

**The Effect Of Behavioural Biases On The University Budget
Estimates: Evidence From Public Sector Universities Of Pakistan**

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Abstract

This study examines how behavioural biases affect budgeting estimates in the public sector universities. Traditional models of budgeting assume that financial decision-makers are rational and they make their decisions based on objective financial data. Still, the experience of Behavioural Finance and Organizational Budgeting showed that decision-makers are often exposed to cognitive and affective biases which can mislead the financial judgment. This study, therefore, analyses how these behavioural biases influence the budgeting that are carried out by the university administrators and financial managers charged with the responsibility of planning and distributing the institutional resources in Public Sector Universities. A random sample of 439 treasurer and budget officers' data collected through structure questionnaire. This study focused on salient cognitive biases (Anchoring, Overconfidence, and Confirmation Bias), and affective biases (Loss Aversion and Status Quo Bias). The results highlighted the importance of the fact that behavioural biases significantly deteriorate the budget estimates and promote resources misallocation, budgetary slack, and operational inefficiencies. These distortions eventually put the financial performance and long term sustainability of the public sector universities at risk. This research adds value to the knowledge on the financial decision-making in institutions of higher learning by including the behavioural-based aspects in the study of institutional budgeting.

Keywords: Behavioural Biases, Behavioural Finance, Budgeting Performance, Financial Performance, Public Sector Universities, Anchoring Bias, Overconfidence Bias, Loss Aversion.

Introduction

The nature of budgeting in universities cannot be perceived in the simplest way of balancing revenues and expenditure as a technical process. Instead, it is a complicated organisational process, which is conditioned by behavioural, psychological and institutional factors, such as managerial judgment, organisational culture, incentive systems and power relations. The classical theory of public finance presupposes that the decision-makers are rational and use resources efficiently on the basis of objective

analysis, effective forecasts, and clear institutional priorities. Recent studies in management accounting and behavioural finance have however questioned this assumption by showing that these limitations and forces of social relations often influence decision-making in organisations. (Birnberg, Luft, & Shields, 2006; Libby & Luft, 1993; Merchant & Van der Stede, 2007).

The behavioural theory of a firm was developed by Cyert and March (1963) according to which organisational decisions are determined by limited rationality, internal bargaining and satisficing behaviour instead of maximisation. In this context, organisations are perceived to be acting in the context of uncertainty and lack of information, and this forces decision-makers to implement solutions that are satisfactory and not the best. Similar sentiments were expressed by Argyris (1952), who showed that budgeting systems may create defensive behaviour, interpersonal tension as well as intentional budgetary slack as individuals feel compelled to meet performance targets. This has been supported by other studies which have been published in the management accounting journals and which have indicated that organisational politics, managerial incentives, and social dynamics have a significant impact on budgeting practices and outcomes (Hopwood, 1972); (Covaleski, Evans III, Luft, & Shields, 2003) (Shields & Shields, 1998).

The findings of the behavioural finance studies also support the claim that financial judgements are influenced by cognitive biases and heuristics. Mental shortcuts are often simplified decisions that decision-makers use in the process of making complex financial decisions. According to Prospect Theory, developed by (Kahneman & Tversky, 1979), people are loss-averse and consider the results in reference points in comparison to the final outcomes, instead of considering the actual outcomes. The empirical evidence published in the most reputable finance journals shows that overconfidence bias, anchoring bias, and status-quo bias are some of the biases that significantly affect the financial judgment ((Barber & Odean, 2001; Tversky & Kahneman, 1974). Notably, these biases do not apply to inexperienced people only; even experienced financial professionals can be subject to psychological distortions in their decision-making process (Henseler, Ringle, & Sarstedt, 2015).

The behavioural patterns are especially relevant to the public sector budgeting, where the incremental decision-making process often rules the allocation process. Empirical studies on the subject of public administration show consistent linkage of past budgetary allocations with the present day decision making, making it more inclined towards the incremental change instead of a complete review of priorities (Davis & Dempster, 2018; Wildavsky, 1964). This effect is directly connected to anchoring behaviour when the past levels of spending are used as benchmarks to make new allocations. Incremental budgeting is further supported by political factors, ambiguity, and risk-averse behaviour among administrators ((Jones, Baumgartner, & True, 1998; Rubin, 2019).

Financial constraints and volatile funding conditions tend to compound these behavioural and institutional processes in developing countries. Pakistani universities are heavily reliant on government funding which has brought so much uncertainty in the financial planning process of the universities. The scarcity of resources can also

increase the loss aversion levels of university administrators making them unwilling to lower the salaries of the staff or abandon underperforming academic programmes. In addition, the uncertainty over the government support encourages conservative and incremental budgeting. A certain degree of informal power relations, lobbying, and institutional politics can also play a role in resource allocation, with or without the objective performance criteria ((Johnstone, 2004; Marginson, 2016; Salmi, 2009).

The rational economic model, therefore, cannot provide a satisfactory explanation of budgeting practices in universities. Rather, budgeting is better perceived as a decision-making process that is socially constructed and determined by cognitive limitations, emotional reactions, political bargaining, and organisational culture. The behavioural finance and management accounting literature suggests that the transparency, efficiency, and effectiveness of budgeting systems may be significantly affected by these psychological and institutional factors, particularly in the situation where the financial scarcity and institutional complexity are the defining features ((Birnberg et al., 2006; Covaleski et al., 2003; Henseler et al., 2015; Rubin, 2019).

The status-quo bias defines the tendency to prefer the status quo and avoid radical changes, even though other solutions are likely to produce a better result. In the context of university budgeting in the government, the heads of departments often strive to maintain the levels of antecedent budgets instead of rethinking the fiscal needs based on the changing institutional priorities or performance measures. Such a tendency is frequently driven by a wish to preclude administrative opposition, political opposition or inter-departmental tensions that might arise due to significant resource redistribution. As a result, inefficient or poor performing programmes can continue to be funded with little explanation. This behaviour is a cause of organisational inertia and limits financial innovation or structural reform in budgeting systems. Empirical research on the topic of public administration and behavioural decision-making reveals that the status-quo bias may significantly limit organisational flexibility and reduce the ability to embrace more effective financial management behaviours (Kahneman, Knetsch, & Thaler, 1991; Samuelson & Zeckhauser, 1988).

