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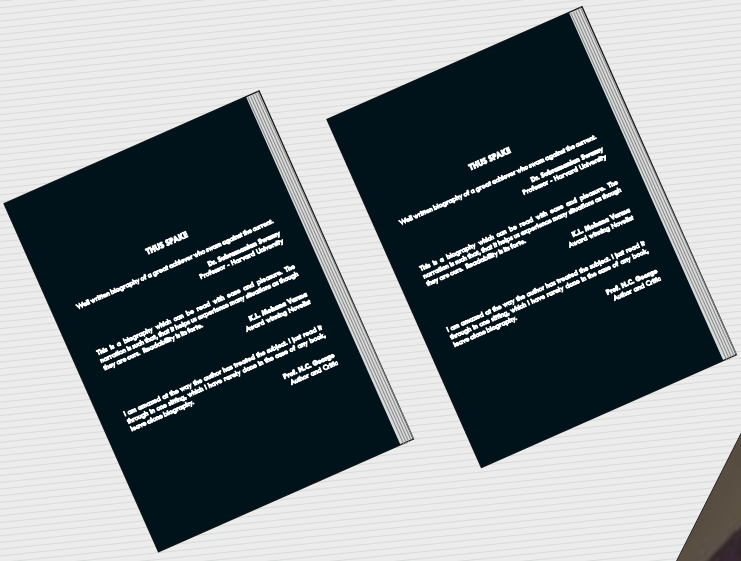
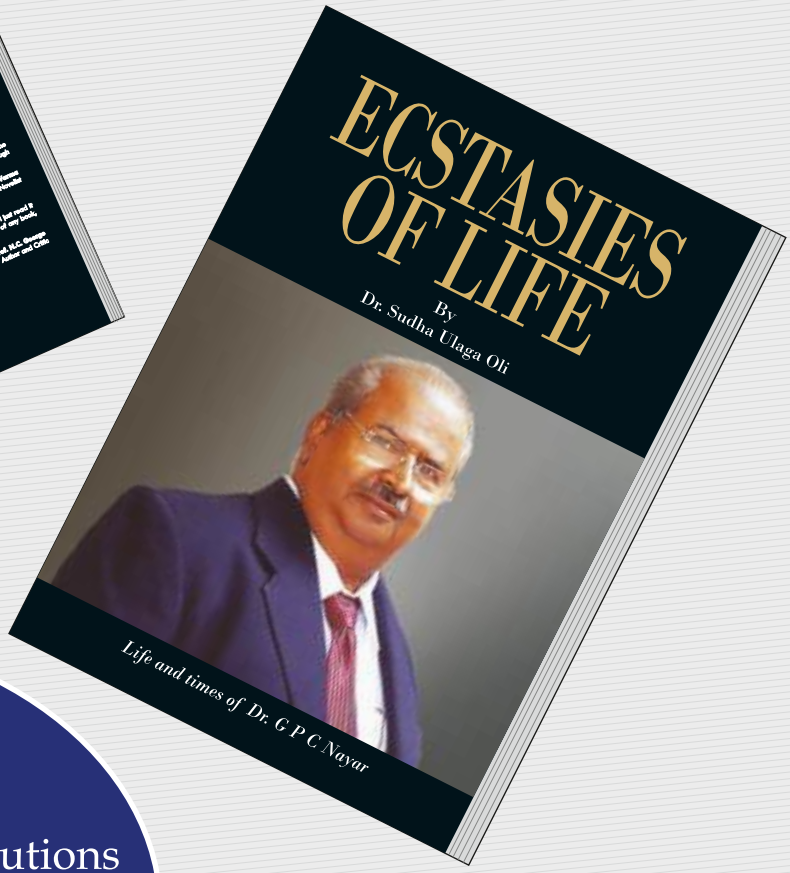
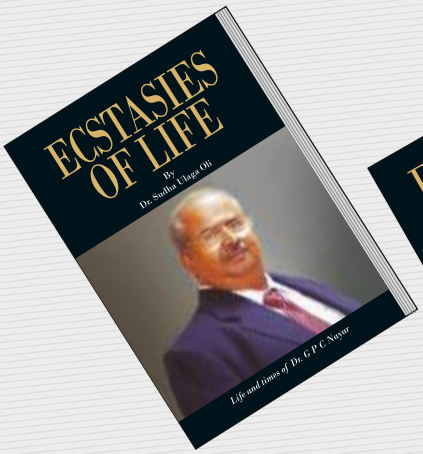
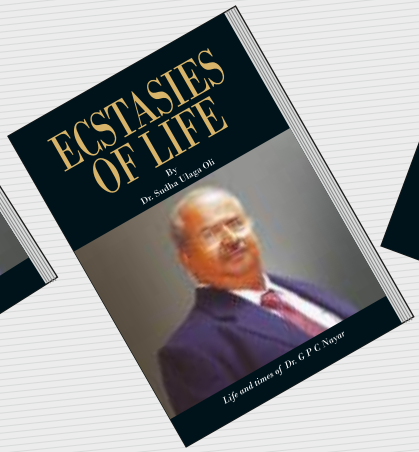




