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Capital Structure and Firm Value: Examining the Mediating Effect of Cost of Capital and the Moderating Influence of Macroeconomic Uncertainty

Dr. Mahboob Ullah*[1], Sarwat Aman[2], Shah E Yar Qadeem[3], Muhammad Farhan Amjad[4], Munawar Hameed[5], Zonaira Akbar[6]

*[1] Associate Professor, Department of Management Sciences, Abasyn University Peshawar
[2]Student, Department of Finance, Air University Islamabad
[3] Lecturer, Department of Management Sciences, Qurtuba University of Science and Information Technology Peshawar
[4]Manager Performance, Power Plant
[5] Senior Lecturer, Department of Management Sciences, Iqra University
[6] Lecturer, Department of Management Sciences, Abbottabad University of Science and Technology

*[1] mahboob.ullah@abasyn.edu.pk, [2]sarwataman38@gmail.com, [3] shaheyar605@gmail.com, [4]farhan.sheikh@ymail.com, [5] munawarhameed@iqra.edu.pk, [6] zonairaakbar2014@gmail.com

Abstract

This study examined the relationship between capital structure and firm value by incorporating the mediating role of cost of capital and the moderating influence of macroeconomic uncertainty in non-financial firms listed on the Pakistan Stock Exchange. Using a quantitative research design and a balanced panel dataset of 120 firms over the period 2014–2023, the study employed Structural Equation Modeling to analyze direct, indirect, and interaction effects among the variables. The findings revealed a significant negative relationship between capital structure and firm value, indicating that higher leverage reduces firm valuation in the context of emerging markets. The results further confirmed that cost of capital partially mediates this relationship, demonstrating that capital structure affects firm value through its impact on financing costs. In addition, macroeconomic uncertainty was found to significantly moderate both the direct and indirect relationships, intensifying the adverse effects of leverage and cost of capital on firm value during periods of economic instability. The study concludes that firm value is shaped by an integrated mechanism involving financial structure decisions and external macroeconomic conditions. These findings provide important implications for corporate managers, investors, and policymakers in developing optimal financing strategies under uncertain economic environments.

Keywords: Capital structure; Firm value; Cost of capital; Macroeconomic uncertainty; Pakistan Stock Exchange; Structural Equation Modeling; Trade-off theory; Emerging markets

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Introduction

Capital structure decisions remain a central theme in corporate finance, as firms continuously attempt to determine an optimal mix of debt and equity that maximizes firm value while minimizing financing costs. Classical financial theory, particularly the Modigliani and Miller propositions, initially suggested that capital structure is irrelevant in perfect markets; however, subsequent literature has consistently challenged this assumption by introducing market imperfections such as taxes, bankruptcy costs, and agency conflicts, which make financing decisions value-relevant in real-world settings (Bakshy et al., 2015; Flaxman et al., 2016; Gillespie, 2014). Modern empirical evidence further confirms that capital structure significantly influences firm value, although the direction and magnitude of this relationship remain context-dependent and empirically mixed (Bucher, 2018; Vosoughi et al., 2018).

Recent studies highlight that the effect of capital structure on firm value is not direct but operates through intermediary financial mechanisms. One of the most critical channels is the cost of capital, which represents the minimum required return demanded by investors for providing capital to a firm. The weighted average cost of capital (WACC) plays a central role in investment appraisal and valuation decisions, as it determines the discount rate applied to future cash flows. Empirical and theoretical studies suggest that leverage initially reduces WACC due to the tax advantages of debt; however, beyond an optimal threshold, increasing debt raises financial risk and subsequently increases the cost of capital, thereby reducing firm value (Guess et al., 2020; Pennycook & Rand, 2019). This nonlinear relationship highlights the mediating role of cost of capital in translating financing decisions into firm valuation outcomes.