The anchoring bias is closely related to incremental budgeting paradigm where previous budget allocations are used as a benchmark in making future financial plans. Under this strategy, the decision-makers use historical financial information extensively and usually make only small modifications instead of making a significant review of the organisational needs or strategic priorities. The use of incremental budgeting is quite common in the higher-education sector in the public sector since it provides the stability of administration and reduces uncertainty in situations when government funding is not predictable. However, the use of historic budgetary values may restrain objective analysis of the programme effectiveness and hinder re-allocations to new academic priorities. Budgeting systems can create a trap of continuity of inefficiencies and reduce institutional flexibility, by basing decisions on previous allocations. Empirical studies of the public budgeting process and behavioural decision-making show that the use of historical anchors is more likely to increase the incidence of incremental forms of decision-making and mitigate the sensitivity and efficiency of financial management systems (Tversky & Kahneman, 1974) (Yousif Alhasnawi et al., 2024).

Optimism bias refers to the systematic error of people to have a higher estimation of the likelihood of a good event happening and at the same time underestimates the likelihood of risks and uncertainties. When it comes to university budgeting, top-level managers can create over-roses predictions about the number of students that are going to enroll, the amount of government funding or even external research grants. These expectations may trigger ambitious financial strategies, including a decision to invest in an infrastructural buildup, an academic programme expansion, or a long-term strategic project without a thorough assessment of the risks that accompany the financial plans. Empirical research shows that such bias can make organisations pursue excessively aggressive financial policies that can compromise long-term financial sustainability ((Lovallo & Kahneman, 2003);(Shefrin, 2007) (Ali, Liu, Alomair, & Alomair, 2026) Khalid and Riaz, 2025).

The psychological predisposition to perceive potential losses as just as salient, or more so, than equivalent gains is called loss aversion. This bias, in the budgeting environment of universities, may be in the form of a strong resistance to budget reduction, staff restructuring, or an amalgamation of departments. The decision-makers can be focused on maintaining the existing financial resources- especially the salaries and operational costs, rather than on the redistribution of funds to the area of research and development, technological development, or academic reform. This kind of aversion to financial losses could hamper requisite institutional reorganization, and reduce the effectiveness of financial management practices. It is always shown in the literature of behavioural finance that the loss aversion has a substantive effect on the financial decision-making and risk-management behaviour in organisations (Ali et al., 2026). The modern literature on budgeting in the public sector highlights that the political and institutional power often intervene in financial decision-making and accountability systems (GHARIB, Isa, SALEH, & TAJUDIN, 2024; Javaid, Farooq, & Iqbal, 2025). Recent behavioural finance empirical studies confirm that overconfidence bias significantly affects financial decision-making and managerial investment behaviour (Khalid and Riaz 2025).

Although behavioural economics has been recognised in recent years as a key theoretical lens to understand financial decision-making, research on public sector budgeting has largely relied on traditional rational models that are based on the assumption that financial managers are objective and impartial in their decision-making. Nonetheless, behavioural theories assume that decision makers are often subject to cognitive biases (overconfidence, anchoring, loss aversion, mental accounting) that in turn distort financial judgements and create erroneous forecasts combined with inefficient resource allocation ((Kahneman & Tversky, 1979; Thaler, 1999). Empirical research on behavioural biases has grown in the areas involving financial and investment choices; however, the body of existing literature will be focused on the capital markets and investor behaviour, and there is little consideration of organisational budgeting processes (Abideen, Ahmed, Qiu, & Zhao, 2023). Emerging scholarship increasingly emphasises the relevance of behavioural perspectives in budgeting situations: a good example of the high influence of cognitive biases on financial forecasting and precision in budgeting, and in particular the impact of

anchoring phenomena and judgement heuristics (Judijanto, 2025). Parallel evidence in the domain of public administration confirms that biases (e.g. anchoring, availability, mental accounting) can inform budgetary preferences and lead to distorted resource allocation decisions among public officials (Overmans & Grimmelikhuijsen, 2025). Systematic reviews also argue that public budgeting research on psychological aspects is rarely carried out, and there is a need for more empirical studies (Overmans, 2024). Notwithstanding these incipient contributions, empirical investigations into behavioural biases within institutional budgeting in the case of higher education are limited. The deficiency is highlighted in developing countries, where universities in the public sector are faced with low resources and complex bureaucratic organisations, which may increase the effects of behavioural factors on financial decision-making. Accordingly, the present research attempts to fill this lacuna by analysing the role of behavioural biases on budget estimates in Pakistani public universities by taking an advance on the scholarship of behavioural finance and behavioural public administration in the domain of higher education budgeting.

1 Theoretical Underpinning.

1.1 Prospect Theory:

Prospect Theory explains how people make judgments in regards to possible profits and losses in uncertain situations. According to the theory, the decision-makers set undue emphasis on losses as compared to equal gains thus creating loss aversion and risk-averse behaviour in the process of making decisions on potential gains. In university budgeting scenarios, administrators often oppose redistribution of funds away out of existing programmes since the apparent loss of resources is psycho-emotional more prominent than the potential rewards of the new investments. This means that the inefficient programmes might continue to enjoy financial resources thus leading to poor resource allocation and low institutional financial performance. Recent empirical studies reveal that behavioural biases have a significant impact on financial decision-making through the subjective risk perception process and cognitive evaluation process, which supports the suitability of the Prospect Theory in explaining financial decision-making in organisations (Khan & Butt, 2024).

1.2 Bounded Rationality Theory:

Bounded Rationality argues that decision-makers work within cognitive limitations, incomplete information and time constraints and these factors make it difficult to find completely rational solutions. People often use simplified decision rules or heuristics as opposed to finding the best alternatives globally so that they can achieve satisfactory results. The administrators in the university budgeting context are faced with the challenge of evaluating multifaceted financial information involving various stakeholders, ambiguous sources of funding, and conflicting institutional interests. Such constraints require decision-makers to use a heuristic like incremental budgeting or use of the previous budget as the anchor. These practices can make the budgeting process smoother but at the same time strengthen the inefficiencies that are already present and hinder strategic financial planning. Recent research stresses the fact that

bounded rationality continues to be an important explanatory model that helps to explain the behavioural patterns that are evident in the budgeting and public financial management systems (Giarlotta & Petralia, 2024).

1.3 Theory of Behavioural Public Finance and Budgeting:

Behavioural public finance is a discipline that brings together psychological and economical knowledge to explain how cognitive biases influence government and organisational financial decision-making. This school of thought disputes classical models of public finance based on rational decision making and instead acknowledges that budgetary results are often shaped by some bias like anchoring, overconfidence, and the optimism bias. The theory of behavioural budgeting explains why the administrators of public universities may cling to the previous financial allocations, be too optimistic about the future revenues, or be reluctant to make budget cuts. Such behavioural predispositions may lead to long term budgetary inefficiencies and perverted financial planning. The recent research on the topic of public budgeting highlights the growing significance of behavioural approaches to the understanding of financial governance and the distribution of resources in public organisations ((GHARIB et al., 2024).