Here's an entrepreneur
who has created
some excellent academic institutions
in an unfriendly environment.
It is a saga of trials and tribulations
in an extremely readable manner
by a consummate
writer in English.





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Articles

Chairman's Overview

Integration of AI into Academics – The Way Forward for B-Schools

The rapid advancement of Artificial Intelligence has redefined the way we live, work, and learn. Within academic institutions, especially business schools, AI is no longer a distant possibility but an active reality shaping teaching, research, and administration. From personalized learning platforms to AI-driven research tools, the opportunities are immense. Yet, as with every transformative technology, the manner in which AI is integrated into education must be guided by ethical responsibility and a commitment to holistic student development.

B-Schools occupy a unique space in higher education. They are tasked not only with imparting knowledge but also with preparing future leaders to navigate complex organizational and societal challenges. In this context, AI offers valuable prospects—predictive analytics for student performance, intelligent tutoring systems, automated grading, and enhanced case study simulations. However, the integration of these tools must be thoughtful, ensuring that technology complements rather than replaces the human touch in education. Faculty mentorship, peer learning, and critical debate remain irreplaceable in shaping managerial wisdom.

Ethical concerns around AI adoption cannot be overlooked. Data privacy, algorithmic bias, academic integrity, and over-reliance on automated systems are real challenges. For instance, while AI can streamline plagiarism detection, its misuse may also encourage academic shortcuts if students become overly dependent on generative tools. It is therefore imperative for B-Schools to build a culture of responsible AI use. This requires clear guidelines, strong digital ethics frameworks, and continuous sensitization of both faculty and students.

The way forward lies in striking a balance—harnessing AI to enhance efficiency and enrich pedagogy while safeguarding core academic values. Faculty members must be equipped with training to integrate AI tools into their teaching and research, not as substitutes for intellectual rigor but as enablers of deeper inquiry. Curricula should include modules on AI literacy and ethics, ensuring that future managers understand both the potential and pitfalls of these technologies.

Ultimately, the fruitful adaptation of AI in B-Schools must align with the broader mission of education: nurturing responsible, innovative, and empathetic leaders. If guided by ethical principles and human-centric values, AI can become not a disruptor but a trusted ally in advancing academic excellence and societal well-being.

Dr. G. P. C. NAYAR
Chairman, SCMS Group of Educational Institutions.

SCMS Journal of Indian Management

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Editors

Editorial Board

Editorial

This issue of the *SCMS Journal of Indian Management* brings together a diverse range of scholarly contributions, each addressing pressing questions at the intersection of leadership, finance, policy, and organisational behaviour. Together, these studies reflect the dynamism of management research and its relevance to both theory and practice.

The first article investigates how ethical and charismatic leadership reduce employees' intention to quit, mediated by affective commitment. By highlighting the importance of trust, emotional attachment, and responsible leadership, the study reinforces the role of leaders in retaining talent. Complementing this theme, another contribution introduces the ELS-MRP scale, a pioneering tool to measure the effect of leadership styles on the performance of medical representatives in India's pharmaceutical sector. The development of this scale offers both academics and practitioners a structured approach to assess and improve frontline effectiveness.

Extending the focus on human resources, one paper develops and validates a causal-formative scale of job quality, demonstrating its linkages to job satisfaction and turnover intention. This research underscores how job design and quality remain central to employee engagement in a technology-driven era.

Shifting to finance and markets, one study evaluates the predictive power of the CAPM and Fama-French Five-Factor Model for non-financial firms in Sri Lanka, concluding that the latter captures risk dimensions more comprehensively. Relatedly, another investigation explores the determinants of CEO remuneration in Indian listed firms, offering evidence that firm-specific structural and financial factors significantly influence executive pay.

The rapidly evolving fintech sector is also featured, with a study examining how fintech innovations shape investor evaluations of banking competitiveness across Asia. Its insights into technology-driven disruption are timely for both regulators and strategists. Policy impact is considered in another contribution analysing how the introduction of GST influenced volatility in India's multi-commodity exchange. The findings indicate that markets responded with resilience, challenging assumptions about policy-induced uncertainty.

