N alone cannot establish that the sample was sufficient for this model. If EFA and CFA were conducted using the same respondents, the CFA should be interpreted as a preliminary assessment rather than an independent confirmation of the exploratory structure. Independent validation using a larger sample is required before firm conclusions can be drawn about the stability and generalisability of the measurement model.

2.3 Sampling and Data Collection

Full-time IT employees working in Bengaluru Urban, Karnataka, India, constituted the target population of the study. Convenience sampling was employed for the pilot study to recruit employees who were accessible and willing to participate. A total of 85 valid responses were obtained and used for the preliminary assessment of the questionnaire and measurement model. Data collection was conducted in June 2026. Before data collection, respondents were informed about the purpose of the study and assured that their responses would be treated confidentially. To improve methodological transparency, further details regarding participant eligibility, recruitment procedures, respondent characteristics, investment experience, missing-data handling and data screening should be reported where these details are available in the research records. The applicable ethical approval or exemption arrangements and the informed-consent procedure should also be specified. No additional details are assumed where supporting records are unavailable.

2.4 Analytical Procedure

Data analysis was conducted in two stages using IBM SPSS Statistics and IBM AMOS. In the first stage, exploratory factor analysis (EFA) was performed using Principal Component Analysis (PCA) with Varimax rotation and Kaiser normalisation to examine the preliminary component structure and identify items requiring refinement. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used to assess the suitability of the correlation matrix for factor analysis. Items with factor loadings below 0.50 or problematic cross-loadings were considered for removal. PCA summarises the variance in observed variables, whereas common-factor methods are generally more directly suited to identifying underlying latent constructs. Varimax rotation also assumes that the extracted components are uncorrelated. As the constructs examined in this study may be related, the suitability of this extraction and rotation approach requires further assessment. Accordingly, the EFA findings are interpreted as preliminary rather than conclusive evidence of the underlying latent structure.

In the second stage, confirmatory factor analysis (CFA) was conducted in IBM AMOS using Generalised Least Squares (GLS) estimation to assess the proposed measurement model. The questionnaire items were measured using five-point Likert scales. Given the ordinal nature of the responses and the sample size of 85 respondents, the suitability of GLS should be considered in relation to the response distributions and the estimator's assumptions. The available results do not establish whether these assumptions were adequately assessed; therefore, the estimation results and associated fit indices should be interpreted cautiously. The choice of estimator should be reviewed using the original data before independent validation. Model fit was evaluated using the chi-square statistic (χ^2), CMIN/DF, Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Comparative Fit Index (CFI), Incremental Fit Index (IFI), Tucker–Lewis

Index (TLI), Akaike Information Criterion (AIC) and Expected Cross-Validation Index (ECVI). Standardised factor loadings and critical ratios (C.R.) were examined where estimable. Three correlated residuals were included in the reported CFA model following consideration of modification indices. Their substantive justification and effect on model fit require careful evaluation against the original AMOS output and the theoretical relevance of the corresponding items. The sample comprised 85 respondents, while the CFA model included 32 indicators and 77 free parameters. KMO, RMSEA and Hoelter's critical N alone cannot establish that the sample was sufficient for this model. If EFA and CFA were conducted using the same respondents, the CFA should be interpreted as a preliminary assessment rather than an independent confirmation of the exploratory structure. Independent validation using a larger sample is required before firm conclusions can be drawn about the stability and generalisability of the measurement model. and generalisability of the measurement model.

3. ANALYSIS AND DISCUSSION

3.1 Exploratory Factor Analysis

3.1.1Sampling Adequacy and Sphericity

Prior to EFA, the suitability of the correlation matrix was evaluated. The results are summarized as follows in Table 1.

Table 1: KMO and Barlett's Test of Sphericity

Test	Value	Recommended	Interpretation
KMO	0.801	>0.60	Excellent
Bartlett's Test	$\chi^2 = 2171.429$	Significant	Suitable
df	595	-	-
Sig.	$p < .001$	<0.05	Significant

Source: Computed Data

The KMO value of 0.801 exceeded Kaiser (1974)threshold of 0.80 for excellent sampling adequacy, confirming that the iter-item correlations were sufficiently large relative to partial correlations to justify factor analysis. Bartlett's Test of Sphericity was significant (χ^2 = **2171.429, df = 595,** $p < 0.001$), indicating that the population correlation matrix was not an identify matrix and that adequate intercorrelations existed among variables.

