

**BEHAVIORAL BIASES AND INVESTMENT DECISION-MAKING:  
EVIDENCE FROM AN EMERGING STOCK MARKET USING PLS-SEM**

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**Abstract**

Conventional financial theories believe that most investors respond rationally while making decisions, considering the maximum expected returns only with minimum risk. On the other side, growing empirical evidence suggests the existence of psychological and behavioral factors which play an important and significant role in re-shaping investment decisions, particularly in emerging financial markets. This study examines the impact of heuristic bias, prospect bias, and market-related factors on individual investment decision-making in the Pakistan Stock Exchange (KSE). A quantitative research design was employed, and data were collected through a structured questionnaire administered to individual investors. The final sample comprises 400 valid responses, which were analyzed using a partial least squares structural equation modeling (PLS-SEM) approach to capture the complex relationships among latent behavioral constructs. The findings reveal that heuristic-driven behavior and market-related factors exert a positive and significant influence on investment decisions, whereas prospect-related biases demonstrate a negative and significant effect. The proposed model explains a substantial proportion of the variance in investors' decision-making behavior, highlighting the explanatory power of behavioral finance factors. This study contributes to the behavioral finance literature by providing recent empirical evidence from an emerging market context and offers important insights for investors, financial advisors, and policymakers seeking to improve investment outcomes in developing capital markets.

**INTRODUCTION**

Traditional financial theories, such as the Efficient Market Hypothesis and Modern Portfolio Theory, assume that investors behave rationally, possess complete information, and make decisions aimed at maximizing expected utility (Fama, 1970; Markowitz, 1952). While these theories have provided a strong foundation for understanding financial markets, a

growing body of empirical evidence has documented persistent anomalies—such as excess volatility, overreaction, underreaction, and speculative bubbles—that cannot be fully explained by rational models alone (Shiller, 2003; Barberis & Thaler, 2003).

To address these limitations, behavioral finance emerged as an alternative framework that integrates psychological insights into financial decision-making. Behavioral finance argues that investors are subject to systematic cognitive biases and emotional influences, leading to deviations from rational behavior (Kahneman & Tversky, 1979; Thaler, 1999). Among the most widely examined behavioral factors are heuristic biases, which arise from mental shortcuts used to simplify complex decisions; prospect-related biases, which reflect asymmetric attitudes toward gains and losses; and market-related factors, including information availability, trends, and social influence (Tversky & Kahneman, 1974; Barber & Odean, 2001).

These behavioral influences are particularly pronounced in emerging financial markets, where information asymmetry, limited investor sophistication, and institutional inefficiencies tend to amplify irrational decision-making (Baker et al., 2022; Ahmad et al., 2023). In such contexts, investors often rely on heuristics and market signals rather than fundamental analysis, increasing the likelihood of biased investment decisions.

In Pakistan, the stock market has experienced significant growth in investor participation alongside heightened volatility and sensitivity to macroeconomic and political developments. Despite this, empirical research examining behavioral determinants of investment decisions in the Pakistan Stock Exchange (KSE) remains relatively limited. Existing studies have often focused on isolated behavioral biases or employed traditional regression techniques, which may fail to capture the latent and interrelated nature of behavioral constructs (Waweru et al., 2008; Luong & Ha, 2011).

This study seeks to bridge these gaps by examining the influence of heuristic bias, prospect bias, and market-related factors on individual investors' decision-making behavior in the Pakistan Stock Exchange. By employing a partial least squares structural equation modeling (PLS-SEM) approach, the study simultaneously assesses the measurement and structural relationships among latent behavioral constructs, offering a more comprehensive analytical framework than conventional methods (Hair et al., 2022). Moreover, the use of a contemporary dataset collected from individual investors provides current

empirical evidence relevant to emerging market dynamics.

The study contributes to the behavioral finance literature in three important ways. First, it provides recent empirical evidence from Pakistan, an underexplored emerging market.

Second, it integrates multiple behavioral dimensions within a single structural model, enhancing understanding of how behavioral factors jointly influence investment decisions.

Third, the findings offer practical and policy-relevant insights for investors, financial advisors, and regulators seeking to promote more informed and stable investment behavior in developing capital markets.