Investor behaviour forms the core of another paper, which distinguishes between the contrarian strategies of domestic institutional investors and the momentum-driven strategies of their foreign counterparts in the Indian stock market. Finally, the issue closes with an important study on financial statement fraud in the pharmaceutical sector, establishing how manipulation erodes firm value and stakeholder trust.

Taken together, these articles reflect the journal's commitment to advancing knowledge that is both contextually grounded and globally relevant. They also reaffirm the responsibility of management scholarship to inform ethical leadership, robust financial systems, and transparent governance in an increasingly complex business landscape.

Dr. Radha Thevannoor

Investigating the Power of Ethical and Charismatic Leadership on Intention to Quit vis-à-vis the Mediating Role of Affective Commitment

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Abstract

In the ever-evolving realm of corporate dynamics, there is a strong focus on ethical leadership, driven by several key factors, including the implementation of new government regulations, the impact of media, and corporate scandals. Ethical leaders take the initiative to direct their followers towards behaving ethically and morally. On the other hand, charismatic leaders possess an extraordinary ability to captivate and revolutionise through their supernatural and creative power. Ethical and Charismatic leaders are revered as saviours, ushering favourable transformations to organisations. Affective commitment refers to the emotional attachment that an individual possesses for their organisation, which in turn reduces an employee's intention to leave the workplace. To drive growth and transformative business change, leaders must attract and retain a competent workforce. This study explores the intricate relationship between the study variables, i.e. ethical leadership, charismatic leadership, affective commitment, and intention to quit.

A cross-sectional survey was used to gather data from 485 employees working in the service sector. Data analysis was performed using Confirmatory Factor Analysis, and Structural Equation Modelling unravelled the relationship among variables. The findings indicated that there is a significant positive impact of charismatic and ethical leadership on affective commitment, with charismatic leadership exerting a more substantial influence. Both leadership styles considerably decrease an employee's intention to quit, with a partial mediating effect of affective commitment. This research has significant theoretical and practical implications. This study reflects on a deeper understanding of ethical and charismatic leadership, affective commitment, and intention to quit. Also, the employees are less likely to consider leaving their organisation for greener pastures when their leaders exude both charm and ethics. The findings have significant implications for future organisational contexts, particularly indicating actions that may boost employees' sense of association with their place of work. This paper contributes to understanding the relationship between ethical and charismatic leadership and turnover intention by examining affective commitment as a mediator.

Keywords*: Affective commitment, charismatic leadership, ethical leadership, intention to quit, retention*

1. Introduction

Ethical leadership is increasingly recognised as a cornerstone for building successful and sustainable organisations. It encompasses the demonstration of integrity, fairness, and responsibility through leaders' personal actions and decision-making processes. These decisions often take into account the welfare of various stakeholders and shape the organisation's overall ethical climate. Ethical leaders are instrumental in cultivating an environment that prioritises just and moral treatment of employees, which in turn can lead to enhanced employee well-being and reduced operational costs (Thomas et al., 2004; Yazdanshenas & Mirzaei, 2023). The positive influence of ethical leadership in curbing unethical practices and negative workplace behaviour has been affirmed by a wide array of studies (Dust et al., 2018; Mayer et al., 2009; Walumbwa & Schaubroeck, 2009). However, despite this growing body of literature, there remains a relative lack of focus on the relationship between ethical leadership and employees' intention to leave the organisation (Athanasiadou et al., 2023; Wang & Yang, 2016). Social learning theory has often been used to explain how ethical leadership fosters positive work behaviour, positing that ethical leaders serve as role models and their actions are emulated by their followers (Brown & Treviño, 2006). In doing so, leaders facilitate the establishment and reinforcement of ethical standards, which in turn cultivate shared values among employees to enhance job performance and minimise counterproductive work behaviour (Byun et al., 2018; Piccolo et al., 2010).

Though ethical leadership-performance linkage is well-documented, the underlying mediating relationship mechanism with turnover intention is less frequently explored (Walumbwa et al., 2012). Previous studies have suggested that the interplay of the values of leaders and employees plays a pivotal role in enhancing performance and reducing attrition (Bouckenooghe et al., 2015; De Hoogh & Den Hartog, 2008). Ethical leaders foster an environment where employees feel more invested and aligned with the mission by instilling shared moral frameworks and organisational goals, leading to a superior likelihood of goal-congruent behaviour –(Brown et al., 2005). The contrary situation may foster toxic workplace cultures with eroding trust, morale, and ultimately, organisational productivity (Garg et al., 2022), which highlights the necessity for organisations to embrace leadership practices rooted in ethics and integrity.

