



ANALYSIS OF BEHAVIORAL BIASES IMPACT ON BANK OPERATIONS:
A CASE STUDY OF PAKISTAN

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Abstract

The influence of psychological factors on financial decision-making has gained increasing attention within behavioural finance, challenging traditional assumptions of rational economic behaviour. This study examines the effect of behavioural biases on banking operations in Pakistan, specifically comparing conventional and Islamic banking institutions. The research investigates how biases including overconfidence, confirmation bias, conservatism bias, disposition effect, and herd behaviour influence risk perception and investment decision-making processes within the banking sector. Employing a quantitative research design, primary data were collected from 350 respondents associated with selected banks across Pakistan through a structured Likert-scale questionnaire. The data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) via Smart-PLS software. The findings reveal that behavioural biases significantly influence financial decisions and judgments, with herding behaviour ($\beta = 0.231, p < 0.001$) and overconfidence bias ($\beta = 0.174, p < 0.001$) emerging as particularly influential factors. Risk perception was found to mediate the relationship between behavioural biases and investment decisions ($\beta = -0.397, p < 0.001$). These results have important implications for banking professionals, policymakers, and financial institutions, highlighting the critical need for awareness of behavioural aspects in decision-making, enhanced risk assessment practices, and the development of evidence-based frameworks that account for psychological factors in banking operations.

Keywords: Behavioural Biases, Quantitative Analysis, Dual Bank Operations, Pakistan

1. Introduction.

In recent years, the banking sector has faced numerous challenges, ranging from economic fluctuations to evolving consumer behaviours. One of the most important but often overlooked issues in these challenges is the importance of behavioural biases in the decision-making process of financial institutions (Khan, Hussain, & Ahmed, 2023). The inclusion of psychological theories in economic analysis describes behavioural finance, which offers important insights into the psychological factors that affect the financial decisions and actions of bank employees and customers alike (Baddeley, 2018; Bhatia et al., 2020). These behavioural factors contradict the notion of rationality in decision-making and emphasize the role of psychological factors in financial transactions (Gigerenzer, 2018).

This study concentrates on the effects of behavioural biases on the banks in general study of Pakistan in particular. These biases can have a significant impact on a company's operations and decision-making process, particularly in an environment where the economy and business are constantly evolving and the



future remains unpredictable. In an ever-changing economic landscape, these biases are crucial to deepening a company's understanding of its customers and improve its operational efficiency, customer satisfaction, and risk management practices. The effects of behavioural factors on financial decision-making, investment behaviour and risk taking in banking and financial institutions have been identified in previous studies (Mahdi & Abbes, 2018; Güneysu & Aydin, 2023). Thus, the study of behavioural biases in the context of Pakistan's banking environment offers valuable insights into the impact of psychological factors on banking practices and strategic decision-making.

When people make decisions and judgments in a system of irrationality in a certain way, it is called behavioural biases. Differential bias can arise from the process of making decisions based on past beliefs, assumptions or limited information and excluding other options. Behavioural biases impact information search, interpretation, evidence evaluation and decision-making processes, and thereby yield effects like belief perseverance and biased judgments. Among the behavioural biases are overconfidence bias, confirmation bias, anchoring bias, loss aversion, cognitive dissonance, herding behaviour and mental accounting (Kumari & Sar, 2017; Jain et al., 2021).

Overconfidence bias is the tendency of individuals to believe that they are better than they actually are, have more knowledge, and can predict things more accurately than they can; often resulting in risk taking and unrealistic expectations. People with overconfidence are likely to think they are more skilled and knowledgeable than they actually are, and this can have a negative impact on their finances (Pompian, 2006; Mittal, 2022). According to Köhn (2023), overconfidence is an erroneous confidence in one's reasoning, cognitive skills, and judgments. But overconfident investors tend to be less aware of uncertainty and risk due to their own confidence that their predictions and decisions may be more accurate than they actually are (Shah et al., 2025).

Likewise, confirmation bias can be described as people's tendency to look for, interpret, and focus on information that confirms their preconceptions or beliefs, while filtering out information that contradicts them. This selective perception can have an impact on financial decisions, as the information that is received and acted upon tends to be what confirms decision makers' expectations (Baddeley, 2018; Calzadilla et al., 2020). People can be led to overlook risks and other alternatives in investment and banking decisions by confirmation bias.

Anchoring bias is when decision makers are influenced by first impressions or reference points when making later decisions and judgements. Investors who suffer from anchoring might pay too much attention to past prices, past information or first estimates, despite the new information. This may lead to unfair assessments and flawed financial decisions (Pompian, 2006; Kumari & Sar, 2017). As a result, it is important to be aware of these cognitive errors when designing efficient banking strategies, making decisions and minimizing the impact of psychological factors that could have a negative effect on financial performance.

It shows the tendency of individual to follow a large group even the action of large group goes against one's own judgment. He or she does not focus on his/her own thinking rather follow others' behaviour. It could be related to social influence, information cascades and herd mentality. Uncertainty, social pressure and informational influence are some of the reasons for herding behaviour.

Herding behaviour bias have the following negative consequences:

- i. Amplification of Trends: Herding behaviour may increase the trend in market due to which bubbles may create in financial markets.
- ii. Groupthink: Herding behaviour may increase group think where critical thinking is discourage and defective decisions are made.
- iii. Lack of innovation: Herding behaviour may lack in innovation because of deficiency of exploring new ideas.