1.4 Budgetary Financial Implications to University

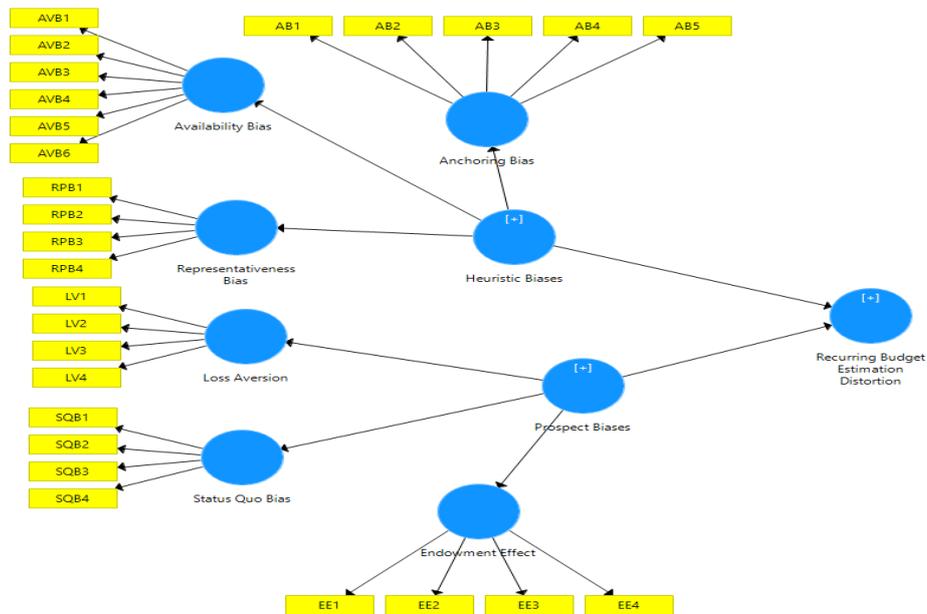
A combination of these behaviour theories provides a full picture of psychological factors that are involved in making financial decisions in institutions of higher learning. Prospect Theory explains loss-averse behaviour and the opposition to budget reductions; bounded rationality explains reliance on simplified decision rules; mental accounting explains the inflexibility of budget categories; and the Theory of Planned Behaviour explains the influence of social norms and institutional pressures. All these behavioural mechanisms have the potential to result in inefficient allocation of resources, incremental budgeting, reduced financial flexibility, and budgetary distortions within the universities of the public sector. The studies of budgeting psychology also indicate that cognitive biases may have a significant impact on the quality of the financial decision and the overall effectiveness of financial management systems.

1.5 Theoretical framework

The theoretical framework of this study is grounded in the behavioral finance theory with a focus on heuristic theory and the prospect theory which explains the nature of cognitive biases in financial decision-making. Conventional budgeting models assume decision makers are rational and make calculations based on all information. In contrast, behavioral scholars have argued that people commonly use mental shortcuts or are victims of psychological biases in making financial judgments, particularly when they are under conditions of uncertainty and time pressure (Tversky & Kahneman, 1974). Within the area of university budgeting, such behavioral tendencies may influence the manner in which budget officers value recurring expenditures, and thereby may contribute to establishing distortions in recurrent budget estimates. Accordingly, the current framework examines the impacts of two main categories of behavioral biases

on budgeting decisions, heuristic biases and prospect biases, and on estimate precision. Heuristic biases are characterized by people simplifying complex decision-making processes by using cognitive shortcuts instead of engaging in systematic analysis. The heuristics and biases theory suggests that people tend to rely on easily available information or initial reference points or perceived similarities in making judgements (Tversky & Kahneman, 1974). In budgeting situations, the availability effect occurs when decision makers reference recent or readily available financial information rather than comprehensive historical data. Anchoring bias occurs when budget estimators put excessive weight on past year's budgets or starting figures as reference points, even when current situations require adjusting. Likewise, representativeness bias forces decision makers to assume that the future of the financial outcome will reflect past trends without proper analytical analysis. Collectively, these biases are referred to as heuristic biases and can affect financial estimations and lead to inaccuracies in regularly budget projections. In addition to heuristic biases, the framework also incorporates prospect theory, which describes the way people consider gains and losses in making financial decisions (Kahneman & Tversky, 1979; Tversky & Kahneman, 1974). According to prospect theory, people tend to be more sensitive to losses than gains and tend to avoid risks that might lead to negative outcomes. Loss aversion, as part of budgeting practices, may lead financial managers to overspend on budget requirements for the sake of avoiding the possibility of shortages in the future. Status quo bias may lead decision makers to maintain previous budget allocations without seeking a critical evaluation of the need for any modification. Similarly, the endowment effect suggests that people tend to overvalue resources that are already controlled by them and may therefore motivate departments to justify retaining or increasing existing budget allocations. These biases together make up prospect biases, which may bias the way financial officers conduct financial budgeting evaluations and may cause distortions in the recurring budget estimations.

Based on these theoretical perspectives, the proposed framework relies on the notion that heuristic biases and prospect biases cause recurrent distortion of budget estimation in institutional budgeting processes. When budget preparers use cognitive short cuts or are influenced by psychological perceptions of gains and losses, their financial estimates may stray from objective requirements. Consequently, behavioral biases can be an important factor in the determination of budgets in public sector institutions, especially universities where recurrent budgets are often based on the previous allocation and managerial judgment. This framework thus incorporates the knowledge gained from behavioral finance and decision making theory to provide evidence to great extent the affect of cognitive and psychological biases in the accuracy of recurring budget estimates.



H1: Heuristic biases have a significant effect on recurring budget estimation distortion.
H2: Prospect biases have a significant effect on recurring budget estimation distortion.

2 Research Methodology

The research methodology section provides a detailed description of the study population, sample size, data collection process, and data analysis methods and thus outlines systematic and empirical approaches that will be used to respond to the research questions. Furthermore, it presents the rationale of the choice of each methodological aspect and evaluates whether similar techniques were used in previous similar studies.