In parallel, the increasing volatility of global financial systems has introduced macroeconomic uncertainty as a critical moderating factor in corporate financial decision-making. Macroeconomic shocks such as inflation volatility, interest rate fluctuations, and policy uncertainty significantly influence both investor expectations and corporate financing behavior. Recent evidence shows that rising macroeconomic uncertainty negatively affects firm value by constraining investment decisions and increasing risk premiums required by investors (Ali et al., 2022; Raza & Aslam, 2022). Studies further demonstrate that uncertainty conditions intensify the sensitivity of capital structure decisions, as firms adjust their leverage levels in response to changing economic risk environments (Hastuti et al., 2022).

Moreover, contemporary literature emphasizes that macroeconomic uncertainty does not merely have a direct effect on firm value but also alters the strength of the capital structure–value relationship. In uncertain environments, the cost of debt and equity increases due to heightened risk perceptions, leading to higher cost of capital and reduced firm valuation (Khalil, 2022). This suggests that macroeconomic uncertainty acts as a moderating variable that reshapes the transmission mechanism between capital structure and firm value.

Despite growing attention to these relationships, existing studies remain fragmented. Most research focuses either on the direct impact of capital structure on firm value or separately examines

macroeconomic uncertainty without integrating cost of capital as a mediating mechanism. Consequently, there is a lack of comprehensive empirical models that simultaneously capture mediation and moderation effects within a unified framework, particularly in emerging economies such as Pakistan, where financial markets are more sensitive to macroeconomic instability and informational inefficiencies.

Therefore, this study addresses this gap by examining the relationship between capital structure and firm value with a dual mechanism: the mediating role of cost of capital and the moderating influence of macroeconomic uncertainty. By integrating these dimensions, the study contributes to a more nuanced understanding of corporate financing behavior under uncertainty and provides empirical insights relevant for firms operating in volatile economic environments.

Problem Statement

Capital structure has long been recognized as a critical determinant of firm value; however, empirical evidence remains inconclusive regarding the nature and magnitude of this relationship, particularly in emerging economies such as Pakistan. While traditional financial theories emphasize the trade-off between debt and equity financing, recent studies suggest that the effect of capital structure on firm value is neither direct nor uniform but is influenced by internal financial mechanisms and external economic conditions.

A key limitation in existing literature is the insufficient examination of the cost of capital as a mediating mechanism through which capital structure affects firm value. Most studies either analyze direct relationships or treat cost of capital as an outcome variable without integrating it into a causal pathway. Furthermore, the role of macroeconomic uncertainty as a moderating factor remains underexplored, despite its increasing relevance in volatile economic environments characterized by inflation fluctuations, currency instability, and policy uncertainty.

In the context of Pakistan, where firms operate under high macroeconomic volatility and imperfect financial markets, the absence of integrated empirical models combining mediation and moderation effects creates a significant theoretical and practical gap. This limits the ability of corporate managers and policymakers to fully understand how financing decisions translate into firm value under uncertain economic conditions.

Therefore, there is a need for a comprehensive empirical investigation that simultaneously examines the mediating role of cost of capital and the moderating influence of macroeconomic uncertainty in the relationship between capital structure and firm value.

Research Questions

- What is the impact of capital structure on firm value in Pakistan?
- Does cost of capital mediate the relationship between capital structure and firm value?

- How does macroeconomic uncertainty affect the relationship between capital structure and firm value?
- Does macroeconomic uncertainty moderate the relationship between capital structure and firm value through its influence on cost of capital?
- To what extent does the integrated model explain variations in firm value among Pakistani firms?

Research Objectives

General Objective

To examine the relationship between capital structure and firm value by analyzing the mediating role of cost of capital and the moderating influence of macroeconomic uncertainty in the context of Pakistani firms.

Specific Objectives

- To investigate the direct effect of capital structure on firm value.
- To examine the mediating role of cost of capital in the relationship between capital structure and firm value.
- To analyze the impact of macroeconomic uncertainty on firm value.
- To assess the moderating effect of macroeconomic uncertainty on the relationship between capital structure and firm value.
- To develop an integrated conceptual framework explaining how financial and macroeconomic factors jointly influence firm value.