Conservatism bias is the tendency of people to rely more on their previous information or beliefs rather than new information or information. This cognitive bias leads people to be slow to adjust their views or predictions in response to new data, often resulting in an underreaction to significant changes in the environment or market conditions (Kudryavtsev & Cohen, 2011; Mittal, 2022). Conservatism bias is a



phenomenon that occurs in the banking sector, where the financial institutions and decision makers take a long time to adapt their strategies, assessment and practices in order to respond to new information or change in market conditions. This bias can significantly impact risk management, lending practices, investment decisions, and overall operational efficiency (Pompian, 2006; Mittal, 2022; Risman, 2024).

Conservatives are underreactive to sample evidence, and overestimate base rates. They then don't react to new information as a sensible person would. The technical side of the conservatism bias was demonstrated by a classic experiment in 1968 by Ward Edwards, who found that people tended to struggle with updating their beliefs in the face of new information (Baddeley, 2019). This means that people tend to hold on to their beliefs more strongly than they will change their decision based on new information.

Conservatism bias can also be seen in the banking and investment sector, where it can lead to an overreaction to negative news and make it difficult to make financial decisions. Studies on the behavioural finance have shown that psychological biases have a significant impact on financial decision making and can affect the efficiency of financial markets (Dervishaj & Xhaferi, 2020; Sumani et al., 2022). Likewise, research on Islamic and conventional banks has shown how behavioural factors, particularly the cognitive biases, affect the risk-taking behaviour and financial institutions' efficiency (Mahdi & Abbes, 2018).

Behavioural finance has therefore become an intriguing area to explore financial behaviour in relation to psychological factors that affect real human behaviour, rather than the complete rationality of human decision making. The awareness of the conservatism bias helps financial institutions and investors to identify their cognitive bias and devise better strategies for decision making (Baddeley, 2019; Kumari & Sar, 2017).

1.1 Problem Statement

Behavioural biases are systematic errors or deviations from the norm or rationality in judgment and are generally due to cognitive, emotional, and social factors (Latif et al., 2011; Jain et al., 2021). These biases can have significant consequences for the banks' decision making, risk management, customer interaction and overall efficiency (Breuer & Perst, 2006; Gupta et al., 2021). However, the gap is identified in the analysis of behavioural biases and their effects on the operation of the banks in Pakistan, along with understanding the human behavioural propensities, which are often conflicting from rational decision making and how it can stimulate various aspects of a functioning of banks operating in Pakistan (Musse et al., 2015; Mahmood et al., 2024; Ranjan, 2025).

1.2 Objectives of the Study

1. To investigate the impact of behavioural biases such as; overconfidence bias, confirmation bias, anchoring bias, loss aversion, cognitive dissonance, herding behaviour, on Pakistani banking industry operations.
2. To examine the impact of behavioural biases such as; framing effect, mental accounting and status quo bias on Pakistani banking industry operations.
3. To recommend policy makers and individual bank management the doable ways based on the evaluation of behavioural biases help understand how human behavioural propensities, often conflicting from rational decision-making and how it can stimulus various aspects of a functioning of banks operating in Pakistan.

1.3 Hypothesis

Suppositions	Variable Type	
H1	There is impact of all behavioural biases on banking operations (Investment Decision) in Pakistan.	IV to DV
H2	Confirmation Bias has a significant effect on Behavioural biases.	IV Formative
H3	Conservatism Bias has a significant effect on Behavioural Biases.	IV Formative
H4	Disposition Effect has a significant effect on Behavioural Biases.	IV Formative
H5	Overconfidence has a significant effect on Behavioural Biases.	IV Formative
H6	Herding Behaviour has a significant effect on Behavioural Biases.	IV
H7	Behavioural Biases have a significant effect on Risk Perception.	IV



Suppositions	Variable Type	
H8	Risk Perception has a significant effect on Investment Decision.	Mediator/ Mediation
H9	Risk Perception significantly mediates the relationship between Behavioural Biases and Investment Decision.	Mediator/ Mediation
H10	Behavioural Biases have a significant direct effect on Investment Decision.	DV/ Direct effect
H11	There is no impact of any Behavioural bias on banking operations in Pakistan	IV to DV

2. Literature Review

Behavioural finance is a new and crucial field of financial research that breaks away from the traditional, rational approach to economic decisions, and emphasizes the role of psychological, emotional, and cognitive factors in financial decision-making. Behavioural biases are systematic deviations from rationality in information processing, risk assessment and decision making by individuals and institutions. Previous studies have shown that biases like overconfidence, confirmation bias, conservatism, anchoring, herding behaviour, and loss aversion are likely to have a significant impact on financial judgments and investment results (De Wit, 2018; Obeng, 2020; Jain et al., 2021). Calzadilla et al. (2020) found that behavioural finance and behavioural economics are growing, rapidly expanding fields of research in a systematic review. The study used a systematic review and meta-analysis of 890 studies that were published from 2009 to 2019 to emphasize the need to understand the importance of behavioural biases in accounting for financial decision-making patterns.

Numerous studies have investigated the role of behavioural biases in investment decision-making situations. Atif et al. (2020) reported that the behavioural finance biases significantly affect investors' perceptions, judgements and risk evaluations, which in turn affect their investment decisions. Similarly, Donkor et al. (2016) noted that even professional financial experience does not completely eradicate psychological biases from bankers' investment decisions in Ghana. Farooq and Sajid (2015) identified various factors that influence investment decision making of equity fund managers and individual investors in the Pakistani context, and Mahmood et al. (2024) found empirical evidence that behavioural biases have significant effects on investment decision making of investors in Pakistan. The recent research also shows that other biases such as overconfidence, herding are still significant factors in financial behaviour in various markets (Shrestha, 2024; Upashi & Kadakol, 2023).