2.1 Research Design

This study uses a quantitative research design to address the impact of behavioral biases on repeated budget estimation distortion in public sector universities. A structured questionnaire was used to gather primary data from financial decision-makers involved in financial budgeting processes. The quantitative approach is suitable as it enables empirical investigation of the existence of the theoretical relationships between behavioral biases and budgeting outcomes using statistical modelling (J. F. Hair, Risher, Sarstedt, & Ringle, 2019).

2.2 Population and Sample

The population of the study consists of 153 public sector universities in Pakistan where budgeting and financial planning activities are done through the creation of designated financial authorities. The target respondents include university budget handlers, treasurers, financial management practitioners and budget officers as these are the

individuals who are directly responsible for the preparation, review and implementation of institutional budget estimates. Using a survey approach, a total of 434 responses were obtained from these financial decision-makers from the selected universities. This sample size is considered adequate for structural equation modelling and behavioral research as recommended in empirical studies dealing with latent constructs (Kline, 2016).

Table 1

Province/Region	Public Sector Universities
Punjab	57
Sindh	44
Khyber Pakhtunkhwa (KPK)	26
Islamabad Capital Territory (ICT)	15
Baluchistan	6
Azad Jammu & Kashmir (AJK)	4
Gilgit-Baltistan (GB)	1
Total	153

2.3 Data Collection Procedure

Primary data were obtained using a structured questionnaire to measure the constructs that were included in conceptual framework. The questionnaire had several sections that measured various behavioral biases and an outcome measure. The constructs were anchoring bias, availability bias, representativeness bias, loss aversion, status quo bias, endowment effect, heuristic biases, prospect biases, recurring budget estimation distortion. Multiple indicators adapted from the behavioral finance and decision making literature were used to measure each construct to ensure content validity. The questionnaire items were measured on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) which is commonly used in behavioral and organizational research. The questionnaire was distributed to the respondents using the electronic and direct survey methods and the respondents were the finance professionals working in the budgeting and financial management department of the public sector universities. Confidentiality was assured to respondents to encourage honest and unbiased responses.

2.4 Measurement of Variables

The study focused on two higher-order constructs namely heuristic biases and prospect biases. Heuristic biases such as anchoring bias, availability bias, and representativeness bias represent cognitive shortcuts used by decision-maker(s) for the budget estimation processes. Prospect biases are loss aversion, status quo bias and the endowment effect, which are behavioral tendencies relating to risk perception and value appraisal. The dependent variable, recurring budget estimation distortion, reflects the degree of behavioral circumstances leading to systematic inaccuracies in university budget estimates.

2.5 Data Analysis Technique

To analyze the relationships between the constructs, the researcher uses Hierarchical Component Modelling (HCM) in the framework of Partial Least Squares Structural Equation Modelling (PLS-SEM). HCM is suitable for this research as the conceptual framework contains higher order constructs which are made up of lower order dimensions (i.e. heuristic biases and prospect biases), which are themselves made up of lower order dimensions which are also made up of lower order dimensions. This approach allows for simultaneous examination of relationships between the higher-order constructs and their respective indicators and account for measurement error (Hair et al., 2019). The analysis is based on a two stage procedure. In the first stage, measurement model is evaluated to examine reliability and validity of the constructs through the help of indicators, such as factor loadings, composite reliability, Cronbach's alpha, and average variance extracted (AVE). In second stage, the structural model is tested for evaluating - hypothesised relationships between behavioral biases and recurring budget estimation distortion. Path coefficients, significance levels and the explanatory power (R2 values) are used for identifying the strength and significance of the relationships.

2.6 Ethical Considerations

The study was done with participation as voluntary, and the respondents were made aware of the academic purpose of the research. The confidentiality and anonymity of the participants have been maintained throughout the data collection and analysis process.

3 Results and Discussions

This section consists of the empirical research results of the study and the discussion of the results concerning the postulated hypotheses and the available literature. The Hierarchical Component Modeling (HCM) under the Partial Least Squares Structural Equation Modeling (PLS-SEM) framework was used to analyze the impact of behavioral biases on recurrent distortion of budget estimation in the Pakistani universities of the public sector. After the preferred process of PLS-SEM analysis, the outcomes are represented in two phases. In the first stage, measurement model is tested to determine the reliability and validity of the constructs using indicators like factor loading, Cronbachs alpha, composite reliability and average variance extracted (AVE). Second, the structural model is tested to test the hypothesized heuristic biases, prospect biases, and recurrent budget estimation distortion causing path coefficient, level of significance and the power to explain (R2). The results will assist in understanding the effect of behavioral biases on budgeting decisions among the university financial managers and help to create distortion in the budget estimates hence providing significant implications towards better financial decision-making and budget planning in the universities of the public sector.

3.1 Outer Loadings Interpretation.

Table 2 presents the outer loading of the indicators of the lower order constructs that are used in the measurement model. In Partial Least Squares Structural Equation Modelling (PLS -SEM), outer loadings are used to test indicator reliability, as an indicator of how well an indicator represents a latent construct. Hair, Hult, Ringle, and Sarstedt (2022) state that an indicator loading of 0.70 or more represents satisfactory reliability, which means that the construct explains at least half of the variance of the indicator. The analysis indicates that most of the indicators have outer loadings that are more than the desired level of 0.70 hence depicting strong indicator reliability. Indicators of Anchoring Bias in the case of example 1, for example, have a range between 0.742 and 0.841, which highlights the fact that all of the items are used to measure the construct reliably. Similarly, the Endowment Effect (0.828-0.906) and Loss Aversion (0.862-0.922) indicators show very high loading, which is an indicator of high quality measurement. With regards to Availability Bias, the loadings are between 0.669 and 0.887. The loading of AVB1 (0.669) is slightly lower than the value of 0.70, but it is not critical and can be accepted as long as construct reliability and validity are not problematic (Hair et al., 2022). Equally, the Recurring Budget Estimation Distortion (RBED) indicators are 0.672 to 0.880, with RBED6 (0.672) slightly lower than 0.70 but still in the admissible range. Besides, variables reporting Representativeness Bias (0.841-0.906) and Status Quo Bias (0.827-0.922) have high outer loadings, which means that the variables are appropriate constructs. Overall, the findings indicate that the measurement items have good indicator reliability since most of the loadings exceed the recommended value and the marginal lower loadings are within the acceptable range. As a result, every indicator was saved to be analyzed in the measurement model.