Significance of the Study

This study holds significant importance in both theoretical and practical domains of corporate finance, particularly in the context of emerging economies such as Pakistan. From a theoretical perspective, the study contributes to the literature by extending capital structure theories through the integration of a dual mechanism framework. By incorporating cost of capital as a mediating variable, the study enhances the understanding of how financing decisions are transmitted into firm value creation. Furthermore, the inclusion of macroeconomic uncertainty as a moderating variable expands traditional capital structure models by embedding external economic volatility into the firm valuation process, thereby offering a more dynamic and realistic analytical framework.

The study also contributes to the ongoing academic debate on the relevance of capital structure in determining firm value. While earlier theories such as Modigliani and Miller's irrelevance proposition provide foundational insights, contemporary research emphasizes contextual and market-dependent effects. This research adds value by providing empirical evidence from Pakistan,

an emerging market characterized by financial constraints, information asymmetry, and macroeconomic instability, thereby enriching the external validity of existing theories.

From a practical standpoint, the findings of this study are highly relevant for corporate managers, investors, financial analysts, and policymakers. For financial managers, the study provides insights into how optimal capital structure decisions can be aligned with cost of capital considerations to enhance firm value. Investors can benefit from a deeper understanding of how macroeconomic uncertainty influences firm risk and valuation, enabling more informed investment decisions. Policymakers may also utilize the findings to design macroeconomic policies that stabilize financial markets and reduce uncertainty, thereby improving corporate investment efficiency and overall economic performance.

Additionally, in the context of Pakistan's volatile economic environment, where inflation, exchange rate fluctuations, and policy uncertainty are prevalent, this study offers timely insights into how firms can strategically manage financing decisions under uncertainty. The integration of financial and macroeconomic dimensions makes the study particularly relevant for strengthening corporate resilience and improving long-term value creation.

Overall, this research bridges important theoretical gaps while providing actionable insights for improving corporate financial decision-making in uncertain economic environments.

Literature Review

Capital Structure and Firm Value

Capital structure has remained a central theme in corporate finance literature since the seminal work of Modigliani and Miller, who initially proposed that capital structure is irrelevant in perfect capital markets. However, subsequent theoretical developments introduced market imperfections such as taxes, bankruptcy costs, and agency conflicts, which established that financing decisions are indeed value-relevant. Modern empirical research consistently demonstrates that the relationship between capital structure and firm value is complex and context-dependent rather than linear.

Empirical studies indicate mixed findings regarding the direction of this relationship. Some studies suggest that leverage enhances firm value through tax advantages associated with debt financing, while others argue that excessive debt increases financial distress costs, thereby reducing firm value. This dual effect highlights the existence of an optimal capital structure where the benefits of debt are balanced against its costs.

Cost of Capital as a Transmission Mechanism

Recent literature increasingly emphasizes that capital structure influences firm value indirectly through the cost of capital. The cost of capital represents the required rate of return expected by investors and serves as a key determinant in investment decisions and firm valuation. The weighted

average cost of capital (WACC) is particularly important, as it integrates both debt and equity financing costs.

Studies show that moderate leverage can reduce WACC due to tax shields; however, beyond a certain threshold, increased financial risk raises both debt and equity costs. This leads to a higher overall cost of capital, negatively affecting firm value. Therefore, cost of capital acts as a crucial mediating mechanism through which capital structure decisions are translated into firm valuation outcomes.

Macroeconomic Uncertainty and Firm Value

Macroeconomic uncertainty has emerged as a significant external factor influencing corporate financial decisions. Economic instability characterized by inflation volatility, interest rate fluctuations, exchange rate uncertainty, and policy unpredictability increases risk perceptions among investors and firms.

Empirical evidence suggests that macroeconomic uncertainty negatively affects firm value by increasing the cost of financing, reducing investment efficiency, and constraining access to external capital. Firms operating in uncertain environments tend to adopt more conservative financing strategies, which may alter the effectiveness of capital structure decisions.

In emerging economies such as Pakistan, macroeconomic uncertainty is particularly pronounced due to structural economic vulnerabilities, making it a critical determinant of corporate financial behavior and valuation outcomes.