Besides, behavioural biases are becoming an important consideration in banking operations and institutional decision making. Banks manage complex environments that involve a range of activities such as risk assessment, credit evaluation, investment management and bank-customer relationship management. "Behavioural factors are important determinants in retail banking decisions and financial product selections" (Breuer & Perst, 2006). Likewise, Van Hoose (2007) noted that managerial decisions, institutional environment and decision-making processes influence banking behaviour. Studies on banks have also shown that there are psychological aspects of credit risk management and in the operation of banks. Azouzi and Bacha (2023) explored the behavioural biases of bankers and how these affect their choice of credit risk assessment methods, identifying that overconfidence, optimism and loss aversion are behavioural biases that affect bankers' choice of methods. Similarly, Zheng et al. (2023) emphasized the role of managerial decision making and risk-taking behaviour of Pakistani commercial banks.

Moreover, social interaction and information transmission is also affected by behavioural biases. Din et al. (2021) explored behavioural biases and herding tendency of investors of Islamic financial products and revealed that self-attribution, illusion of control and information availability significantly affect herding behaviour in Islamic financial products. Han et al. (2022) also noted that social transmission bias is a factor in investor behaviour. Musse et al. (2015) noted that in the Islamic banking and conventional banking world,



behavioural finance offers valuable explanations of financial behaviour in addition to the rational explanations.

Although behavioural finance has been the subject of ongoing research, most studies have been conducted on individual investors, investment decisions and risk assessment practices (Jain et al., 2021; Gabhane et al., 2023). The study of the impact of behavioural biases on the overall banking performance is an under-researched area especially in emerging markets like Pakistan. A few previous studies have pointed out that the behavioural biases have been found to have a significant impact on the financial decision making, investment decisions, and market outcomes (Dong et al., 2021; Elmas et al., 2024). This study aims to fill this gap by studying the effect of behavioural biases on bank operations in Pakistan, and how psychological factors influence financial decisions, risk management, and the effectiveness of bank operations (Gupta et al., 2021; Peria & Schmukler, 2001).

3. Methodology

3.1 Selection Criteria

Selection of four conventional banks viz. Habib bank, United bank, Allied bank & Bank Alfalah and four Islamic banks viz. Meezan Bank, Albaraka bank, Bank Islami and Dubai Islamic bank is purely based on the prominent role of these banks in banking industry in Pakistan as market maker of dual banking sector.

3.2 Research Design and Data Collection

Data collected using primary data collection method. Questionnaire have adapted based on Likert scale according to Hypothesis and variables. Each variable has four questions in relation and direction of variables as depicted in the conceptual diagram of model. Primary data collection method is used using a questionnaire. The purpose of this study is to investigate the relationship between behaviour biases and bank's operation in Pakistan. For this, 350 respondents are selected randomly (male & female). In this study, the measurement tools of behavioural biases are used for research in order to get better understanding between behavioural biases and banks' operation.

3.3 Research Model

The proposed research model was developed to examine the relationship between behavioural biases and banking operations. The model is presented as:

$$Bb = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + a_7X_7 + a_8X_8 + e$$

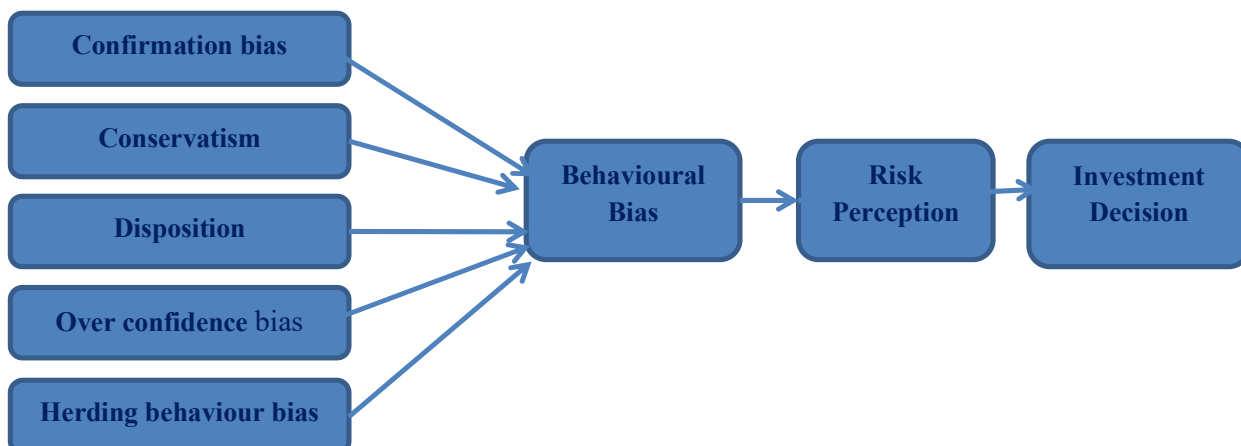
Where:

Bb = Behavioural biases, a_0 = Intercept, X_1 = Overconfidence bias, X_2 = Confirmation bias, X_3 = Anchoring bias, X_4 = Loss aversion, X_5 = Herding behaviour bias, X_6 and X_7 = Additional behavioural bias variables, a_1 to a_8 = Coefficients, and e = Error term

3.4 Conceptual Diagram of Research Model

Figure 1

Conceptual Diagram of Research Model





3.5 Measurement Instrument

Questionnaire is adapted for primary data collection regarding behaviour biases and their impact on banking operation i.e. investment decision. It consists of Confirmation Bias, Conservatism bias, Disposition effects, Over confidence bias, Herding behaviour these all are dependent variables, Behaviour Biases (Core Independent Variable), Risk Perception (Mediator), Financial Literacy (Moderator) and Investment Decision (Dependent Variable).