Complementing ethical leadership can be attributed to charismatic leadership, which revolves around a leader's ability to inspire and profoundly influence their followers through personal magnetism, compelling vision, and exemplary behaviour (Conger & Kanungo, 1994; House et al., 1990). Charismatic leaders are known for motivating followers to exceed expectations by appealing to their emotions and sense of purpose, especially in dynamic and high-pressure work environments, and fostering loyalty, admiration, and strong emotional bonds while making their leadership style particularly effective in assimilating organisational change with increased commitment (Bass, 1990; Jia et al., 2024). These leaders have been closely associated with transformational influence via ambitious goal setting, articulating a compelling vision to stimulate coordinated effort with targeted value alignment and follower identification (House & Shamir, 1993). Conger and Kanungo (1994) underscore the importance of personal charisma in motivating subordinates, while Fuller et al. (1996) highlight their ability to translate vision into shared action. Despite its prominence in leadership theory, the concept remains somewhat elusive in empirical research due to the challenges in consistently defining and measuring charisma (Bryman, 1992; Howell & Frost, 1989). Nevertheless, charismatic leadership continues to occupy a central role in organisational behaviour studies, particularly in contexts of organisational transitions or crises (Reyaz, 2024).

The meta-analytic work has attempted to consolidate findings on charismatic leadership, illustrating its correlation with improved performance outcomes, emotional engagement and satisfaction (Banks et al., 2017; DeGroot et al., 2000; Hunter & Schmidt, 1990; Tavares et al., 2021; Zhang et al., 2025). Moreover, much attention has been given to performance outcomes; the mechanisms through which charismatic leadership reduces turnover intention, particularly through emotional variables like affective commitment, remain under-researched (Mangundjaya et al., 2024). By investigating how charismatic leaders enhance emotional bonds within teams, this study aims to clarify the indirect pathways of affective commitment through which such leadership can effectively reduce employee intention to quit.

In the world of leadership dynamics, affective commitment plays a significant role and reflects an employee's emotional attachment and identification with their organisation (Mathieu & Zajac, 1990; Mercurio, 2015; Meyer et al.,

2002; Nanjundeswaraswamy, 2023). When employees genuinely resonate with their organisation's mission and values, they are more likely to stay and perform well (Mowday et al., 1982; Meyer et al., 2002). Research consistently shows a strong negative link between affective commitment and turnover intention. Employees with deeper emotional bonds are significantly less likely to leave (Haque et al., 2019; Samuel & Engelbrecht, 2021; Solinger et al., 2008). Leaders play a crucial role in shaping this commitment by fostering trust, respect, and shared values, while also reinforcing employees' emotional attachment. This approach is not just about retention; it creates a sense of purpose and cohesion in the workplace.

Building on these ideas, this study explores how ethical and charismatic leadership styles influence employees' intentions to quit, with a specific focus on how affective commitment serves as a mediator. The objective is to determine whether strong, value-driven leadership can foster deeper emotional connections that ultimately help retain talent in-house. The understanding of how these two leadership styles interact with affective commitment, along with practical insights for organisations looking to create a stable, motivated, and loyal workforce, has been put in place. In summation, research aims to bridge the gap in the literature on how leadership styles can be leveraged to strengthen retention through affective commitment, which has been examined empirically.

2. Theoretical Underpinning and Hypotheses Development

The study is grounded in the premise that leadership styles significantly influence employee turnover intention through their effect on emotional attachment to the organisation, i.e. affective commitment. This study integrates three key theoretical perspectives to develop its hypotheses i.e. drawing from Social Exchange Theory (Blau, 1964) which explains how ethical treatment from leaders fosters reciprocation in the form of commitment; Affective Events Theory (Weiss & Cropanzano, 1996) which frames leadership as a source of emotional events that shape affective responses in the workplace; and Transformational Leadership Theory (Bass, 1985), which supports the influence of charismatic leaders on employee engagement and emotional investment. This section develops a framework to explain how ethical and charismatic leadership styles impact employees' intention to quit, with a mediating mechanism of affective commitment.