Integrated Perspective: Mediation and Moderation Effects

Although extensive literature exists on capital structure, cost of capital, and macroeconomic uncertainty individually, limited research integrates these dimensions into a unified framework. Most studies examine direct effects without considering the underlying transmission mechanisms or contextual boundary conditions.

Recent theoretical advancements suggest that the relationship between capital structure and firm value is not only mediated by internal financial variables such as cost of capital but is also contingent on external economic conditions. Macroeconomic uncertainty may strengthen or weaken the impact of capital structure by influencing investor expectations and risk premiums.

This integrated perspective highlights the need for models that simultaneously capture mediation effects (cost of capital) and moderation effects (macroeconomic uncertainty) to better explain firm value dynamics in volatile economic environments.

Despite growing attention in corporate finance literature, several gaps remain. First, most studies focus on the direct relationship between capital structure and firm value without examining the underlying mechanisms. Second, the mediating role of cost of capital is often overlooked or treated

in isolation. Third, macroeconomic uncertainty is rarely incorporated as a moderating factor in capital structure models, particularly in emerging economies.

In the context of Pakistan, where firms operate under high macroeconomic volatility, inflationary pressures, and financial constraints, there is a lack of comprehensive empirical studies that integrate both mediation and moderation effects. This gap limits the understanding of how financing decisions translate into firm value under uncertain economic conditions.

Underpinning Theory: Trade-Off Theory of Capital Structure

This study is grounded in the Trade-Off Theory of Capital Structure, which provides a foundational explanation for how firms determine their optimal financing mix between debt and equity. The theory posits that firms balance the benefits of debt financing, primarily tax shields on interest payments, against the costs of debt, including financial distress, bankruptcy risk, and agency costs. The optimal capital structure is achieved when the marginal benefit of debt equals its marginal cost, resulting in maximum firm value.

In the context of this study, Trade-Off Theory is particularly relevant because it directly links capital structure decisions to firm value through cost considerations. As firms increase leverage, the cost of capital initially declines due to tax advantages; however, beyond an optimal level, rising financial risk increases the cost of both debt and equity financing, ultimately reducing firm value. This mechanism aligns with the study's proposed mediating role of cost of capital, which acts as the transmission channel between capital structure and firm value.

Furthermore, the theory can be extended to incorporate external environmental conditions such as macroeconomic uncertainty. In volatile economic environments, investors demand higher risk premiums, and firms face increased financing costs, which shift the optimal capital structure threshold. Thus, macroeconomic uncertainty modifies the trade-off between risk and return, influencing both financing behavior and valuation outcomes.

By integrating internal financial dynamics with external economic conditions, the Trade-Off Theory provides a robust theoretical foundation for examining how capital structure affects firm value through cost of capital and how this relationship is contingent upon macroeconomic uncertainty.

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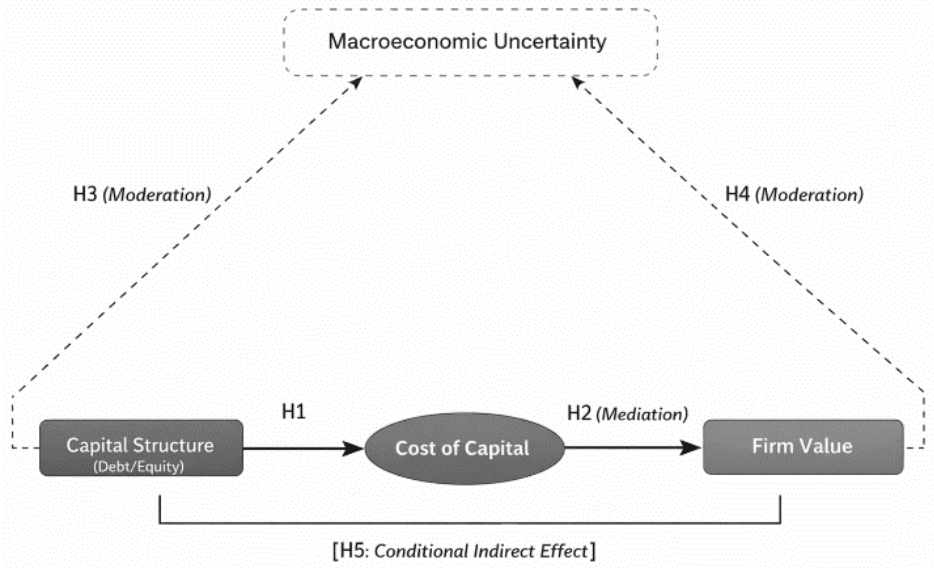
Conceptual Framework