3.6 Data Acquisition

Data is acquired through questionnaire from 350 respondents from four conventional and four Islamic banks. questionnaires consist of questions on Confirmation Bias, Conservatism bias, Disposition effects, Over confidence bias, Herding behaviour these all are dependent variables, Behaviour Biases (Core Independent Variable), Risk Perception (Mediator), Financial Literacy (Moderator) and Investment Decision (Dependent Variable). Data run and analysed in Smart PLS Software.

3.7 Data Analysis Techniques

The collected data were analysed using partial least squares structural equation modelling (PLS-SEM) with the software used is the software Smart-PLS. Assessment of the relationship between the latent variables and observed indicators was performed using the measurement model.

Latent variables are constructs or entities that cannot be directly measured, but are inferred from observed variables. In this study, behavioural biases were treated as a latent construct which refers to overconfidence bias, confirmation bias, and other behavioural factors. Observed variables were measurable items in a questionnaire that measured each latent construct.

The measurement model indicated how the constructs were observed in the study. The reliability and validity evaluations were carried out to guarantee reliability and validity of the measurement constructs. Cronbach's alpha and composite reliability were used to evaluate the reliability of the instrument, while content validity, convergent validity and discriminant validity were used to examine the validity of the instrument.

The observed variables were further validated for the representation of the underlying latent constructs by performing Confirmatory Factor Analysis (CFA). The relationships between the constructs and indicators were interpreted with the assistance of a well-defined measurement model, and the overall model fit was assessed to ensure that the proposed relationships between constructs and indicators were supported by the collected data.

4. Results and Findings

4.1 Demographic Profile

Table 1

Demographic Profile

Category	Group	Frequency	Percentage (%)
Gender	Female	156	44.6
	Male	194	55.4
Age	18-24	8	2.3
	25-29	19	5.4
	30-34	30	8.6
	35-39	61	17.4
	40-44	93	26.6
	45-49	77	22.0
	50-54	37	10.6
	55+	25	7.1
Qualification	Bachelor	117	33.4
	Diploma	53	15.1
	High School	12	3.4
	MBA	55	15.7



Category	Group	Frequency	Percentage (%)
Profession	Master	104	29.7
	PhD	9	2.6
	Accountant	27	7.7
	Banking Professional	81	23.1
	Business Owner	20	5.7
	Financial Analyst	55	15.7
	Individual Investor	61	17.4
	Investment Advisor	44	12.6
	Other	21	6.0
	Portfolio Manager	41	11.7

4.2 Measurement Model Assessment

The measurement model was assessed through outer loadings, reliability, convergent validity, and discriminant validity. The assessment included Cronbach's alpha, composite reliability, average variance extracted (AVE), HTMT, cross loading, and VIF values.

Table 2

Outer Loading Assessment

	Behaviour Biases	Confirmation Bias	Conservatism Bias	Disposition Bias	Herding Behaviour	Investment Decision	Over Confidence Bias	Risk Perception
BB1	0.233							
BB2	0.226							
BB3	0.236							
BB4	0.240							
BB5	0.208							
CB1		0.225						
CB2		0.223						
CB3		0.237						
CB4		0.222						
CB5		0.232						
COB1			0.237					
COB2			0.219					
COB3			0.220					
COB4			0.235					
COB5			0.235					
DE1				0.239				
DE2				0.243				
DE3				0.235				
DE4				0.205				
DE5				0.217				
HB1					0.226			
HB2					0.227			
HB3					0.237			
HB4					0.219			
HB5					0.235			
ID1						0.206		
ID2						0.243		
ID3						0.218		



	Behaviour Biases	Confirmation Bias	Conservatism Bias	Disposition Bias	Herding Behaviour	Investment Decision	Over Confidence Bias	Risk Perception
ID4						0.218		
ID5						0.243		
OC1							0.229	
OC2							0.225	
OC3							0.222	
OC4							0.240	
OC5							0.197	
RP1								0.228
RP2								0.215
RP3								0.230
RP4								0.223
RP5								0.229

Table 3
Reliability and Convergent Validity Assessment

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Behaviour Biases	0.923	0.925	0.942	0.765
Confirmation Bias	0.925	0.926	0.944	0.770
Conservatism Bias	0.921	0.922	0.941	0.760
Disposition Bias	0.926	0.928	0.944	0.771
Herding Behaviour	0.923	0.923	0.942	0.764
Investment Decision	0.933	0.936	0.949	0.788
Over Confidence Bias	0.940	0.942	0.954	0.805
Risk Perception	0.934	0.934	0.950	0.791

Table 4
Discriminant Validity (HTMT Criterion)

	1	2	3	4	5	6	7	8
1. Behaviour Biases	-							
2. Confirmation Bias	0.516	-						
3. Conservatism Bias	0.527	0.487	-					
4. Disposition Bias	0.479	0.449	0.490	-				
5. Herding Behaviour	0.565	0.506	0.552	0.506	-			
6. Investment Decision	0.383	0.302	0.246	0.350	0.325	-		
7. Over Confidence Bias	0.490	0.449	0.461	0.417	0.436	0.264	-	
8. Risk Perception	0.510	0.365	0.342	0.385	0.442	0.423	0.325	-