Table 2 Loadings

Table 1: Outer Loadings of Indicators (Lower-Order Constructs)		
Construct	Indicator	Outer Loading
Anchoring Bias	AB1	0.742
	AB2	0.841
	AB3	0.806
	AB4	0.832
	AB5	0.824
Availability Bias	AVB1	0.669
	AVB2	0.766
	AVB3	0.887
	AVB4	0.73
	AVB5	0.86
	AVB6	0.738
Endowment Effect	EE1	0.828
	EE2	0.865
	EE3	0.906

	EE4	0.876
Loss Aversion	LV1	0.894
	LV2	0.908
	LV3	0.922
	LV4	0.862
Recurring Budget Estimation Distortion	RBED1	0.829
	RBED2	0.864
	RBED3	0.88
	RBED4	0.758
	RBED5	0.751
	RBED6	0.672
Representativeness Bias	RPB1	0.841
	RPB2	0.906
	RPB3	0.895
	RPB4	0.887
Status Quo Bias	SQB1	0.827
	SQB2	0.922
	SQB3	0.915
	SQB4	0.906

3.2 Reliability and Convergent Validity Interpretation

The results of internal consistency reliability and convergent validity used in the constructs of the measurement model are empirical in Table 2. The measurements of reliability were taken using Cronbachs Alpha, rho A, and Composite Reliability, and the measure of convergent validity was taken using the Average Variance Extracted (AVE). Internal consistency reliability measures the level to which items relating to a specific construct are consistent in terms of their ability to measure the same latent variable. Hair and colleagues (2022) find that reliability coefficients of 0.70 and above depict satisfactory internal consistency. The analysis results are that Cronbachs Alpha values range between 0.867 and 0.919, which is more than the lower limit suggested at 0.70. This indicates that the internal consistency of all the constructs is high. On the same note, rho -A coefficients lie within the range of 0.874 to 0.918, which is higher than the required minimum, and which once again supports the reliability of the constructs.

Composite Reliability (CR) as a more accurate measure of reliability in the Partial Least Squares Structural Equation Modeling (PLS-SEM) model is between 0.901 and 0.943. Since all of the values exceed the 0.70 mark, the constructs exhibit high rates of internal consistency reliability (Hair et al., 2022). Convergent Validity: Convergent validity measures the extent to which the indicators of a construct have a significant percent of

variance in common. It is measured in the Average Variance Extracted (AVE). Fornell and Larcker (1981) defined an AVE of 0.50 or more as the construct explains more than half of the variance of the indicators.

Table 3 showed that the values of AVE are between 0.606 and 0.804 and above 0.50. Therefore, convergent validity is adequate in the constructs. Indicatively, the convergent validity of Loss Aversion (AVE = 0.804) and Status Quo Bias (AVE = 0.798) can be described as rather strong, which means that the measures are very representative of the latent constructs.

These results indicated that each of the constructs is of satisfactory internal consistency reliability and convergent validity. All of the Cronbach Alpha, rho A, and Composite Reliability statistics are greater than the recommended levels, and AVE estimates are greater than 0.50. Thus, the measurement model meets the necessary reliability and convergent validity criteria, which will equip the analysis to proceed to the analysis of the discriminant validity and the further analysis of the structural model.

Table 3: Reliability and Convergent Validity				
Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Anchoring Bias	0.869	0.874	0.905	0.656
Availability Bias	0.867	0.876	0.901	0.606
Endowment Effect	0.893	0.906	0.925	0.756
Loss Aversion	0.919	0.92	0.943	0.804
Recurring Budget Estimation Distortion	0.884	0.904	0.911	0.633
Representativeness Bias	0.905	0.907	0.934	0.779
Status Quo Bias	0.915	0.918	0.94	0.798

Table: Fornell–Larcker Criterion for Discriminant Validity (Lower-Order Constructs)

Constructs	AB	AVB	EE	LV	RBED	RPB	SQB
Anchoring Bias (AB)	0.81						
Availability Bias (AVB)	0.383	0.779					

Endowment Effect (EE)	0.091	0.251	0.869				
Loss Aversion (LV)	0.389	0.406	0.203	0.897			
Recurring Budget Estimation Distortion (RBED)	0.33	0.474	0.103	0.405	0.796		
Representativeness Bias (RPB)	0.283	0.439	0.257	0.506	0.485	0.883	
Status Quo Bias (SQB)	0.4	0.295	0.318	0.526	0.177	0.29	0.893

Table: HTMT Ratio of Correlations (Lower-Order Constructs)

Constructs	AB	AVB	EE	LV	RBED	RPB	SQB
Anchoring Bias (AB)	—						
Availability Bias (AVB)	0.436	—					
Endowment Effect (EE)	0.128	0.276	—				
Loss Aversion (LV)	0.423	0.453	0.214	—			
Recurring Budget Estimation Distortion (RBED)	0.352	0.529	0.113	0.44	—		
Representativeness Bias (RPB)	0.31	0.489	0.283	0.554	0.53	—	
Status Quo Bias (SQB)	0.444	0.334	0.345	0.575	0.188	0.317	—