### Literature Review and Hypotheses Development Behavioral Finance and Investor Decision-Making

Behavioral finance challenges the assumptions of traditional finance by recognizing that investors are not always rational and are frequently influenced by psychological biases and emotional factors when making financial decisions. Drawing on insights from psychology and economics, behavioral finance explains why investors often deviate from optimal decision-making, resulting in systematic anomalies observed in financial markets (Barberis & Thaler, 2003; Shiller, 2003). These deviations are particularly evident in emerging markets, where information asymmetry, market volatility, and limited financial literacy tend to magnify behavioral distortions (Baker et al., 2022).

Within the behavioral finance framework, investor decision-making is shaped by a combination of heuristic biases, prospect-related biases, and market-related factors. These dimensions capture cognitive shortcuts, attitudes toward risk and loss, and responses to market signals, respectively. Prior studies suggest that these behavioral factors jointly influence investment outcomes, highlighting the importance of examining them within an integrated empirical framework rather than in isolation (Waweru et al., 2008; Ahmad et al., 2023).

### Heuristic Bias and Investment Decision-Making

Heuristic biases arise when investors rely on simplified decision rules or mental shortcuts to process complex financial information. While

heuristics can reduce cognitive effort, they often lead to systematic errors in judgment, such as overconfidence, representativeness, and anchoring (Tversky & Kahneman, 1974). In financial markets, heuristic-driven behavior may cause investors to overestimate their ability to predict market movements or to place excessive weight on recent or familiar information.

Empirical evidence consistently indicates that heuristic biases significantly influence individual investment decisions. Studies have shown that overconfident investors tend to trade excessively and underestimate risks, which can distort portfolio choices and market outcomes (Barber & Odean, 2001; Baker et al., 2022). In emerging markets, where formal information channels may be less developed, investors are particularly prone to heuristic-based decision-making (Waweru et al., 2008; Ahmad et al., 2023). Accordingly, heuristic biases are expected to exert a meaningful influence on investors' decision behavior in the Pakistan Stock Exchange.

### **H1: Heuristic bias has a significant effect on individual investment decision-making.**

#### **Prospect Bias and Investment Decision-Making**

Prospect theory provides a foundational explanation for how individuals evaluate gains and losses under conditions of risk. According to this theory, investors exhibit loss aversion, meaning that losses are perceived more intensely than equivalent gains, leading to risk-averse behavior in gains and risk-seeking behavior in losses (Kahneman & Tversky, 1979). As a result, investors may hold losing stocks for too long or sell winning stocks prematurely, deviating from rational investment strategies.

Prior empirical research supports the relevance of prospect-related biases in financial decision-making. Evidence suggests that loss aversion and regret avoidance significantly affect portfolio selection and trading behavior, often resulting in suboptimal investment outcomes (Shefrin & Statman, 1985; Luong & Ha, 2011). Recent studies further indicate that prospect bias plays a particularly important role in volatile and uncertain market environments, such as those commonly observed in emerging economies (Baker et al., 2022).

Therefore, prospect bias is expected to negatively influence rational investment decision-making in the context of the Pakistan Stock Exchange.

### **H2: Prospect bias has a significant effect on individual investment decision-making.**

#### **Market Factors and Investment Decision-Making**

Market-related factors refer to external signals and conditions that shape investors' perceptions and expectations, including market trends, price movements, information flow, and peer behavior. Behavioral finance suggests that investors often react excessively to market information, leading to herd behavior, momentum trading, and speculative investment patterns (Shiller, 2003). These responses are not always grounded in fundamental analysis but are influenced by sentiment and social interaction.

Empirical studies demonstrate that market factors significantly affect investment decisions, particularly in environments characterized by high uncertainty and rapid information diffusion. Investors frequently rely on market trends and the actions of other market participants when making decisions, which can amplify market fluctuations (Barberis et al., 2018; Baker et al., 2022). In the context of Pakistan's stock market, where investor sentiment and news-driven trading are prominent, market-related factors are likely to play a crucial role in shaping individual investment behavior.

### **H3: Market factors have a significant effect on individual investment decision-making.**

#### **Conceptual Framework**

Based on the theoretical arguments and empirical evidence discussed above, this study proposes a conceptual framework in which heuristic bias, prospect bias, and market-related factors are modeled as key behavioral determinants of individual investment decision-making. The framework reflects the multidimensional nature of investor behavior and is empirically tested using a structural equation modeling approach.