Table 5
Collinearity Assessment (VIF)
5a. Outer Model List

	VIF		VIF
BB1	2.833	BB5	2.373
BB2	2.867	CB1	2.725
BB3	3.016	CB2	3.050
BB4	3.056	CB3	3.089



	VIF		VIF
CB4	2.383	HB5	2.594
CB5	3.312	ID1	2.866
COB1	2.537	ID2	3.351
COB2	2.781	ID3	3.243
COB3	2.786	ID4	3.131
COB4	2.700	ID5	2.899
COB5	2.857	OC1	3.232
DE1	3.263	OC2	3.711
DE2	3.204	OC3	3.030
DE3	2.451	OC4	3.690
DE4	2.592	OC5	3.281
DE5	3.296	RP1	3.414
HB1	2.650	RP2	3.378
HB2	2.877	RP3	2.818
HB3	2.925	RP4	3.005
HB4	3.175	RP5	3.181

Table 5b

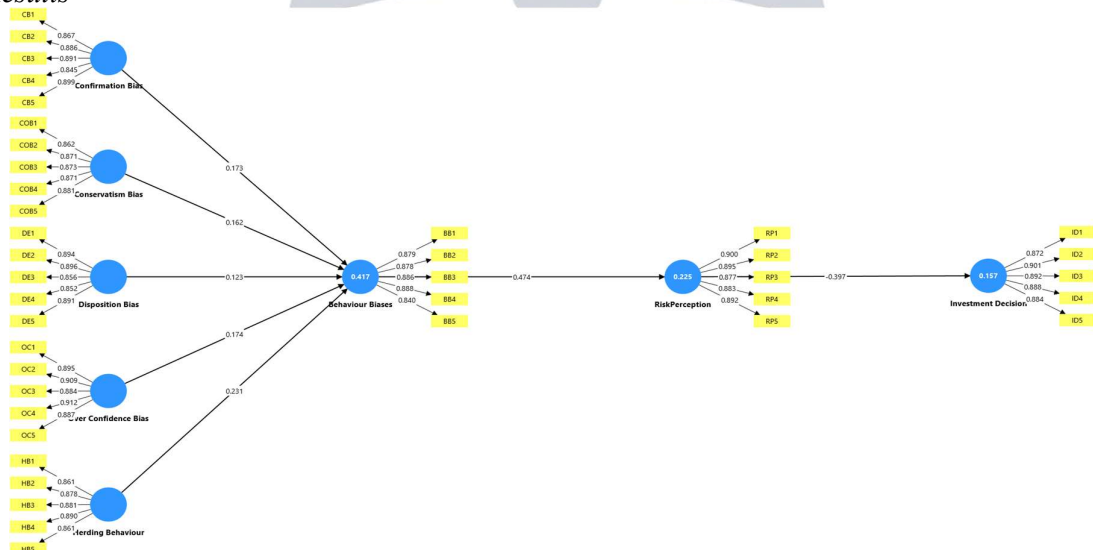
(VIF) Inner Model List

	VIF
Behaviour Biases -> Risk Perception	1.000
Confirmation Bias -> Behaviour Biases	1.497
Conservatism Bias -> Behaviour Biases	1.596
Disposition Bias -> Behaviour Biases	1.476
Herding Behaviour -> Behaviour Biases	1.620
Over Confidence Bias -> Behaviour Biases	1.400
Risk Perception -> Investment Decision	1.000

4.3 Structural Model Assessment

Figure 2

Model Results





Cross loading is the correlation of an indicator (observed variable) with more than one latent variable within a measurement model. Cross loading is used in this study to examine the discriminant validity of the constructs. Each indicator should be more closely related with its latent variable rather than any other latent variable.

Key Points About Cross Loading in the Research

1. Discriminant Validity: Cross loading is used to test if the indicators are properly related to the latent constructs. An indicator that has higher loadings on other constructs than on itself may suggest the absence of discriminant validity.

2. Interpretation of Results: The cross loading matrix in the study shows the loadings of each observed variable on each latent variable. The results should indicate that each observed variable loads the highest onto its latent variable, thus demonstrating that each variable measures what it is measuring.

Table 6

Cross Loading Assessment

	Behaviour Biases	Confirmation Bias	Conservatism Bias	Disposition Bias	Herding Behaviour	Investment Decision	Over Confidence Bias	Risk Perception
BB1	0.879	0.461	0.478	0.394	0.474	-0.293	0.437	0.378
BB2	0.878	0.431	0.404	0.399	0.474	-0.337	0.402	0.392
BB3	0.886	0.409	0.434	0.374	0.475	-0.287	0.393	0.449
BB4	0.888	0.421	0.429	0.424	0.454	-0.333	0.396	0.462
BB5	0.840	0.363	0.383	0.349	0.405	-0.308	0.373	0.389
CB1	0.415	0.867	0.358	0.359	0.401	-0.240	0.399	0.273
CB2	0.411	0.886	0.392	0.375	0.441	-0.322	0.331	0.314
CB3	0.436	0.891	0.442	0.410	0.403	-0.257	0.412	0.300
CB4	0.408	0.845	0.399	0.364	0.378	-0.190	0.364	0.297
CB5	0.427	0.899	0.384	0.321	0.428	-0.223	0.338	0.304
COB1	0.439	0.357	0.862	0.376	0.432	-0.206	0.347	0.298
COB2	0.406	0.376	0.871	0.404	0.421	-0.182	0.382	0.264
COB3	0.408	0.410	0.873	0.431	0.465	-0.195	0.392	0.255
COB4	0.435	0.387	0.871	0.374	0.473	-0.227	0.362	0.294
COB5	0.435	0.433	0.881	0.389	0.423	-0.190	0.386	0.269
DE1	0.408	0.371	0.411	0.894	0.418	-0.285	0.343	0.339
DE2	0.415	0.420	0.397	0.896	0.434	-0.269	0.364	0.315
DE3	0.401	0.343	0.401	0.856	0.443	-0.296	0.361	0.315
DE4	0.351	0.313	0.394	0.852	0.372	-0.270	0.305	0.314
DE5	0.370	0.376	0.381	0.891	0.389	-0.307	0.333	0.289
HB1	0.450	0.370	0.442	0.408	0.861	-0.258	0.285	0.342
HB2	0.454	0.446	0.420	0.442	0.878	-0.292	0.348	0.352
HB3	0.472	0.401	0.408	0.428	0.881	-0.265	0.381	0.435
HB4	0.437	0.437	0.500	0.385	0.890	-0.256	0.404	0.313
HB5	0.469	0.391	0.453	0.389	0.861	-0.251	0.361	0.350
ID1	-0.287	-0.262	-0.175	-0.300	-0.270	0.872	-0.224	-0.320
ID2	-0.349	-0.260	-0.209	-0.307	-0.286	0.901	-0.237	-0.377
ID3	-0.308	-0.249	-0.204	-0.274	-0.226	0.892	-0.233	-0.339
ID4	-0.291	-0.235	-0.201	-0.286	-0.264	0.888	-0.187	-0.339
ID5	-0.338	-0.240	-0.226	-0.275	-0.292	0.884	-0.220	-0.378
OC1	0.421	0.354	0.365	0.321	0.341	-0.193	0.895	0.274
OC2	0.413	0.414	0.422	0.385	0.369	-0.257	0.909	0.305
OC3	0.409	0.371	0.394	0.354	0.387	-0.248	0.884	0.266