2.1 Ethical Leadership and Intention to Quit

Ethical leadership is defined as the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers (Brown et al., 2005). Ethical leaders are honest, principled, and fair, creating psychologically safe environments that promote trust and mutual respect. According to Social Exchange Theory, when leaders exhibit ethical behaviour, employees perceive this as organisational support and respond with greater loyalty and reduced desire to exit the organisation (DeConinck, 2015). Ethical leadership has been empirically shown to reduce turnover intention by promoting fairness and mitigating job stress (Benevene et al., 2018; Elçi et al., 2012; Li et al., 2022; Lin & Liu, 2017; Shafique et al., 2018). Yurtkoru et al. (2018) also found trust to be a mediator in this relationship, reinforcing the inverse relationship between ethical leadership and turnover intention.

H1: Ethical leadership negatively influences employees' intention to quit.

2.2 Charismatic Leadership and Intention to Quit

Charismatic leadership refers to the ability of a leader to inspire, motivate, and instil a strong sense of commitment through personal charm, vision, and exceptional communication (Conger & Kanungo, 1988). Charismatic leaders influence followers by articulating a compelling vision and fostering a shared sense of identity. This leadership style is closely aligned with Transformational Leadership Theory, which posits that leaders inspire followers to exceed expectations by aligning personal goals with organisational objectives (Bass, 1997). Employees often prefer to be led by charismatic leaders, increasing their emotional connection to the organisation and reducing turnover intention (Lindblom et al., 2016). Researches affirm that charismatic leadership is negatively associated with employee turnover (Dixon & Hart, 2010; Feng & Pircher Verdorfer, 2020; Tavares et al., 2021).

H2: Charismatic leadership negatively influences employees' intention to quit.

2.3 Ethical Leadership and Affective Commitment

Affective commitment represents the emotional attachment of employees to the organisation (Meyer & Allen, 1991). Ethical leadership fosters such attachment by promoting justice, respect, and concern for employees' well-being

(Brown & Treviño, 2006). According to Social Exchange Theory (Blau, 1964), when leaders treat employees ethically and fairly, employees are likely to reciprocate with positive attitudes and behaviours, such as increased affective commitment. Ethical leadership has been shown to positively influence affective commitment, both directly and indirectly, as supported by several empirical studies (Demirtas & Akdogan, 2015; Khuntia & Suar, 2004; Neubert et al., 2009; Ruiz et al., 2011; Santiago-Torner et al., 2024). Ethical leaders provide employees with a sense of purpose and belonging, which strengthens their emotional investment in the organisation and reduces withdrawal intentions.

H3: Ethical leadership positively influences employees' affective commitment.

2.4 Charismatic Leadership and Affective Commitment

Charismatic leadership plays a significant role in enhancing employees' affective commitment by fostering emotional engagement, a compelling vision, and a deep sense of purpose. Drawing from **Transformational Leadership Theory** (Bass, 1985), charismatic leaders are seen as inspirational figures who articulate an appealing organisational vision, model core values, and demonstrate confidence, thereby strengthening employees' emotional attachment to the organisation. This emotional connection reinforces employees' identification with organisational goals and values (Bass, 1997). Moreover, according to **the Self-Concept Based Theory of Charismatic Leadership** (Shamir et al., 1993; 1998), charismatic leaders influence followers by aligning work with personal identity and meaning, which heightens intrinsic motivation and deepens affective bonds. As a result, employees experience a more substantial emotional commitment and a desire to remain with the organisation. Empirical research also supports this link, indicating that charismatic leadership is positively associated with affective commitment (Shamir et al., 1998; Tufan, 2022; Zangaro, 2001).

H4: Charismatic leadership positively influences employees' affective commitment.

2.5 Affective Commitment and Intention to Quit

Affective commitment, which reflects employees' emotional attachment to their organisation, has been consistently shown to be a key determinant of retention (Allen et al., 2003; Meyer et al., 1993). Employees with high affective commitment are more likely to stay because they feel personally invested in the organisation's success and values. Drawing from **Affective Events Theory** (Weiss & Cropanzano, 1996), emotional experiences at work, such as fair treatment, recognition, and supportive leadership, positively influence affective commitment, which in turn reduces the likelihood of voluntary turnover. Additionally, **Social Exchange Theory** (Blau, 1964) provides a foundation for understanding how employees respond to supportive organisational practices with increased loyalty and reduced withdrawal intentions. Empirical research supports this relationship, showing that affective commitment is negatively associated with turnover intentions (Mathieu & Zajac, 1990; Rhoades et al., 2001; Samuel & Engelbrecht, 2021).

H5: Affective commitment negatively influences employees' intention to quit.