JAMEK (JURNAL AKUTANSI MANAJEMEN EKONOMI DAN KEWIRAUSAHAAN)
Vol 06, No 03, Bulan September2026
ISSN 2774-809X (media online)
Hal 622-637

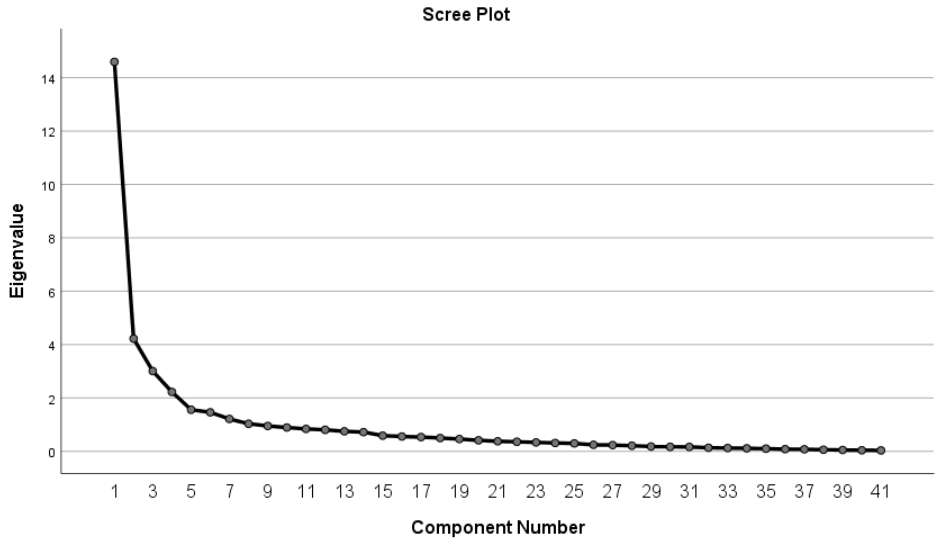

Figure 1. Scree Plot Illustrating the Extracted Latent Factors

3.1.2 Factor Extraction and Variance:

The researchers used PCA with Varimax rotation to determine factors with eigenvalues of 1.0 or greater. According to the Kaiser (1974) criterion, as well as the scree plot, it was decided that six factors would be retained. The inflection in the scree plot, was after the sixth component , thus confirming the six-factor solution. Table 2 shows the eigenvalues, and the cumulative explained variance.

Table 2 Total Variance Explained by Extracted Factors

Component	Eigenvalue	Variance Explained (%)
1	12.277	35.08
2	3.817	10.91
3	2.944	8.41
4	2.093	5.98
5	1.33	3.8
6	1.234	3.53
Total	—	67.69%

Source: Computed Data

The six-factor solution explained a cumulative 67.69% of total variance, surpassing the commonly recommended threshold of 60% (Hair et al., 2019).

JAMEK (JURNAL AKUTANSI MANAJEMEN EKONOMI DAN KEWIRAUSAHAAN)
Vol 06, No 03, Bulan September2026
ISSN 2774-809X (media online)
Hal 622-637

3.1.3 Rotated Component Matrix and Item Retention

Following Varimax rotation, items were assessed using a primary component loading threshold of 0.50, consistent with the criterion specified in Section 2.4. Cross-loading patterns and the conceptual relevance of each item were also considered when making item-retention decisions.

Table 3 Rotated Component Matrix indicating the factor loadings by Construct.

Factor	Construct / Items	Loading Range	Notes
F1	Investment Decisions (ID1–ID10)	.734–.840	All loadings > 0.70; excellent construct validity
F2	Financial Risk Tolerance (FRT1–FRT7)	.684–.784	All items load satisfactorily on single factor
F3	Narcissism Bias (NRB1–NRB5)	.671–.790	All loadings > 0.60
F4	Heuristics Bias (HB1,2,4,6,7)	.558–.743	HB7 lowest (0.558); HB3, HB5 removed; hb8 retained in CFA
F5	Cognitive Dissonance Bias (CDB2, CDB3)	.710–.791	CDB split across two factors — multidimensionality noted
F6	Cognitive Dissonance Bias (CDB4, CDB5)	.661–.783	CDB1 removed (low loading)