	Behaviour Biases	Confirmation Bias	Conservatism Bias	Disposition Bias	Herding Behaviour	Investment Decision	Over Confidence Bias	Risk Perception
OC4	0.441	0.409	0.374	0.345	0.398	-0.241	0.912	0.281
OC5	0.363	0.332	0.367	0.344	0.326	-0.170	0.887	0.238
RP1	0.436	0.282	0.263	0.312	0.332	-0.346	0.289	0.900
RP2	0.397	0.322	0.277	0.311	0.378	-0.343	0.280	0.895
RP3	0.444	0.334	0.297	0.330	0.379	-0.346	0.264	0.877
RP4	0.413	0.274	0.281	0.307	0.388	-0.356	0.280	0.883
RP5	0.417	0.295	0.292	0.333	0.352	-0.371	0.244	0.892

4.4 Reliability and Validity Assessment

Table 7

Reliability and Validity

	Cronbach's alpha	Composite reliability (rho a)	Composite reliability (rho c)	Average variance extracted (AVE)
Behaviour Biases	0.923	0.925	0.942	0.765
Confirmation Bias	0.925	0.926	0.944	0.770
Conservatism Bias	0.921	0.922	0.941	0.760
Disposition Bias	0.926	0.928	0.944	0.771
Herding Behaviour	0.923	0.923	0.942	0.764
Investment Decision	0.933	0.936	0.949	0.788
Over Confidence Bias	0.940	0.942	0.954	0.805
Risk Perception	0.934	0.934	0.950	0.791

4.5 Structural Model Results

Figure 3

Measurement Model

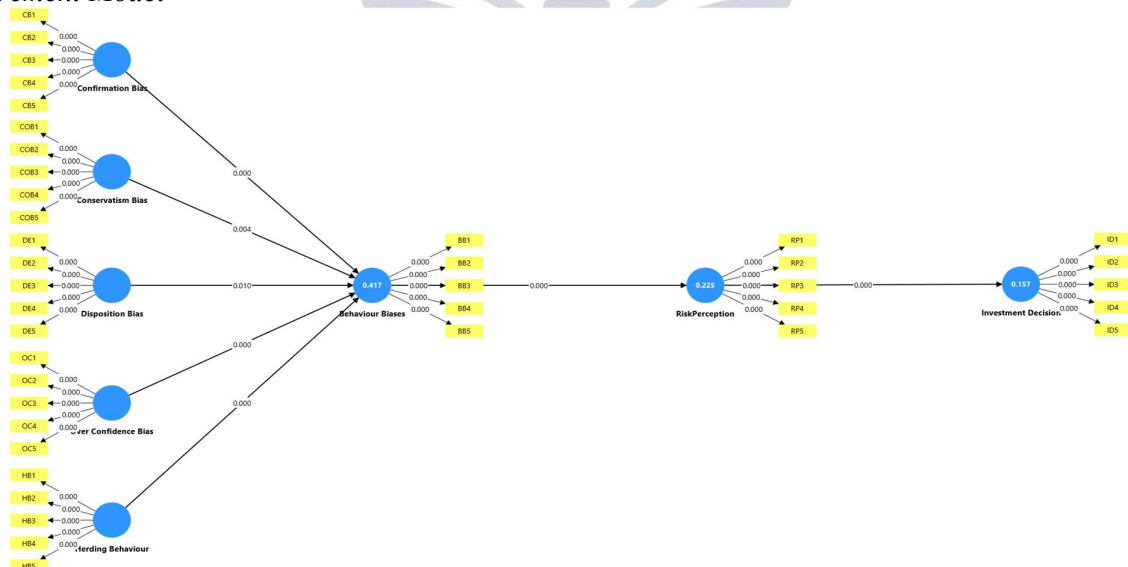




Table 8

Path Coefficients

	Path coefficients
Behaviour Biases -> Risk Perception	0.474
Confirmation Bias -> Behaviour Biases	0.173
Conservatism Bias -> Behaviour Biases	0.162
Disposition Bias -> Behaviour Biases	0.123
Herding Behaviour -> Behaviour Biases	0.231
Over Confidence Bias -> Behaviour Biases	0.174
Risk Perception -> Investment Decision	-0.397

Table 9

R-Square

	R-square	R-square adjusted
Behaviour Biases	0.417	0.408
Investment Decision	0.157	0.155
Risk Perception	0.225	0.223