2.6 The Mediating Role of Affective Commitment

This study proposes that **affective commitment mediates** the relationship between leadership styles (ethical and charismatic) and employees' **intention to quit.** Drawing on **Affective Events Theory** (Weiss & Cropanzano, 1996), leadership behaviours are viewed as emotionally impactful events that shape employees' attitudes toward their organisation. When leaders demonstrate ethical principles or exhibit charismatic traits, they generate positive emotional experiences that foster affective commitment. In line with **Social Exchange Theory** (Blau, 1964), employees who feel emotionally supported and valued by their leaders are more likely to reciprocate with loyalty, expressed through reduced intention to leave. Affective commitment, therefore, acts as a key psychological mechanism that explains how leadership influences turnover intention. Empirical studies support this mediating role. For example, **Joarder et al. (2011)** highlighted that affective commitment serves as a crucial link between leadership behaviours and employee retention outcomes. The past studies reinforced that affective commitment serves as a significant mediator between leadership behaviours and employees' intention to quit (Donkor et al., 2022; Gyensare et al., 2016; Yang et al., 2019).

Overall, the study's theoretical justification contends that ethical and charismatic leadership can significantly affect employees' affective commitment, which in turn can lessen their desire to leave the company. Based on these arguments, the researcher has proposed the following hypothesis:

H6: Affective commitment mediates the relationship between ethical leadership and intention to quit.

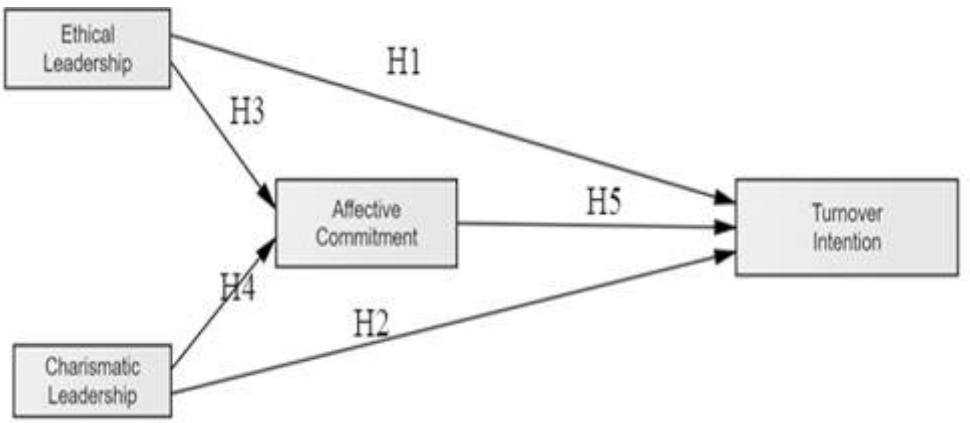

Figure 1. Conceptual framework

H7: Affective commitment mediates the relationship between charismatic leadership and intention to quit.

A hypothetical model illustrating the relationships between antecedents and turnover intention, as well as the direct link between ethical leadership and charismatic leadership on intention to quit, with affective commitment serving as a mediator, is presented in Figure 1.

3. Methodology

3.1. The Sample

The data for the current study were collected from 485 professionals serving in Banking and IT service sector organisations of Northern India using a cross-sectional survey approach. This study focused on the employees from the banking and IT sectors, as both sectors are characterised by high-pressure, client-oriented work environments with increasing turnover trends, and these sectors demand strong ethical standards and transformational leadership to maintain workforce stability and engagement. With the online and offline modes of survey, participants were requested to complete the research instrument, a 30-item questionnaire comprising scales that focus on ethical leadership, charismatic leadership, affective commitment, and intention to quit, as detailed in the ensuing part of the paper. A total of 600 questionnaires were distributed, and 508 respondents provided their responses, resulting in an 84.6 per cent response rate. Out of the total number of questionnaires received, 23 were found to have incomplete responses, leaving a final count of 485 usable questionnaires for analysis. Sample adequacy has been duly ascertained for data analysis while selecting the sample size, which suggests a ratio of at least 5 cases per variable (Bentler & Chou, 1987) would be sufficient. Also, there is a generally accepted rule of thumb, i.e., 10 observations per statement or indicator variable (Nunnally, 1967), to make it representative.

3.2. Measurement of Variables

To assess ethical leadership, a 10-item scale that was modified from Brown et al. (2005) was employed. Items were based on employees' perceptions of their leaders, including how much they care about them and how much they include them in decision-making. A Likert scale of 5 points is utilised, where one represents Strongly Disagree and 5 represents Strongly Agree. The Cronbach's alpha coefficient of 0.915 signifies a substantial degree of internal consistency for the scale.