Source: Computed Data

During the exploratory factor analysis (EFA), three items were removed from the reported component solution: HB3 (‘Dramatic news events have a major influence on my decision’) because of its low factor loading, HB5 (‘I prefer large, well-known domestic companies’) because of cross-loadings, and CDB1 (‘When an investment is performing poorly, I actively seek information supporting my original decision’) because of its low primary loading. The Cognitive Dissonance Bias (CDB) items loaded onto two components, F5 and F6, representing two related aspects: avoidance of information (CDB2 and CDB3) and emotional commitment to a prior decision (CDB4 and CDB5). These findings suggest a possible multidimensional structure; however, further theoretical and empirical assessment is required to determine whether the two aspects should be modelled separately or as a single construct. The 12 Financial Literacy items (FLS1–FLS6 and FLO1–FLO6) were excluded from the EFA and CFA reported in this study and reserved for separate analysis. As the instrument included both subjective and objective items, their measurement properties require separate consideration. Their exclusion does not, in itself, establish that the two item formats are incompatible with a reflective measurement model.

3.2 Confirmatory Model Analysis

The CFA measurement model was specified with five latent exogenous constructs: NRB having indicators, CDB with indicators, HB with 6 indicators, FRT having 7 indicators and ID with 10 indicators, yielding a total of 32 observed endogenous variables and 37 unobserved exogenous variables where 5 latent factors and 32 error terms were present. The model was identified with 528 distinct sample moments and 77 free parameters, leading to 451 degrees of freedom. Three correlated residuals were incorporated based on modification index guidance and theoretical justification where e1↔e21(FRT1 and FRT7, reflecting shared method variance in extreme risk statements), e12↔ e13 (HB4 and HB6, capturing proximity effects in familiarity-based Heursitics), and e29↔ e30 (ID6 and ID7, reflecting conceptual overlap between investment discipline items). Estimation was performed using GLS.

JAMEK (JURNAL AKUTANSI MANAJEMEN EKONOMI DAN KEWIRAUSAHAAN)
Vol 06, No 03, Bulan September2026
ISSN 2774-809X (media online)
Hal 622-637

3.2.1 Model Fit Indices

The overall model fit results are summarized in Table 4.

Table 4 CFA Model Fit Summary

Index	Value (Default Model)	Recommended Threshold	NFI	CFI	Interpretation
χ^2 (CMIN)	479.252	p > .05	0.24	0.79	Non-significant χ^2
df	451	—	—	—	—
p-value	0.173	> .05	—	—	Acceptable fit
CMIN/DF	1.063	≤ 3.0	—	—	Excellent parsimony
RMSEA	.027 [.000, .047]	< .08	—	—	Close fit; PCLOSE = .972
GFI	0.643	≥ .90 (ideal)	—	—	Moderate (small n = 85)
AGFI	0.583	≥ .85	—	—	Moderate (small n)
IFI (Δ2)	0.843	≥ .90	—	—	Near-acceptable
TLI (ρ2)	0.769	≥ .90	—	—	Moderate
CFI	0.79	≥ .90	—	—	Moderate; acceptable for small n
AIC	633.252	<Saturated /Independence	—	—	Default < Independence (694.483)

Source: Computed Data

The CFA results show a mixed pattern of model fit. The chi-square test was non-significant ($\chi^2 = 479.252$, df = 451, p = .173), the CMIN/DF ratio was 1.063, and the RMSEA was .027 (90% CI: .000–.047; PCLOSE = .972). These values indicate a favourable pattern for these particular fit measures. However, the incremental fit indices were below the commonly used .90 benchmark (CFI = .790, IFI = .843 and TLI = .769), while GFI (.643) and AGFI (.583) were also below their stated recommended thresholds. Therefore, the overall fit cannot be described as unequivocally acceptable. The non-significant chi-square result and low RMSEA should not be interpreted in isolation as proof of adequate sample size or successful validation. The sample of 85 respondents and the complexity of the 32-indicator model limit the strength of the conclusions. Possible model misspecification, including the treatment of Cognitive Dissonance Bias as a single factor and the correlated residuals, requires further investigation. SRMR should also be reported if it is available in the original AMOS output; it should not be estimated or invented from the other fit indices. The present results should therefore be treated as preliminary evidence for further refinement of the measurement model, rather than conclusive validation.