Table 10

Total Indirect Effect

	Total indirect effects
Behaviour Biases -> Investment Decision	-0.188
Confirmation Bias -> Investment Decision	-0.032
Confirmation Bias -> Risk Perception	0.082
Conservatism Bias -> Investment Decision	-0.031
Conservatism Bias -> Risk Perception	0.077
Disposition Bias -> Investment Decision	-0.023
Disposition Bias -> Risk Perception	0.058
Herding Behaviour -> Investment Decision	-0.043
Herding Behaviour -> Risk Perception	0.109
Over Confidence Bias -> Investment Decision	-0.033
Over Confidence Bias -> Risk Perception	0.082

Table 11

Outer Loading

	Outer loadings		Outer loadings
BB1 <- Behaviour Biases	0.879	COB2 <- Conservatism Bias	0.871
BB2 <- Behaviour Biases	0.878	COB3 <- Conservatism Bias	0.873
BB3 <- Behaviour Biases	0.886	COB4 <- Conservatism Bias	0.871
BB4 <- Behaviour Biases	0.888	COB5 <- Conservatism Bias	0.881
BB5 <- Behaviour Biases	0.840	DE1 <- Disposition Bias	0.894
CB1 <- Confirmation Bias	0.867	DE2 <- Disposition Bias	0.896
CB2 <- Confirmation Bias	0.886	DE3 <- Disposition Bias	0.856
CB3 <- Confirmation Bias	0.891	DE4 <- Disposition Bias	0.852
CB4 <- Confirmation Bias	0.845	DE5 <- Disposition Bias	0.891
CB5 <- Confirmation Bias	0.899	HB1 <- Herding Behaviour	0.861
COB1 <- Conservatism Bias	0.862	HB2 <- Herding Behaviour	0.878



	Outer loadings		Outer loadings
HB3 <- Herding Behaviour	0.881	OC3 <- Over Confidence Bias	0.884
HB4 <- Herding Behaviour	0.890	OC4 <- Over Confidence Bias	0.912
HB5 <- Herding Behaviour	0.861	OC5 <- Over Confidence Bias	0.887
ID1 <- Investment Decision	0.872	RP1 <- Risk Perception	0.900
ID2 <- Investment Decision	0.901	RP2 <- Risk Perception	0.895
ID3 <- Investment Decision	0.892	RP3 <- Risk Perception	0.877
ID4 <- Investment Decision	0.888	RP4 <- Risk Perception	0.883
ID5 <- Investment Decision	0.884	RP5 <- Risk Perception	0.892
OC1 <- Over Confidence Bias	0.895		
OC2 <- Over Confidence Bias	0.909		

Table 12

Path Coefficient - Mean, Standard Deviation, T-Values, P Values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Behaviour Biases -> Risk Perception	0.474	0.474	0.045	10.624	0.000
Confirmation Bias -> Behaviour Biases	0.173	0.171	0.047	3.673	0.000
Conservatism Bias -> Behaviour Biases	0.162	0.162	0.057	2.873	0.004
Disposition Bias -> Behaviour Biases	0.123	0.123	0.047	2.591	0.010
Herding Behaviour -> Behaviour Biases	0.231	0.232	0.051	4.510	0.000
Over Confidence Bias -> Behaviour Biases	0.174	0.175	0.046	3.790	0.000
Risk Perception -> Investment Decision	-0.397	-0.398	0.042	9.351	0.000

Table 13

Path Coefficient - Confidence Interval

	Original sample (O)	Sample mean (M)	2.5%	97.5%
Behaviour Biases -> Risk Perception	0.474	0.474	0.382	0.557
Confirmation Bias -> Behaviour Biases	0.173	0.171	0.078	0.261
Conservatism Bias -> Behaviour Biases	0.162	0.162	0.052	0.270
Disposition Bias -> Behaviour Biases	0.123	0.123	0.029	0.215
Herding Behaviour -> Behaviour Biases	0.231	0.232	0.132	0.332
Over Confidence Bias -> Behaviour Biases	0.174	0.175	0.086	0.265
Risk Perception -> Investment Decision	-0.397	-0.398	-0.478	-0.311

Table 14

Total Indirect Effect - Mean, Standard Deviation, T-Values, P Values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Behaviour Biases -> Investment Decision	-0.188	-0.189	0.030	6.225	0.000
Confirmation Bias -> Investment Decision	-0.032	-0.032	0.010	3.133	0.002
Confirmation Bias -> Risk Perception	0.082	0.081	0.023	3.498	0.000
Conservatism Bias -> Investment Decision	-0.031	-0.031	0.012	2.494	0.013
Conservatism Bias -> Risk Perception	0.077	0.077	0.028	2.757	0.006
Disposition Bias -> Investment Decision	-0.023	-0.023	0.010	2.265	0.024



	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
Disposition Bias -> RiskPerception	0.058	0.058	0.024	2.467	0.014
Herding Behaviour -> Investment Decision	-0.043	-0.044	0.012	3.617	0.000
Herding Behaviour -> RiskPerception	0.109	0.110	0.027	4.096	0.000
Over Confidence Bias -> Investment Decision	-0.033	-0.033	0.010	3.225	0.001
Over Confidence Bias -> RiskPerception	0.082	0.083	0.024	3.499	0.000