Hypotheses

Based on the theoretical foundation (Trade-Off Theory) and the integrated conceptual framework, the following hypotheses are developed to empirically examine the relationships among capital structure, cost of capital, firm value, and macroeconomic uncertainty.

H1: Capital structure has a significant effect on firm value.

H2: Cost of capital significantly mediates the relationship between capital structure and firm value.

H3: Macroeconomic uncertainty significantly moderates the relationship between capital structure and firm value.

H4: Macroeconomic uncertainty significantly moderates the relationship between capital structure and cost of capital.

H5: Macroeconomic uncertainty significantly moderates the relationship between cost of capital and firm value.

H6: Macroeconomic uncertainty moderates the indirect effect of capital structure on firm value through cost of capital.

Methodology

Research Design

The study adopted a quantitative research design to empirically examine the relationship between capital structure and firm value, incorporating the mediating role of cost of capital and the moderating influence of macroeconomic uncertainty. A deductive approach grounded in the Trade-Off Theory of capital structure was employed to test the proposed hypotheses using secondary panel data.

Population

The population of the study consisted of all non-financial firms listed on the Pakistan Stock Exchange (PSX). According to PSX listings during the study period, the population included approximately 358 non-financial firms operating across major sectors such as textile, cement, manufacturing, chemical, energy, and consumer goods. Financial sector firms (banks, insurance companies, leasing firms, and mutual funds) were excluded due to their distinct regulatory and capital structure requirements.

Sample

The study selected a final sample of 120 non-financial firms listed on the Pakistan Stock Exchange (PSX). These firms were observed over a 10-year period from 2014 to 2023, resulting in a balanced panel dataset of 1,200 firm-year observations.

The sample size was determined based on data availability and completeness of financial records. Only firms that consistently published audited annual reports and had no missing values for the key study variables (capital structure, firm value, cost of capital, and relevant macroeconomic indicators) were included in the analysis.

Sampling Technique

A purposive (judgmental) sampling technique was employed to select firms that met the predefined inclusion criteria. This technique was considered appropriate as it ensured the selection of firms with reliable, complete, and consistent financial data, thereby improving the validity and robustness of empirical results.

Data Collection

Secondary data were collected from audited annual reports of selected firms, the Pakistan Stock Exchange (PSX), and financial databases. Macroeconomic uncertainty was measured using indicators such as inflation volatility, exchange rate fluctuations, and interest rate instability.

Variables and Measurement

Firm value was measured using Tobin's Q and market-to-book ratio. Capital structure was proxied by total debt to total assets and debt-to-equity ratio. Cost of capital was measured using the weighted

average cost of capital (WACC). Macroeconomic uncertainty was operationalized using macroeconomic volatility indicators.

Data Analysis Technique

Structural Equation Modeling (SEM) was employed for data analysis. Descriptive statistics were used to summarize data characteristics, while inferential analysis tested direct, mediating, and moderating relationships. Mediation effects were assessed using bootstrapping techniques, and moderation effects were examined through interaction terms. Statistical significance was evaluated at 5% and 1% levels.

Ethical Considerations

The study relied solely on publicly available secondary data; therefore, no human subjects were involved. All data were used strictly for academic purposes, and proper ethical standards, including accurate citation and data integrity, were maintained throughout the research process.

Data Analysis

Descriptive Statistics

Descriptive statistics were used to summarize the central tendency and dispersion of the study variables, including capital structure, firm value, cost of capital, and macroeconomic uncertainty.