To measure charismatic leadership, the 6-item Bass Charisma Scale (1985) was used. The items in the scale are "Is a model for me to follow" and "It makes me proud to be associated with him." I have complete faith in him". The reliability of the scale in this study was 0.859.

The eight-item Affective Commitment Scale developed by Allen and Meyer (1990) is adopted to measure affective commitment. A sample statement is "I feel as if this organisation's problems are my own". Cronbach's alpha of 0.841 indicates good reliability. A sample item is "I feel as if this organisation's problems are my own." Cronbach's alpha of 0.841 indicates good reliability.

Turnover intentions were assessed using the 6-item scale by Bothma and Roodt (2013). Items were based on individuals' desires to leave their organisations, which were assessed through questions such as "How often have you considered leaving your job?" and "How often do you look forward to another day at work?" Reliability for the instrument was .905.

3.3 Data Analysis

Researchers developed a structural equation model (SEM) using SPSS AMOS 24.0. This is a specialised tool that includes confirmatory factor analysis (CFA) to measure the model's fitness to the data and path analysis to validate the study's assumptions and investigate the relationships between the constructs.

4. Results

4.1 Measurement Model Assessment

A confirmatory factor analysis (CFA) was performed to check the validity and reliability of the scale and to test the fitness of the measurement model. The measurement model included four first-order reflective constructs, i.e., ethical leadership, charismatic leadership, intention to quit, and affective commitment. Firstly, the normality of the data was assessed by examining the values of skewness and kurtosis for all items. The data's normality was confirmed, as all skewness and kurtosis values were between -1 and +1. Next, to assess the factor loadings, two items from the affective commitment and one item from the intention to quit were removed due to the weak item loadings below 0.4, which

Table 1. Analysis of reliabilities and validities

Variable	Items	Loading	Cronbach's Alpha	CR	AVE
CL	CL1	0.847	.859	0.925	0.533
	CL2	0.869			
	CL3	0.80			
	CL4	0.654			
	CL5	0.712			
	CL6	0.748			
EL	EL1	0.723	0.915	0.917	0.690
	EL2	0.77			
	EL3	0.562			
	EL4	0.814			
	EL5	0.787			
	EL6	0.762			
	EL7	0.874			
	EL8	0.796			
	EL9	0.814			
	EL10	0.591			
AC	AC1	0.732	0.841	0.843	0.642
	AC2	0.837			
	AC3	0.810			
	AC4	0.71			
	AC5	0.851			
	AC6	0.782			
ITQ	ITQ1	0.758	0.905	0.858	0.668
	ITQ2	0.625			
	ITQ3	0.731			
	IQT4	0.789			
	ITQ5	0.817			

Source: Author's own

Note: EL= Ethical Leadership, CL= Charismatic Leadership, AC= Affective Commitment and ITQ= Intention to Quit

improved construct reliability and validity (Hair et al., 2010). Further, to evaluate reliability and internal consistency, the researchers used Cronbach's alpha (a and composite reliability (CR). All constructs reported a and CR values are greater than the suggested threshold of 0.7 (Hair et al., 2010), indicating strong internal consistency across the scales. For convergent validity, researchers examined the average variance extracted (AVE). The AVE values for each construct were above 0.5, showing no concern about convergent validity between the constructs. Table 1 presents the factor loading, reliability, and convergent validity of the constructs (Hair et al., 2010).

In addition to this, discriminant validity was checked using the Fornell-Larcker criterion. According to the Fornell-Larcker criterion (1981), the square root of AVE for each construct is higher than its correlation with other constructs, showing that each construct is distinct from the others. The findings for the criteria are shown in Table 2, and the square roots of the AVE are bold values on the diagonal of the correlation matrix. These values are greater than the correlations between the latent variables, demonstrating that there is no concern for discriminant validity.

Model fit was also examined using key fit indices, including the Tucker-Lewis index (TLI), the comparative fit index (CFI), the adjusted goodness-of-fit index (AGFI), the goodness-of-fit index (GFI), the minimum discrepancy function by degrees of freedom divided (CFMIN/DF), the root mean square residual (RMR), and the root mean square error of approximation (RMSEA). As shown in Table 3, all these indices met the recommended thresholds, indicating excellent model fit (Hu & Bentler, 1998).

4.2 Structural Model Evaluation and Testing the Hypotheses

Before measuring the structural model, multicollinearity must be examined using variance inflation factors (VIFs). There is no concern of multicollinearity because all VIF values were below 3. We then used Hair et al.'s (2010) bootstrapping method to assess path coefficient significance. Thus, we assessed the path coefficient using 5000 subsamples and a cut-off of 1.96 (5% significance). The findings demonstrate that all path coefficients were statistically significant and supported the hypotheses of the study (Figure 2).