Table 15

Total Direct Effect - Confidence Interval

	Original sample (O)	Sample mean (M)	2.5%	97.5%
Behaviour Biases -> Investment Decision	-0.357	-0.359	-0.448	-0.268
Confirmation Bias -> Behaviour Biases	0.173	0.171	0.079	0.262
Confirmation Bias -> Investment Decision	-0.062	-0.061	-0.100	-0.027
Conservatism Bias -> Behaviour Biases	0.162	0.162	0.052	0.269
Conservatism Bias -> Investment Decision	-0.058	-0.058	-0.101	-0.018
Disposition Bias -> Behaviour Biases	0.123	0.123	0.029	0.215
Disposition Bias -> Investment Decision	-0.044	-0.045	-0.084	-0.010
Herding Behaviour -> Behaviour Biases	0.231	0.232	0.132	0.331
Herding Behaviour -> Investment Decision	-0.082	-0.083	-0.129	-0.044
Over Confidence Bias -> Behaviour Biases	0.174	0.176	0.086	0.265
Over Confidence Bias -> Investment Decision	-0.062	-0.063	-0.102	-0.029

5. Discussion

5.1 Understanding Behavioural Biases and Contribution of the Study

The study contributes to the understanding of the impact of different behavioural biases (e.g., overconfidence, confirmation bias, conservatism, herding behaviour and loss aversion) on decision-making in the banking sector. This contributes to the growing body of literature on behavioural finance by providing empirical evidence specific to the context of Pakistani banks (Mahmood et al., 2024; Jain et al., 2021; Gabhane et al., 2023).

This research is part of a growing literature on the effects of behavioural biases on dual banking operations. The study highlights the role of psychological factors in influencing financial decisions and banking behaviour in Pakistan, offering insights into the influence of behavioural biases on financial choices and banking-related behaviours (Musse et al., 2015; Din et al., 2021). The results of the study could help customers to make better informed decisions about their banking institutions and whether they want to choose or avoid them, depending on their behavioural preferences and decisions (Peria & Schmukler, 2001; Bhatia et al., 2020). Moreover, the study's recommendations are useful for customers and banking stakeholders to better grasp how behavioural factors play a role in financial decisions (Risman, 2024; Sumani et al., 2022). The study also fills a gap in the literature by providing empirical evidence of the effect of behavioural biases on the functions of banking in the context of Pakistan (Gupta et al., 2021; Ranjan, 2025).

The study, entitled "Behavioural Biases and Their Impact on Banks' Operations: A Case Study of Pakistan", made important contributions to the fields of behavioural finance and banking operations as it helped in understanding the relationship between behavioural factors and financial decision making processes (Atif et al., 2020; Mahmood et al., 2024). It provides practical implications for banking institutions, customers, and policymakers by highlighting the importance of considering behavioural aspects in developing effective banking strategies and improving operational decision-making (Breuer & Perst, 2006; Van Hoose, 2007).

5.2 Implications for Banking Operations and Policy



The study investigates how the behavioural biases affect the operational performance of banks, which in turn can offer information on the impact of behavioural biases on risk management, lending activities, and investment decisions of the Conventional and Islamic banks. This information can inform banks of ways to counter the impact of these biases.

The results can assist the policymakers and regulators in the understanding of the psychological determinant affecting banking activity. This knowledge can be used to develop policies which can encourage more rational decision making and improved regulatory policies within the banking sector.

5.3 Methodological and Practical Implications

The research method for this study is a quantitative method with the data collection technique in the form of a questionnaire and data analysis technique in the form of regression analysis. This methodological approach can be used as a model for further research studies in the field of behavioural finance and banking in other settings or geographical areas.

The study's results can be used by banking professionals to improve their decision-making processes. An awareness of these biases can be useful in designing the training of bank personnel to be aware of and overcome them in their work.

5.4 Future Research Directions

The research provides a foundation for future investigations of behavioural finance in banking, and offers a framework for more research into the role of psychological factors in financial decision making in other settings. It provides opportunities for longitudinal studies or comparative studies across countries and/or banking systems.

6. Conclusion

In conclusion, the study on behavioural biases and their effects on bank operations in Pakistan underline the critical impact of psychological biases on decision making in financial institutions. The study notes that biases like overconfidence, loss aversion and herd behaviour influence investor decision making, trends and strategies in the markets and in banking operations.

Knowledge of these biases enables banks to create better risk management processes, improve their customer engagement approaches, and offer training initiatives that help to reduce the impact of these biases on the decision-making process. Moreover, this study highlights the importance of the formulation of policies based on behavioural sciences when addressing banking practices. Finally, tackling these behavioural biases can result in better financial stability and a stronger banking system in Pakistan.

7. Recommendations

Based on the findings of the analysis of behavioural biases' impact on bank operations in Pakistan, the following recommendations are proposed:

Enhanced Training Programs:

Provide behavioural biases training to staff in banks. That will enable staff to make better choices and limit the impact of their biases in their daily work.

Behavioural Finance Workshops:

Conduct workshops with clients and stakeholders on typical investor mistakes in financial decision-making. This can provide customers with the ability to make informed investment decisions and improve their financial knowledge.

Data-Driven Decision Making:

Promote banks to use data analytics tools to assist pattern identification influenced by behavioural bias. Banks can make use of big data to gain insights into customer behaviour and adjust their offerings as needed.

Policy Formulation:

Propose that policy makers incorporate behavioural facts into their policy-making process. This may include developing guidelines to guide banks in developing financial products that are consumer-friendly and mitigates common biases, in both the interests of consumers and financial stability.

Feedback Mechanisms:



Introduce feedback mechanism so that customers can give their feedback and perception about banking services. This can be helpful in understanding the nature of behavioural biases in customer interactions and inform banks on how to enhance their products and services.

Author Contributions

All authors participated in ideation, development, and writing the manuscript. All authors read and approved the final manuscript.

Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this article.

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Informed consent was obtained from all participants.

Data Availability

The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

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