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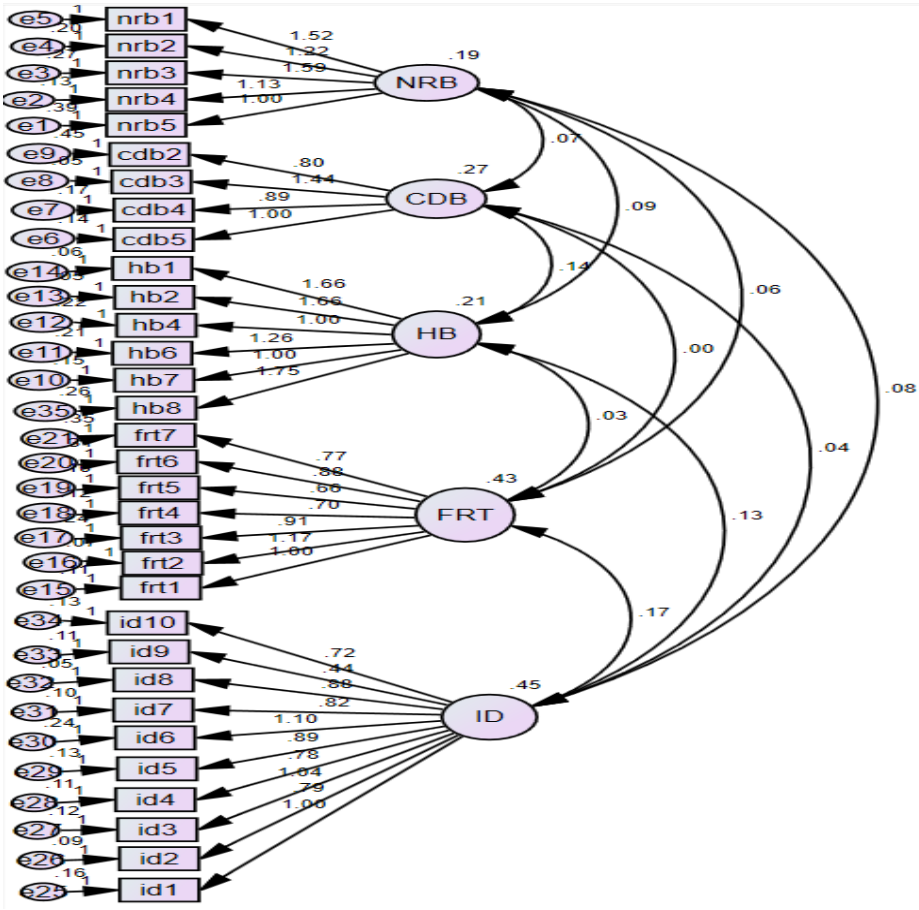

Figure 2. Confirmatory Factor Analysis Measurement Model Showing Standardised Estimates

3.2.2 Indicator Loadings and its Significance

The CFA measurement model comprised five latent constructs and 32 observed indicators. The standardised factor loadings varied across items, and several were below 0.70. In particular, CDB2 (0.526), NRB5 (0.571), FRT7 (0.650) and ID9 (0.666) warrant further examination. HB4 (0.695) was also slightly below 0.70. These results indicate that the retained indicators do not contribute equally to their respective constructs. The loadings should therefore be interpreted alongside construct-level reliability and validity evidence rather than treating all indicators as equally strong measures.

Table 5 Standardized Regression Weights and Critical Ratios (CFA)

Construct	Item	Std. Loading (β)	CR (p)
NRB	NRB1	0.826	3.856 (***)
	NRB2	0.764	3.788 (***)
	NRB3	0.802	3.793 (***)
	NRB4	0.803	3.644 (***)
	NRB5	0.571	— (fixed)

JAMEK (JURNAL AKUTANSI MANAJEMEN EKONOMI DAN KEWIRAUSAHAAN)
Vol 06, No 03, Bulan September2026
ISSN 2774-809X (media online)
Hal 622-637