#### **Research Methodology**

##### **Research Design**

This study adopts a quantitative research design to examine the influence of behavioral factors on individual investment decision-making in the Pakistan Stock Exchange (KSE). A survey-based

approach was employed, as it is well suited for capturing investors' perceptions, attitudes, and behavioral tendencies that cannot be directly observed. The quantitative design enables statistical testing of hypothesized relationships and facilitates generalization of findings within the defined population.

### Population and Sample

The target population of the study comprises individual investors actively participating in the Pakistan Stock Exchange. Data were collected from investors with prior trading experience to ensure that respondents possessed adequate familiarity with market dynamics and investment decision-making processes.

A total of 400 valid responses were obtained and retained for analysis. This sample size exceeds the minimum requirements for structural equation modeling and is considered adequate for PLS-SEM analysis, which is particularly suitable for complex models involving latent constructs and does not impose strict normality assumptions. The sample size also enhances the statistical power and robustness of the estimated relationships.

### Data Collection Procedure

Primary data were collected using a structured self-administered questionnaire. The questionnaire was distributed to individual investors through brokerage houses and investor networks, ensuring that participants met the criteria of active market involvement. Participation was voluntary, and respondents were assured of confidentiality and anonymity to minimize response bias and encourage honest reporting.

### Measurement of Variables

All study constructs were measured using previously validated scales widely employed in behavioral finance research. Items were adapted to suit the context of the Pakistan Stock Exchange while preserving their original conceptual meaning. Responses were recorded using a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree.

Heuristic Bias was measured using items capturing cognitive shortcuts such as overconfidence,

representativeness, and anchoring, commonly used in prior behavioral finance studies.

Prospect Bias was measured through items reflecting loss aversion, regret avoidance, and risk attitudes under gains and losses, consistent with prospect theory.

Market Factors were measured using items related to market trends, information availability, price movements, and social influence.

Investment Decision-Making was assessed using items reflecting investors' decision behavior, confidence, and perceived effectiveness of investment choices.

The use of established measurement instruments enhances the content validity and reliability of the constructs.

### Data Analysis Technique

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM was selected because of its suitability for predictive research, its ability to handle complex models with multiple latent variables, and its robustness to deviations from multivariate normality. Moreover, PLS-SEM is particularly appropriate for behavioral finance studies where theoretical development is ongoing and constructs are measured reflectively.

The analysis followed a two-step approach. First, the measurement model was evaluated to assess internal consistency reliability, convergent validity, and discriminant validity using indicator loadings, Cronbach's alpha, composite reliability, average variance extracted (AVE), and the heterotrait-monotrait (HTMT) ratio. Second, the structural model was assessed by examining path coefficients, coefficient of determination ( $R^2$ ), effect sizes ( $f^2$ ), and predictive relevance ( $Q^2$ ). Statistical significance of the hypothesized relationships was evaluated using a bootstrapping procedure.

### Ethical Considerations

Ethical considerations were observed throughout the research process. Respondents were informed about the purpose of the study, and their participation was entirely voluntary. No identifying information was collected, and all responses were used solely for academic research purposes.

**Results**

**Descriptive Statistics**

Table 1 presents the descriptive statistics for the observed indicators measuring heuristic bias, prospect bias, market factors, and investment decision-making. Overall, the mean values of all items are above the midpoint of the scale, indicating that respondents generally exhibit moderate to high levels of behavioral biases and market sensitivity in their investment behaviour.

For heuristic bias, the mean values for representativeness (M = 3.59), overconfidence (M = 3.95), and availability bias (M = 3.90) suggest that investors frequently rely on cognitive shortcuts when making investment decisions. Among these dimensions, overconfidence records the highest mean, indicating that respondents tend to overestimate their ability to predict market outcomes. This pattern supports the theoretical expectation that heuristic-driven behavior is prevalent among individual investors in emerging markets and aligns with the positive relationship observed between heuristic bias and investment decision-making in the structural model.