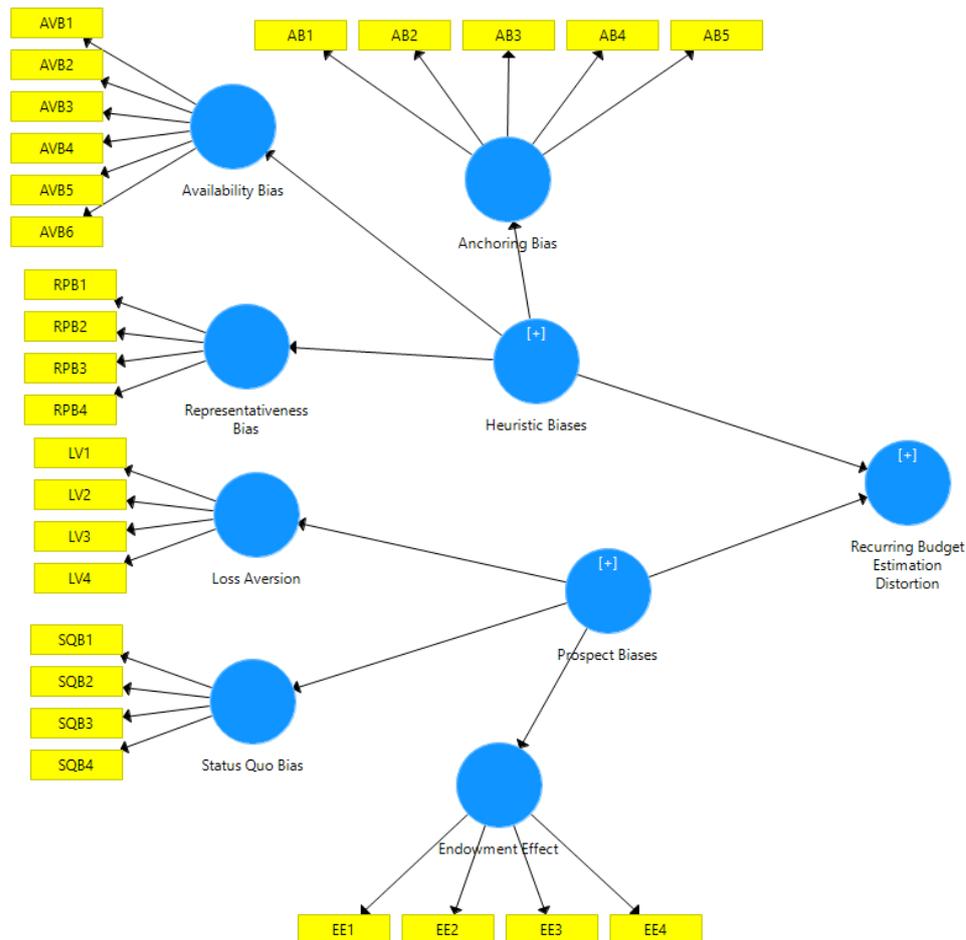


Table 4. Loadings

Outer loadings	Financial Implications	Heuristics Biases	Prospect Theory
Anchoring Bias		0.655	
Availability Bias		0.821	
Endowment			0.97
Loss Aversion			0.92
RBED1	0.828		
RBED2	0.863		
RBED3	0.88		
RBED4	0.759		
RBED5	0.753		
RBED6	0.673		

Representativeness Bias		0.794	
Status Quo Bias			0.803

3.3 Interpretation of Higher-Order Constructs Outer Loadings.

The outer loadings in the table indicate the relationships between the higher-order constructs, which are Financial Implications, Heuristics Biases, and Prospect Theory, and the corresponding lower-order constructs. Outer loadings in Partial Least Squares Structural Equation Modelling (PLS -SEM) are used to indicate the strength of the relationship between measurement indicators and latent constructs. According to (J. Hair & Alamer, 2022), the values of outer loading of 0.70 or more are considered acceptable in general, as the values reflect the construct explaining at least 50 percent of the variance in the indicator.

Financial Implications is a construct that is operationalised using indicators RBED1 to RBED6 (Recurring Budget Estimation Distortion). The outer loadings range between 0.673 and 0.880, which means that all the indicators have a significant contribution to the construct. The majority of loadings are above the recommended level of 0.70 indicating strong indicator reliability. Though RBED6 (0.673) is slightly less than the threshold, it still lies within the acceptable range of exploratory research and can be held on board in case of sufficient overall construct reliability (J. Hair & Alamer, 2022). Anchoring Bias, Availability Bias and Representativeness Bias represent the higher-order construct Heuristics Biases. These indicators have an outer loading of 0.655, 0.821, and 0.794 respectively. The Availability Bias and Representativeness Bias loadings are higher than the suggested recommendation meaning that they are highly correlated with the higher-order construct. Even though Anchoring Bias (0.655) is a little less than the recommended of 0.70, the range of 0.60 to 0.70 is also acceptable in case there is theoretical justification and other reliability factors are good.

Endowment Effect, Loss Aversion, and Status Quo Bias are the constructs that represent the Prospect Theory, and the outer loading of the constructs is 0.970, 0.920, and 0.803, respectively. These values are considerably more than the recommended value which implies very strong associations between the lower-order constructs and the higher-order construct. This implies that the constructs are capable of explaining the behavioural aspect of Prospect Theory.

To conclude, the findings of the outer loading results show that the higher-order measurement model can be characterized by a good level of indicator reliability. The majority of the loadings are above the recommended value of 0.70 with the few lower values falling within the acceptable range. The constructs are therefore sufficiently valid as they represent their higher-order latent variables and are appropriate in further structural model analysis.

Table 5: Reliability and Convergent Validity				
	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)

Financial Implications	0.884	0.903	0.911	0.634
Heuristics Biases	0.701	0.7	0.803	0.578
Prospect Theory	0.89	0.992	0.927	0.811

The evaluation of internal consistency reliability and convergent validity of higher-order constructs, Financial Implications, Heuristics Biases, and Prospect Theory, are shown in Table 5. In partial least squares structural equation modelling (PLS-SEM), the reliability is usually assessed by Cronbachs Alpha, rho A and Composite Reliability (CR) whereas the convergent validity is assessed with the help of Average Variance Extracted (AVE).

Internal consistency reliability is the measure of how the indicators of a construct are always measuring the same latent variable. Joseph F. Hair Jr. et al. state that Alpha of Cronbach and Composite Reliability are acceptable when they are 0.70 or more. The outcome shows that Financial Implications has a Cronbachs Alpha of 0.884, rho A of 0.903 and Composite Reliability of 0.911 which is a good internal consistency. Prospect Theory is also very reliable, its Cronbachs Alpha is 0.890, it has a rho of 0.992 and Composite Reliability of 0.927 and all these are above the recommended value. In the case of Heuristics Biases, Cronbach Alpha = 0.701, rho A = 0.700 and the Composite Reliability = 0.803. Though these values are a bit lower than those of the other constructs still these values meet the minimum acceptable level of 0.70, which means that the internal consistency reliability is satisfactory.

Convergent validity is the degree of variation of a construct comprised by indicators. It is measured in Average Variance Extracted (AVE). A value of 0.50 or higher is considered to have sufficient convergent validity, i.e. the construct explains at least 50 per cent of the variance in the indicators, according to Claudette Fornell and David F. Larcker (1981). The AVE values in Table 2 are all above the 0.50 level, with a range of 0.578 to 0.811. Prospect Theory has the highest convergent validity of AVE 0.811 followed by Financial Implications (0.634) and Heuristics Biases (0.578). These results indicate that the constructs are effective in explaining the variance of the indicators that they depict.