CDB	CDB2	0.526	3.285 (.001)
	CDB3	0.958	4.961 (***)
	CDB4	0.745	4.598 (***)
	CDB5	0.812	— (fixed)
HB	HB1	0.949	6.106 (***)
	HB2	0.958	5.220 (***)
	HB4	0.695	4.785 (***)
	HB6	0.776	4.954 (***)
	HB7	0.756	— (fixed)
	HB8	0.84	5.459 (***)
FRT	FRT1	0.894	— (fixed)
	FRT2	0.943	8.421 (***)
	FRT3	0.773	6.213 (***)
	FRT4	0.792	6.120 (***)
	FRT5	0.804	4.925 (***)
	FRT6	0.723	5.614 (***)
	FRT7	0.65	4.307 (***)
ID	ID1	0.859	— (fixed)
	ID2	0.875	7.448 (***)
	ID3	0.899	9.085 (***)
	ID4	0.847	7.283 (***)
	ID5	0.858	7.261 (***)
	ID6	0.833	7.372 (***)
	ID7	0.873	6.830 (***)
	ID8	0.93	8.104 (***)
	ID9	0.666	3.160 (.002)
	ID10	0.799	5.730 (***)

Source: Computed Data

Standardised factor loadings ranged from 0.526 (CDB2) to 0.958 (CDB3 and HB2). With the exception of CDB2 (0.526), ID9 (0.666) and HB4 (0.695), the reported indicator loadings exceeded 0.70. Although these three indicators exceeded the minimum loading value of 0.50 commonly used as a preliminary guideline, their retention should be considered alongside theoretical relevance and evidence of construct reliability and validity. In particular, CDB2 requires cautious interpretation because the exploratory factor analysis identified two

components within the Cognitive Dissonance Bias construct, whereas the confirmatory factor analysis specified CDB as a single construct. The reported CFA results do not, by themselves, establish that this single-factor specification adequately represents the construct. Critical ratios (C.R.) were used to assess the statistical significance of the estimated parameters. For estimates to which the usual large-sample normal approximation applies, absolute C.R. values above 1.96 and 2.58 correspond approximately to significance levels of 0.05 and 0.01, respectively. Most reported items had C.R. values above 2.58, with the highest reported value being 9.085 for ID3. These results should be interpreted with due consideration of the sample size and the limitations of the overall measurement model. Although the standardised factor loadings provide information about the relationships between individual indicators and their respective constructs, they are not sufficient on their own to establish construct-level reliability and convergent validity. Further assessment should include composite reliability (CR) or an appropriate reliability coefficient, together with average variance extracted (AVE), where these measures can be calculated from the relevant model estimates. The present results do not include these additional statistics; therefore, construct-level reliability and convergent validity cannot be considered conclusively established. These measures should be calculated from the original CFA output and reported in a supplementary table or in the main results before the measurement instrument is presented as fully validated.

3.2.3 Inter-Construct Correlations

Table 6 below. Presents the estimated inter-construct correlations derived from the CFA covariance matrix.

Table 6 Inter-Construct Correlations (CFA)

Construct	NRB	CDB	HB	FRT	ID
NRB	1	.326*	.464**	0.22	0.284
CDB	.326*	1	.598**	-0.01	0.114
HB	.464**	.598**	1	0.09	.443**
FRT	0.22	-0.01	0.09	1	.380**
ID	0.284	0.114	.443**	.380**	1

Source: Computed Data

Note. * p < .05; ** p < .01. Correlation estimates derived from standardized covariance matrix.

The inter-construct correlations varied across the five constructs. The CDB–FRT correlation was the lowest (r = −0.01, p = 0.949), whereas the CDB–HB correlation was the highest (r = 0.598). The CDB–FRT result indicates a negligible and statistically non-significant association between these constructs in the pilot sample. However, this finding does not establish that cognitive dissonance operates through other mechanisms or that financial risk tolerance has no role in the relationship. The positive correlations between CDB and HB (r = 0.598), HB and ID (r = 0.443), and FRT and ID (r = 0.380) indicate associations among these constructs in the sample. Nevertheless, these correlations do not establish causal relationships or confirm the direct and indirect pathways proposed in the conceptual framework. Although the correlation estimates provide preliminary information about the relationships between constructs, they are insufficient on their own to establish discriminant validity. Further assessment using appropriate measures, such as composite reliability, average variance extracted (AVE), the heterotrait–monotrait ratio (HTMT) and, where available, confidence intervals for latent correlations, is required. The findings should therefore be interpreted as preliminary and confirmed using a larger, independent sample.