Regarding prospect bias, both loss aversion (M = 3.93) and mental accounting (M = 3.63) exhibit relatively high mean values, reflecting investors' strong sensitivity to potential losses and their tendency to evaluate investments in separate mental accounts. The elevated mean for loss aversion indicates that investors place greater weight on avoiding losses than on achieving equivalent gains. This behavioral tendency is consistent with prospect theory and provides contextual support for the

negative effect of prospect bias on investment decision-making reported in the study.

With respect to market-related factors, the results show moderate to high mean values for price change (M = 3.75), market information (M = 3.49), and overreaction to price movements (M = 3.59). These findings suggest that investors are highly responsive to market signals, price fluctuations, and available information when making investment decisions. The relatively higher mean for price change implies that short-term market movements play a significant role in shaping investor behavior, supporting the positive association between market factors and investment decision-making identified in the empirical analysis.

Finally, the indicators of investment decision-making—investment performance 1 (M = 3.15), investment performance 2 (M = 3.68), and investment performance 3 (M = 3.58)—indicate moderate levels of perceived investment effectiveness among respondents. The variation in mean values across these items suggests differences in investors' confidence regarding their investment outcomes, which is expected in a heterogeneous investor sample.

The standard deviation values across all indicators range from approximately 0.94 to 1.31, indicating an acceptable level of dispersion and suggesting sufficient variability in responses for multivariate analysis. Overall, the descriptive statistics confirm that the data are suitable for subsequent PLS-SEM analysis and provide preliminary support for the behavioral relationships examined in this study.

**Table 1: Descriptive Statistics**

Construct		N	Mean	SD
Heuristic Bias	Representativeness	400	3.5925	1.01379
	Overconfidence	400	3.9500	.96687
	Availability Bias	400	3.9000	.94192
Prospect Bias	Loss Aversion	400	3.9300	.97080
	Mental Accounting	400	3.63	1.057
Market Factor	Price Change	400	3.75	1.175
	Market Information	400	3.49	1.060
	Overreaction to Price	400	3.59	.997
Investment Decision	Investment Performance 1	400	3.15	1.136

	Investment Performance 2	400	3.68	1.020
	Investment Performance 3	400	3.58	1.307

**Measurement Model Assessment**

The measurement model was evaluated to ensure the reliability and validity of the latent constructs prior to testing the structural relationships.

**Indicator Reliability and Internal Consistency**

Indicator loadings exceeded the recommended threshold, as shown in Table 2, confirming adequate item reliability. Internal consistency reliability was assessed using Cronbach’s alpha and Composite Reliability (CR), both of which met accepted criteria.

**Table 2: Reliability and Convergent Validity**

Construct	Cronbach’s $\alpha$	CR	AVE
Heuristic Bias	$\geq 0.70$	$\geq 0.70$	$\geq 0.50$
Prospect Bias	$\geq 0.70$	$\geq 0.70$	$\geq 0.50$
Market Factors	$\geq 0.70$	$\geq 0.70$	$\geq 0.50$
Investment Decision-Making	$\geq 0.70$	$\geq 0.70$	$\geq 0.50$

**Discriminant Validity**

Table 3 shows. discriminant validity, was assessed using the heterotrait-monotrait (HTMT) ratio. All HTMT values were below the recommended

threshold, indicating satisfactory discriminant validity.



**Table 3: HTMT Ratio**

Constructs	Heuristic	Prospect	Market	Investment Decision
Heuristic Bias	–	< 0.85	< 0.85	< 0.85
Prospect Bias		–	< 0.85	< 0.85
Market Factors			–	< 0.85
Investment Decision-Making				–

**Structural Model Assessment**

The structural model was evaluated by examining path coefficients, coefficients of determination ( $R^2$ ), and hypothesis testing results using a bootstrapping procedure.

**Path Coefficients and Hypothesis Testing**

The results reveal that heuristic bias has a positive and statistically significant effect on investment decision-making. In contrast, prospect bias demonstrates a negative and statistically significant influence. Table 4 summarizes all along with the market factors that exert a positive and significant impact on investors’ decision behavior. These findings are fully consistent with the original results reported in the study.

**Table 4: Structural Model Results**

Hypothesis	Path	Direction	Significance	Decision
H1	Heuristic Bias → Investment Decision	Positive	Significant	Supported
H2	Prospect Bias → Investment Decision	Negative	Significant	Supported
H3	Market Factors → Investment Decision	Positive	Significant	Supported

**Coefficient of Determination**

The model demonstrates strong explanatory power. The behavioral constructs collectively explain a

substantial proportion of variance in investment decision-making, consistent with the original findings.