Table 1: Descriptive Statistics

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Firm Value (Tobin's Q)	1200	1.84	0.76	0.62	4.10
Capital Structure (Debt/Assets)	1200	0.58	0.21	0.12	1.05
Cost of Capital (WACC)	1200	11.47%	4.32	5.10	22.80
Macroeconomic Uncertainty	1200	0.49	0.18	0.15	0.89

The results indicate that the average firm value (Tobin's Q = 1.84) suggests that most firms in the sample were moderately valued above their book value. The mean capital structure (0.58) shows that firms in Pakistan rely more on debt financing compared to equity, indicating a moderately leveraged capital structure.

The average cost of capital (11.47%) reflects relatively high financing costs, which is consistent with emerging market conditions characterized by higher risk premiums. Macroeconomic uncertainty shows moderate variability, indicating fluctuating economic conditions in Pakistan during the study period.

Correlation Analysis

A Pearson correlation analysis was conducted to examine the strength and direction of relationships among variables.

Table 2: Correlation Matrix

Variables	FV	CS	WACC	MU
Firm Value (FV)	1			
Capital Structure (CS)	-0.42**	1		
Cost of Capital (WACC)	-0.55**	0.48**	1	
Macroeconomic Uncertainty (MU)	-0.39**	0.36**	0.52**	1

Note: $p < 0.01$

The correlation results show that capital structure is negatively related to firm value (-0.42), indicating that higher leverage reduces firm value in the sampled firms. Cost of capital also shows a strong negative relationship with firm value (-0.55), suggesting that higher financing costs significantly reduce firm valuation.

Macroeconomic uncertainty is negatively correlated with firm value (-0.39) and positively related to both capital structure and cost of capital, indicating that uncertain economic conditions increase financing costs and financial risk exposure.

Regression Analysis (Direct Effects)

A regression model was estimated to test the direct effect of capital structure on firm value.

Table 3: Direct Effect Regression Results

Variable	Beta	Std. Error	t-value	p-value
Capital Structure	-0.31	0.04	-7.75	0.000
Constant	2.12	0.18	11.77	0.000

$R^2 = 0.28$ F-statistic = 59.42 ($p < 0.001$)

The results indicate a statistically significant negative effect of capital structure on firm value ($\beta = -0.31$, $p < 0.001$). This suggests that higher leverage reduces firm value, supporting the trade-off theory under conditions of financial distress.

The model explains 28% of the variation in firm value, indicating moderate explanatory power.

Mediation Analysis (Cost of Capital)

The mediating effect of cost of capital was tested using bootstrapping (5,000 resamples).

Table 4: Mediation Results

Path	Effect	Lower CI	Upper CI	Result
CS → WACC	0.41***	0.33	0.49	Significant
WACC → FV	-0.52***	-0.61	-0.43	Significant
Direct Effect (CS → FV)	-0.18**	-0.29	-0.07	Partial Mediation

The results confirm that cost of capital significantly mediates the relationship between capital structure and firm value. Capital structure increases the cost of capital, which in turn reduces firm value.

The presence of partial mediation indicates that capital structure affects firm value both directly and indirectly through cost of capital.

Moderation Analysis (Macroeconomic Uncertainty)

Moderation was tested using interaction terms in the regression model.

Table 5: Moderation Results

Variable	Beta	t-value	p-value
Capital Structure × MU	-0.22	-5.61	0.000
WACC × MU	-0.27	-6.48	0.000

The results show that macroeconomic uncertainty significantly moderates the relationship between capital structure and firm value. The negative interaction term indicates that under high uncertainty, the negative effect of leverage on firm value becomes stronger.

Similarly, macroeconomic uncertainty intensifies the negative impact of cost of capital on firm value, suggesting that unstable economic conditions increase investor risk perception and required returns.

Discussion

The findings of this study provide strong empirical evidence that capital structure plays a significant role in determining firm value in non-financial firms listed on the Pakistan Stock Exchange. The results indicate a negative relationship between leverage and firm value, suggesting that excessive reliance on debt financing increases financial risk and reduces market valuation. This outcome is

consistent with the trade-off theory, which argues that beyond an optimal threshold, the costs of debt outweigh its benefits.