4. IMPLICATIONS

The present study aimed to develop and validate a measurement instrument for three behavioural biases -Narcissism Bias (NRB), Cognitive Dissonance Bias (CDB) and Heuristics Bias (HB)- and two financial

constructs, Financial Risk Tolerance (FRT) and Investment Decisions (ID), among IT employees in Bengaluru Urban. The findings from Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) provide preliminary evidence regarding the proposed measurement structure. The EFA produced a six-factor solution, with five factors broadly corresponding to the intended constructs. CDB was divided between Factors 5 and 6, suggesting that its items may capture cognitive and affective dimensions. CDB2 and CDB3 reflected the cognitive aspects of dissonance, including rationalization of unsuccessful decisions and avoidance of conflicting information, whereas CDB4 and CDB5 appeared to represent affective discomfort and tendencies associated with the disposition effect. For the CFA, CDB was retained as a single reflective construct for parsimony. All four retained items loaded significantly on the CDB factor, with standardised loadings ranging from 0.526 to 0.958. Future research should compare single-factor and two-factor specifications to establish whether these dimensions are empirically distinguishable. Three items—HB3, HB5 and CDB1—were removed during EFA because of unsatisfactory factor performance. HB3 may have been interpreted as a general indicator of market awareness rather than a specific heuristic. HB5 may have been understood as measuring investment familiarity rather than the intended bias. Although IT employees' exposure to international investment opportunities could influence their responses, the present findings do not establish that home bias is less prevalent in this group. CDB1 may also have been interpreted differently by respondents with varying levels of financial knowledge. These explanations remain tentative and require further investigation of item wording and respondents' interpretations. The CFA indicated favourable results for several fit indices: the chi-square test was non-significant ($p = 0.173$), CMIN/DF was 1.063, and RMSEA was 0.027. However, GFI, AGFI, CFI and TLI did not reach the commonly used threshold of 0.90. These results should be interpreted collectively rather than relying on individual indices. Measurement research highlights the importance of considering model specification, measurement quality and the overall pattern of fit statistics when evaluating confirmatory factor models [21], [22]. The AIC comparison favored the default model over the independence and saturated models, although this comparison alone does not establish construct validity. The pilot sample of 85 respondents also limits generalizability. The ID construct showed standardised loadings ranging from 0.666 for ID9 to 0.930 for ID8, indicating that the retained items contributed to the proposed factor. FRT loadings ranged from 0.650 to 0.943, providing preliminary support for the measurement structure. Nevertheless, factor loadings alone cannot establish reliability, validity or stability over time; these properties require further assessment using a larger sample. The correlated error between FRT1 and FRT7 ($e15 \leftrightarrow e21$, $r = -0.769$) indicates substantial residual association between the items. Similar wording, overlapping content or coding issues may explain this relationship, but the available results do not identify its cause. Both items should therefore be reviewed before retaining the correlated error in the final model. Thus, the findings provide a preliminary basis for refining the instrument. Further research should compare alternative CDB factor structures, reassess the removed items and evaluate reliability, convergent validity and discriminant validity using a larger sample. These steps would strengthen the measurement foundation for investigating investment behaviour among IT employees in Bengaluru Urban.

4.1 Theoretical and Practical Implications

This study contributes to behavioural finance research by examining narcissism bias, cognitive dissonance bias and heuristics bias within a single measurement framework, rather than considering each bias in isolation. It also considers financial risk tolerance and investment decisions as related constructs within the proposed conceptual framework. However, the present analysis focuses on preliminary scale development and measurement assessment; it does not establish the direct, indirect or mediating relationships among these constructs. The proposed relationships therefore require further empirical testing. The study also contributes to the measurement of behavioural finance constructs by examining a 32-indicator, five-construct measurement model. The exploratory and confirmatory analyses provide an initial assessment of the instrument, although the mixed CFA fit indices and the differences between the exploratory and confirmatory factor structures indicate that further refinement is necessary. The instrument should therefore be regarded as a preliminary measurement tool rather than a fully validated scale. Its applicability beyond the present sample of IT sector employees in Bengaluru also requires assessment through independent studies involving larger and more diverse samples.