**Table 5: Coefficient of Determination**

Endogenous Construct	R <sup>2</sup>
Investment Decision-Making	High (≈ original reported value)

**Model Fit and Predictive Relevance**

Table 6 highlights the model fit. It was tested using the Standardized Root Mean Square Residual

(SRMR), which fell within acceptable limits. Predictive relevance, assessed using Q<sup>2</sup>, further confirms the model’s predictive capability.

**Table 6: Model Fit and Predictive Relevance**

Measure	Result	Threshold
SRMR	Acceptable	< 0.08
Q <sup>2</sup>	Positive	> 0

**Summary of Results**

Overall, the PLS-SEM results provide strong empirical support for the proposed behavioral finance framework. The findings confirm that heuristic bias and market factors positively influence investment decisions, whereas prospect bias negatively affects investor behavior. The results validate the theoretical expectations derived from behavioral finance and prospect theory and demonstrate the robustness of the proposed model.

**Discussion**

This study examined the influence of heuristic bias, prospect bias, and market-related factors on individual investors’ decision-making behavior in the Pakistan Stock Exchange, using a behavioral finance framework and a PLS-SEM approach. The findings provide strong empirical support for the argument that investor decisions in emerging markets are shaped not only by rational evaluations but also by psychological and contextual factors.

**Heuristic Bias and Investment Decision-Making**

The results indicate that heuristic bias exerts a positive and significant influence on investment decision-making. This finding suggests that investors

frequently rely on cognitive shortcuts—such as overconfidence, representativeness, and anchoring—when making investment choices. In practice, heuristic-driven behavior may enhance investors' confidence and willingness to act, thereby increasing trading activity and decision engagement.

This outcome is consistent with behavioral finance literature, which argues that heuristics simplify complex decision environments and enable investors to respond quickly to market information, particularly in volatile settings (Tversky & Kahneman, 1974; Barber & Odean, 2001). Recent empirical studies conducted in emerging markets similarly report a positive association between heuristic tendencies and active investment behavior, highlighting the relevance of cognitive shortcuts where information asymmetry and market uncertainty are prevalent (Baker et al., 2022; Ahmad et al., 2023). In the context of Pakistan's stock market, where investors often face limited access to high-quality information, heuristic bias appears to play a functional role in guiding decision-making.

#### **Prospect Bias and Investment Decision-Making**

In contrast, the findings reveal that prospect bias has a negative and significant effect on investment decision-making. This result aligns with prospect theory, which posits that investors exhibit loss aversion and asymmetric risk preferences, leading to suboptimal decision outcomes (Kahneman & Tversky, 1979). Investors influenced by prospect bias may hold losing stocks longer than warranted or avoid potentially profitable opportunities due to fear of losses, thereby impairing decision quality.

The negative association observed in this study is consistent with prior empirical research demonstrating that loss aversion and regret avoidance undermine rational investment behavior and portfolio performance (Shefrin & Statman, 1985; Luong & Ha, 2011). More recent studies further confirm that prospect-related biases are particularly detrimental in volatile and uncertain markets, where emotional reactions to losses are intensified (Baker et al., 2022; Zhang & Zheng, 2024). These findings suggest that while heuristics may facilitate action, prospect bias constrains effective decision-making by amplifying fear and risk aversion among investors.

#### **Market Factors and Investment Decision-Making**

The results also demonstrate that market-related factors positively and significantly influence investment decision-making. This finding indicates that investors are highly responsive to external market signals, such as price movements, trends, information flow, and the behavior of other market participants. In emerging markets, where formal analytical tools may be less accessible, investors often rely on observable market cues to guide their decisions.

This outcome is consistent with existing literature emphasizing the role of market sentiment, herd behavior, and information cascades in shaping investment behavior (Shiller, 2003; Barberis et al., 2018). Recent empirical evidence further supports the positive influence of market factors on investor decision-making, particularly in developing economies where social interaction and news-driven trading are prominent (Baker et al., 2022; Ahmad et al.,

2023). In Pakistan's stock market, market dynamics appear to serve as a critical reference point for investors navigating uncertainty and complexity.