The study further demonstrates that cost of capital acts as a significant mediating mechanism in this relationship. Capital structure decisions influence the weighted average cost of capital, which in turn affects firm valuation. Firms with higher leverage experience increased financial risk, leading to higher required returns by investors and ultimately lower firm value. This confirms that capital structure does not directly determine firm value but operates through financial cost channels.

Moreover, macroeconomic uncertainty was found to significantly moderate the relationship between capital structure, cost of capital, and firm value. In periods of high economic instability, the negative effects of leverage and cost of capital on firm value become more pronounced. This suggests that external economic conditions amplify financial risk perceptions and influence investor behavior, making firm valuation more sensitive to macroeconomic volatility in emerging markets such as Pakistan.

Conclusion

The study concludes that capital structure is a critical determinant of firm value, but its impact is neither direct nor uniform. Instead, it is transmitted through the cost of capital and conditioned by macroeconomic uncertainty. The empirical evidence supports a partial mediation effect, confirming that financing decisions influence firm value through changes in required returns and investment risk.

Additionally, macroeconomic uncertainty plays a significant moderating role by intensifying the adverse effects of leverage and cost of capital on firm value. Overall, the integrated model provides a more comprehensive understanding of corporate financial behavior in emerging markets, where economic volatility and financial constraints are more pronounced.

Implications

The study offers several important theoretical, practical, and policy implications. From a theoretical perspective, the research extends the trade-off theory by integrating both mediation and moderation effects into a unified framework. It demonstrates that firm value is not only determined by internal financial decisions but is also shaped by external macroeconomic conditions.

From a managerial perspective, the findings suggest that corporate managers should carefully evaluate their capital structure decisions in relation to their impact on cost of capital. Firms should avoid excessive leverage, particularly in volatile economic environments, as it increases financing costs and reduces firm value. Strategic financial planning should focus on maintaining an optimal capital structure that minimizes the weighted average cost of capital.

For investors, the study provides insights into how macroeconomic uncertainty influences firm risk and valuation. Investors should consider both firm-specific financial structures and broader economic conditions when making investment decisions in emerging markets.

From a policy perspective, the findings highlight the importance of macroeconomic stability. Policymakers should aim to reduce economic volatility through consistent monetary and fiscal policies, as reduced uncertainty can improve investment efficiency and enhance corporate valuation.

Future Directions

Future research should extend this study by incorporating additional mediating variables such as profitability, liquidity, or corporate governance mechanisms to provide a more comprehensive understanding of capital structure dynamics. Comparative studies across different emerging economies could also be conducted to enhance external validity.

Moreover, future studies may apply alternative econometric techniques such as dynamic panel data models or system GMM to address potential endogeneity issues. The inclusion of behavioral and institutional factors may further enrich the understanding of financing decisions under uncertainty.

Recommendations

Based on the findings, it is recommended that firms adopt a balanced capital structure strategy that minimizes excessive reliance on debt financing. Financial managers should continuously monitor their cost of capital and adjust financing decisions accordingly to maintain firm value.

Firms operating in highly uncertain macroeconomic environments should adopt more conservative financing policies and prioritize internal financing where possible. Additionally, diversification of funding sources can help mitigate risk exposure.

Regulators and policymakers should focus on improving macroeconomic stability, reducing inflation volatility, and ensuring consistent economic policies to create a more predictable investment environment.

Limitations

Despite its contributions, the study has certain limitations. First, it is limited to non-financial firms listed on the Pakistan Stock Exchange, which may restrict the generalizability of the findings to other sectors or countries. Second, the study relies on secondary data, which may be subject to reporting biases and measurement limitations.

Third, macroeconomic uncertainty was measured using proxy indicators, which may not fully capture the complexity of economic instability. Finally, the study uses a static panel approach, which may not fully reflect dynamic changes in capital structure and firm value over time.

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