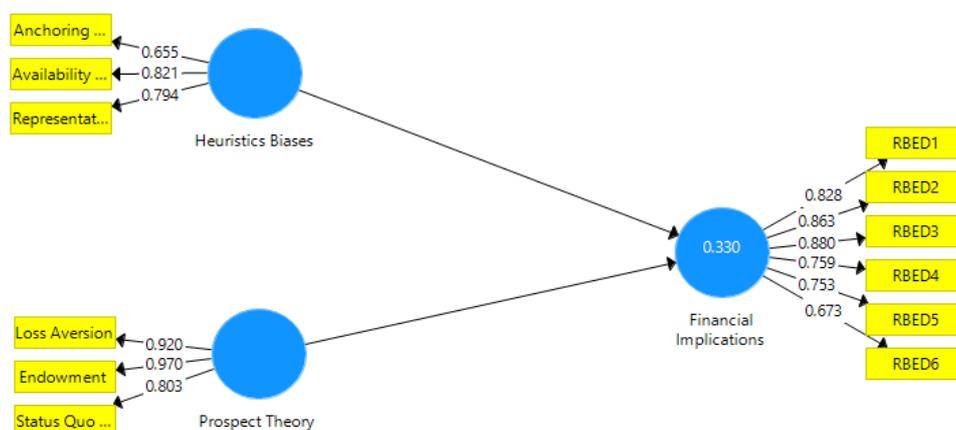
All of the higher-order constructs have satisfactory internal consistency reliability and convergent validity, as indicated by the results. The Cronbach Alpha, Rho A and Composite Reliability values are within or above the suggested values whereas the AVE values confirm that a high percentage of variance is explained in the indicators. As a result, the model of measurement meets the requirements of reliability and convergent validity, which allows conducting further analysis of the structural associations between the constructs.

Table 6: Fornell–Larcker Criterion for Discriminant Validity (Lower-Order Constructs)

	Financial Implications	Heuristics Biases	Prospect Theory
Financial Implications	0.796		
Heuristics Biases	0.574	0.76	
Prospect Theory	0.361	0.592	0.9

In measurement model results, the Hetero Trait Mono Trait (HTMT) ratio of correlations is used as the discriminant validity diagnostic. Discriminant validity showed that every latent construct is empirically different in the model in comparison to its counterparts. The HTMT criterion is a valid method of evaluating discriminant validity in the partial least squares structural equation modelling (PLS-SEM). Empirical rules usually dictate that the values of HTMT should be lower than 0.90 and in more conservative studies, lower than 0.85 to establish adequate discriminant validity. Table lists the ratios of HTMT calculated on the constructs of the Financial Implications, Heuristics Biases, and the Prospect Theory. The results indicate that all the HTMT values are lower than the recommended value. The statistic of the pair of constructs in the HTMT is 0.734, which is well below the 0.90 mark and thus confirmed the fact that the constructs are statistically different. The HTMT score of the variable Financing Implication compared to Prospect Theory is 0.363 which implies that there is a moderate inter-construct relationship and a high discriminant validity. The computed coefficient of the relationship between the Heuristics Biases and the Prospect Theory is 0.771 that is below the recommended value, and it further proved the uniqueness of the two constructs. All the sub-threshold estimates of HTMT confirm that the discriminant validity is adequately met in all constructs of the model. Therefore, every construct represents a certain aspect of the theoretical framework without excessive overlapping with other aspects.

Figure 3.



3.4 Path Analysis and Hypothesis Testing

Table showed the results of the structural-model analysis which explores the influence of heuristic biases and prospect-theory biases on financial implication in the budgeting of universities. It is concluded with the help of the Partial Least Squares Structural Equation Modelling (PLS-SEM) method that assesses the relationships among latent constructs in terms of strength and significance that are measured by the path coefficients, t-statistics, and p-values (Hair et al., 2019).

The results show that there is a significant positive statistically significant effect of heuristic biases on financial implications with path coefficient of $b = 0.557$, $t = 12.235$, and $p = 0.001$. The large t-value and very low p-value are used to verify the strength and statistical significance of this relationship. This result proposed that the heuristic based cognitive shortcuts, including anchoring bias, availability bias and representativeness bias play a significant role in financial decision-making in the budgeting process. When financial managers and budget handlers work with public-sector universities, they can make use of the simplified rules of judgment or rely on previous budget data when making estimates, which creates systematic misstatements of financial performance. This finding is congruent with heuristic decision theory which states that people often use mental shortcuts to draw complex judgments in times of uncertainty (Tversky & Kahneman, 1974). Previously conducted empirical studies support the claim that heuristics have a significant impact on financial predictions, managerial decision-making, and budget-related decisions, particularly in the organizational context that is uncertain and time-constrained ((Overmans, 2024)Bazerman, 2013. In turn, the current results supported the hypothesis that heuristic bias has a central role in determining financial implications and may result in the repetitive bias in the budget estimation in universities.

The findings also indicate that prospect-theory biases have a positive and statistically significant impact on financial implications with a path coefficient of $b=0.290$, $t=6.640$ and $p=0.000$. Whereas this effect is of smaller magnitude than that of heuristic biases, the statistical significance of it means that there are behavioral tendencies associated with loss aversion, status-quo bias and endowment effect that impact financial decision-making in the budgeting process. Prospect theory suggests that people judge potential gains and losses in unequal ways and they are more sensitive to losses compared to equal gains (Kahneman & Tversky, 1979). In the budgeting environment, the behavioral tendency can encourage the decision-makers to either avoid budget cuts, maintain the current allocations or overestimate the financial needs to lessen the perceived risks. This sort of behavior may create long lasting distortions in budget estimates and ineffective allocation of resources. The results are consistent with the recent literature in the behavioral public administration and financial decision-making, showing that loss aversion and status-quo bias are often used to make budgetary decisions and decisions on financial management of a population ((Overmans, 2024; Thaler, 1999).

In comparison, the results indicated that the heuristic biases have a greater impact on the financial implications than the prospect-theory biases, as indicated by the larger path coefficient and greater t -statistic. This means that risk-related behavioural

tendencies could be overridden by cognitive shortcuts adopted in the decision making process in influencing budget estimates. This is in practice to imply that university financial managers might tend to apply the rapid judgment rules, such as anchoring on past budgets or weighted on the easy to recall financial data, more than detailed financial analysis in budget estimates preparation.

These results are empirical evidence of the behavioral decision theory which underlines that financial decisions cannot be regarded as purely rational choice because they are primarily influenced by psychological and cognitive factors (Kahneman, 2012; Simon, 1955). The results highlighted the need to be aware of behavioral biases in the institutional budgeting processes especially in the context of the public-sector universities where the budgetary decisions are made with uncertainties, limited information and institutional pressures. These biases can be mitigated by providing better financial training and structured decision structure framework and by using evidence-based budgeting practices that can reduce distortions and enhance the accuracy of the university budget estimates.