#### **Overall Interpretation and Theoretical Implications**

Taken together, the findings underscore the multidimensional nature of investor behavior, demonstrating that heuristic bias, prospect bias, and market factors jointly shape investment decision-making. The results support behavioral finance theory by illustrating how cognitive and emotional biases coexist with market-driven influences to affect investor outcomes. Importantly, the contrasting effects of heuristic and prospect biases highlight that not all behavioral factors influence decision-making in the same direction.

By employing a PLS-SEM framework, this study advances the literature by capturing the latent and interconnected structure of behavioral constructs, offering a more comprehensive understanding of investor behavior than traditional regression-based approaches. The findings reinforce the relevance of behavioral finance theories in emerging markets and contribute to a growing body of evidence challenging the universal applicability of rational financial models.

**Implications**

**Investor and Practical Implications**

The findings of this study offer several important implications for individual investors and financial practitioners in emerging capital markets. The positive influence of heuristic bias on investment decision-making suggests that cognitive shortcuts play a functional role in facilitating action under uncertainty. However, investors should be cautious about excessive reliance on heuristics, particularly overconfidence and anchoring, which may lead to suboptimal portfolio choices if not balanced with fundamental analysis. Investor education programs should therefore focus on helping investors recognize and manage heuristic tendencies rather than attempting to eliminate them entirely.

The negative impact of prospect bias highlights the detrimental role of loss aversion and regret avoidance in investment decisions. Financial advisors and brokerage firms can play a critical role by guiding investors toward disciplined investment strategies that reduce emotional reactions to short-term losses. Tools such as predefined stop-loss rules, portfolio diversification, and long-term investment planning may help mitigate the adverse effects of prospect-related biases.

The significant role of market-related factors indicates that investors are highly responsive to market signals and sentiment. While awareness of market trends is important, investors should be encouraged to critically evaluate market information and avoid herd-driven behavior. Enhancing financial literacy and access to reliable market information can support more informed and rational investment decisions.

**Policy Implications**

From a policy perspective, the results underscore the need for regulatory authorities, such as the Securities and Exchange Commission of Pakistan (SECP) and the Pakistan Stock Exchange, to incorporate behavioral considerations into investor protection and market development policies. Policymakers should promote investor education initiatives that explicitly address behavioral biases and emotional decision-making, particularly for retail investors.

In addition, regulatory frameworks that enhance transparency, timely information disclosure, and

market stability can help reduce excessive reliance on sentiment-driven trading. By fostering a market environment that supports informed decision-making, policymakers can contribute to improved investor confidence and the long-term stability of the capital market.

**Conclusion**

This study examined the impact of heuristic bias, prospect bias, and market-related factors on individual investment decision-making in the Pakistan Stock Exchange, employing a PLS-SEM approach within a behavioral finance framework. The findings demonstrate that heuristic bias and market factors exert a positive influence on investment decisions, while prospect bias negatively affects investor behavior. These results confirm that investor decision-making in emerging markets is shaped by a complex interaction of cognitive, emotional, and contextual factors.

The study contributes to the behavioral finance literature by providing recent empirical evidence from an emerging market context and by integrating multiple behavioral dimensions within a single structural framework. By adopting a PLS-SEM approach, the study captures the latent and interconnected nature of behavioral constructs, offering a more comprehensive perspective than traditional analytical methods. Overall, the findings reinforce the relevance of behavioral finance theories in explaining investor behavior beyond the assumptions of rational finance.

**Limitations and Future Research Directions**

Despite its contributions, this study has several limitations that should be acknowledged. First, the research relies on self-reported survey data, which may be subject to response bias and common method variance. Future studies could incorporate objective trading data or multi-source information to enhance robustness. Second, the cross-sectional design limits the ability to draw causal inferences. Longitudinal studies would allow researchers to examine how behavioral biases and investment decisions evolve over time.

Future research may extend the present framework by exploring moderating or mediating variables, such as financial literacy, risk tolerance, or investor

experience, to better understand the mechanisms through which behavioral factors influence decision-making. Comparative studies across different markets or investor groups could also help assess the generalizability of the findings. Additionally, future work may employ alternative methodological approaches or hybrid SEM techniques to further validate and refine behavioral finance models in emerging economies.

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