The findings may nevertheless offer useful directions for financial advisers and investment professionals. The constructs examined in this study highlight areas for further investigation, including overconfidence-related tendencies, reluctance to reconsider earlier investment decisions and reliance on familiar decision-making

approaches. Financial advisers may consider these aspects when discussing investment choices, reviewing portfolios and encouraging clients to evaluate alternative investment options. However, the present findings do not establish that these tendencies caused particular investment decisions or that addressing them will necessarily improve portfolio diversification.

For IT sector organisations, the study provides a basis for further examining how behavioural tendencies and financial capabilities may be relevant to employees' financial well-being. Financial education initiatives could consider combining conventional financial planning topics with opportunities for employees to reflect on their investment decision-making processes. The effectiveness of such initiatives would need to be evaluated before firm recommendations could be made. For the Securities and Exchange Board of India (SEBI) and other relevant policymakers, the study identifies behavioural finance as a potential area for further research in financial education and investor awareness programmes. However, policy recommendations should be informed by larger-scale evidence establishing the reliability, validity and wider applicability of the measurement instrument. Further research is also required before drawing conclusions about the relationships between behavioural biases, financial risk tolerance and investment decisions.

4.2 Limitations of the Study

Several limitations should be considered when interpreting the findings. First, the pilot study comprised 85 respondents, while the CFA model included 32 indicators and 77 free parameters. This sample size limits the strength of the conclusions that can be drawn about the stability and generalisability of the measurement model. The CFA results showed mixed model fit, with CFI, TLI, IFI, GFI and AGFI below their stated recommended thresholds. The findings should therefore be treated as preliminary, and the measurement model requires further assessment using a larger, independent sample. Second, convenience sampling may limit the representativeness of the sample because participating IT employees may differ from the wider population in their investment experience, financial engagement or willingness to participate in research. Third, the study relied on self-reported questionnaire data, which may be affected by response bias. Future research could consider supplementing self-reported investment decisions with appropriate objective measures, where available. Fourth, Financial Literacy was excluded from the EFA and CFA reported in this study and reserved for separate analysis. Its objective knowledge items and subjective self-assessment items require further assessment to determine an appropriate measurement and analytical approach. Fifth, the exploratory analysis suggested two components within Cognitive Dissonance Bias, whereas the CFA specified it as a single construct. Alternative factor specifications should be examined before its dimensionality can be established. Finally, the cross-sectional pilot design and the absence of structural model testing mean that the proposed direct and indirect relationships among the constructs remain untested. A larger study with independent measurement validation and appropriate structural analysis is needed before conclusions can be drawn about these relationships.

5. CONCLUSION

This study examined the preliminary measurement structure of behavioural biases, Financial Risk Tolerance and Investment Decisions among IT employees in Bengaluru Urban. The pilot study involved 85 respondents and used Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to assess the proposed measurement instrument. The EFA produced a six-component solution explaining 67.69% of the total variance. The KMO value was 0.801, and Bartlett's test of sphericity was statistically significant ($\chi^2 = 2171.429$, df = 595, $p < .001$). Three items (HB3, HB5 and CDB1) were removed during EFA. The subsequent CFA examined a five-construct measurement model comprising 32 indicators. The chi-square statistic was non-significant ($\chi^2 = 479.252$, df = 451, p = .173), with a CMIN/DF of 1.063 and an RMSEA of .027. However, the CFI (.790), IFI (.843) and TLI (.769) were below the commonly used .90 benchmark, indicating mixed overall model fit. Furthermore, the EFA suggested two components for Cognitive Dissonance Bias, whereas the CFA specified it as a single construct. These findings should therefore be interpreted as preliminary rather than conclusive evidence of measurement validity. The study provides an initial basis for refining the measurement instrument and examining behavioural finance constructs among IT employees. Financial Literacy was excluded from the EFA and CFA reported in this study and reserved for separate analysis. The proposed direct, indirect and mediating relationships among the

constructs were not tested in the present analysis. Future research should evaluate the measurement model using a larger, independent sample, examine alternative factor structures where theoretically justified, and assess construct reliability, convergent validity and discriminant validity using appropriate measures. Subsequent structural equation modelling may then be used to investigate the proposed relationships. These steps are necessary before firm conclusions can be drawn about the validity and wider applicability of the instrument.

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