Table 7 Structural Model

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Heuristics Biases_ -> Financial Implications	0.557	0.563	0.045	12.235	0.000
Prospect Theory -> Financial Implications	0.29	0.29	0.043	6.64	0.000

R-Square					
	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Financial Implications	0.327	0.336	0.047	6.937	0.000

The explanatory strength of the structural model was measured through the coefficients of determination (R^2) and the size of effects (f^2), which are measures that measure the amount of variability explained by the independent constructs in the dependent variable. In this study, the R^2 of the financial implications was 0.327, which means that both the heuristic biases and the prospect theory biases are used to explain 32.7 percent of the variance of university budget estimation. According to Hair et al. (2019), R^2 of 0.25, 0.50, and 0.75 represent weak, moderate, and strong explanatory power in the social science research. Based on this R^2 value, it can be noted that there is moderate explanatory power, which supports the significance of behavioral biases on the

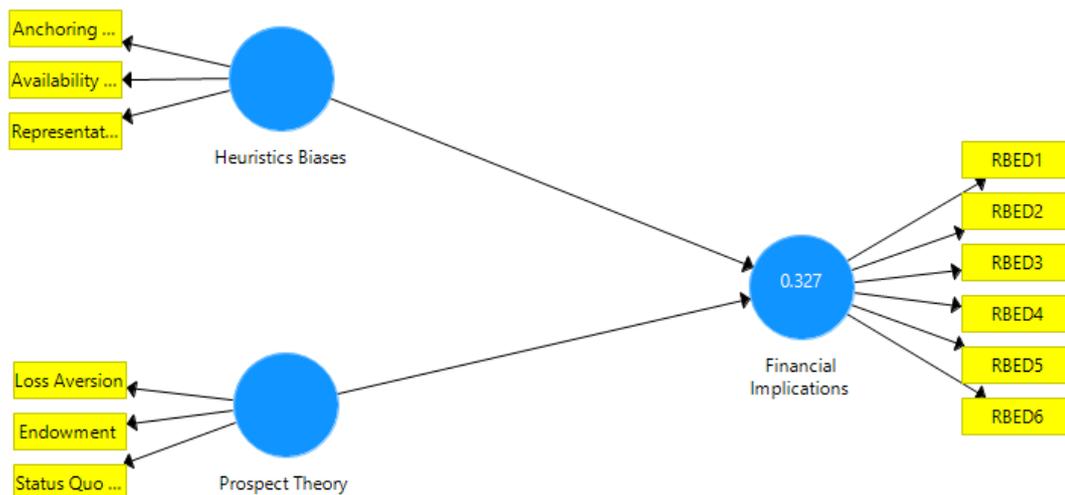
financial consequences of university budgeting, which is conducted in a public sphere. The R^2 value was also significantly ($t= 6.937, p= 0.001$) predictive of the model. Effect-size analysis through f^2 also explains the unique contribution of every predictor towards the explanatory variance of the dependent variable. The findings show that the heuristic biases have an f^2 value of 0.30, which can be characterized as large to moderate based on the thresholds in the literature on Cohen (1988) and operationalized in PLS-SEM studies (Hair et al., 2019). Based on these criteria, the values of 0.02 0.15, and 0.35 will be associated with small, medium, and large effects, respectively. Therefore, heuristic biases have a significant impact on the financial value of the university budget. The strong effect demonstrates that cognitive shortcuts namely anchoring, availability bias and representativeness bias play a significant role in making financial decisions and budgeting. This observation is in line with the heuristic decision theory which assumes that, when making complex or uncertain financial decisions, people employ simplified rules that are in their minds (Tversky & Kahneman, 1974). The hypothesis that the influence of heuristic-based judgments on financial forecasting and budget-planning processes is strong is supported by the empirical studies conducted in the areas of behavioral finance and administration (Bazerman and Moore, 2013;(Overmans, 2024).

Conversely, the prospect-theory biases have an f^2 of 0.10 which is evidence of a small to moderate impact on the financial implications. Even though the strength of the correlation between it and the bias associated with heuristics is smaller, the correlation is statistically significant ($t= 2.28, p= 0.001$). This observation implies that behavioral disposition associated with loss aversion, status-quo bias, and endowment effect are also the factors that add to the financial effects of the budgeting process. Prospect theory argues that people judge results against points of reference and are more sensitive to potential losses as compared to gains (Kahneman & Tversky, 1979). In the university budgeting context, these biases can influence the financial managers to either evade any cuts in the current budget allocations, maintain the current spending trends, or even inflate the financial needs in an attempt to reduce the perceived risks.

These results showed that the effect of heuristic biases on financial implications is stronger than the effect of prospect-theory biases, and the prevalence of cognitive shortcuts in determining financial decision making in the budgeting process is more dominant. These results provide a solid empirical evidence of the behavioral decision theory, which includes the idea that the process involved in making financial decisions is not only rational but also psychological and cognitive (Kahneman, Lovallo, & Sibony, 2011; Simon, 1955). Practically, it is possible to recognize the impact of behavioral biases in order to promote budget-planning accuracy in universities of the public sector by encouraging the introduction of formulaic decision-making structures, evidence-based budgeting, and financial training programmes with the specific design to reduce cognitive biases.

F-Square

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Heuristics Biases_ -> Financial Implications	0.3	0.316	0.068	4.416	0.000
Prospect Theory -> Financial Implications	0.1	0.3	0.04	2.28	0.000



Conclusion

This study examined the influence of heuristics biases and prospect biases on financial implications using Partial Least Squares Structural Equation Modelling (PLS-SEM). Using a survey approach, a total of 434 responses were obtained from these financial decision-makers from the selected 153 Public Sector Universities. The results demonstrate that both constructs significantly affect financial implications, confirming the relevance of behavioural finance theories in explaining financial decision-making. The findings reveal that heuristics biases have a stronger impact on financial implications than prospect theory, indicating that cognitive shortcuts such as anchoring, availability, and representativeness biases play a major role in shaping financial outcomes. Although prospect theory also shows a significant effect, its influence is comparatively weaker. Additionally, the model explains 32.7% of the variance in financial implications, suggesting that behavioural biases represent an important but not exclusive determinant of financial outcomes. This implies that future research may explore additional variables such as organizational culture, financial literacy, managerial experience, or environmental uncertainty to improve the explanatory power of the model. The study highlights the critical role of behavioural biases in financial

decision-making and provides empirical evidence supporting the theoretical foundations of behavioural finance. Understanding these biases can help organizations and financial decision-makers develop better strategies to minimize biased judgments and improve financial planning and budgeting processes.

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