Table 2. Discriminant validity using the Fornell-Larcker criterion

Variables	**1**	**2**	**3**	**4**
1. Ethical Leadership	**0.830**			
2. Affective Commitment	0.373***	**0.801**		
3. Charismatic leadership	0.566***	0.717***	**0.730**	
4. Intention to Quit	-0.075†	-0.260***	-0.273***	**0.817**

Source: Author's own

Table 3. Fit indices of the CFA Measurement Model

Fit Indices	**CMIN/DF**	**GFI**	**AGFI**	**CFI**	**TLI**	**RMSEA**	**RMR**
Acceptable value	<5	>0.9	>0.9	>0.9	>0.9	<0.08	<0.08
Model fit score	1.843	0.941	0.924	0.965	0.917	0.045	0.052

Source: Author's own

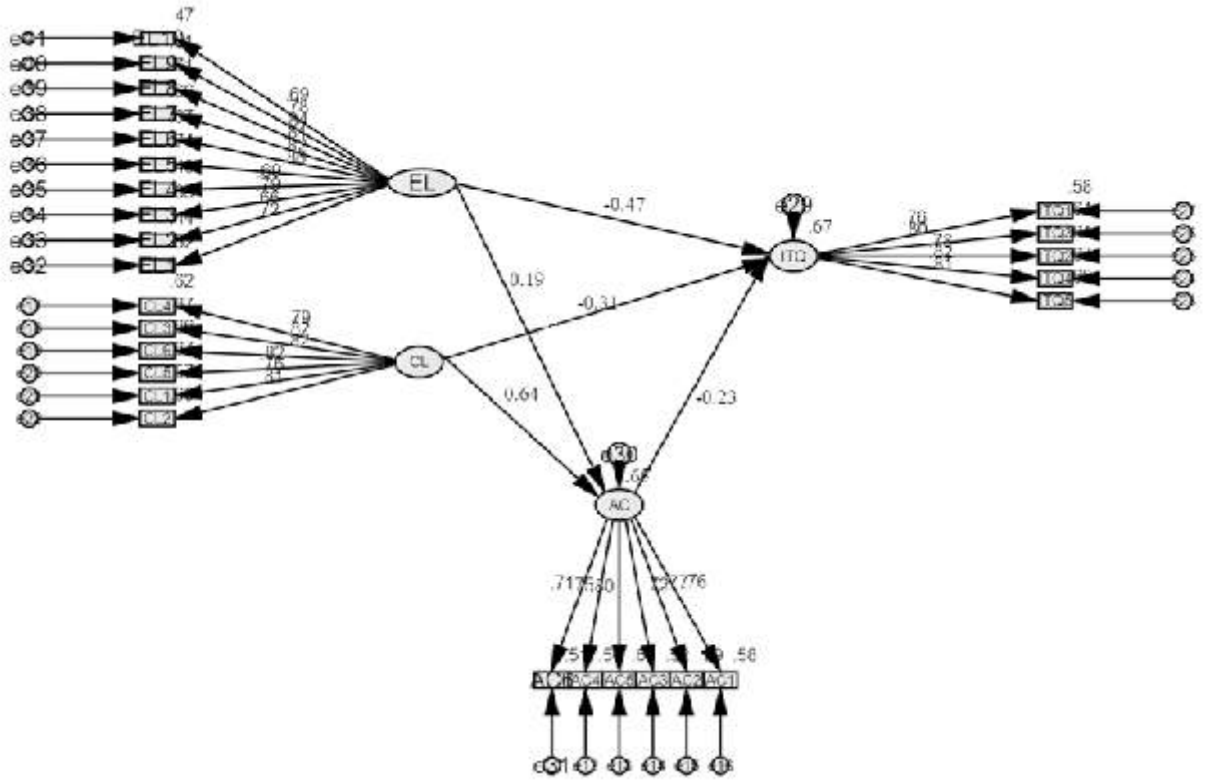

Figure 2. Direct path coefficients of the structural model

Additionally, the researchers conducted a path analysis to test the study hypotheses. Table 4 presents the results of the standardised regression weights obtained from the path analysis. This study examined five direct hypotheses. The findings reveal a substantial inverse relationship between ethical leadership (b = -0.473, p = 0.001) **H1** and charismatic leadership (b = -0.316, p = 0.002) **H2** on intention to quit. Thus, hypotheses 1 and 2 are accepted. The findings also indicated that charismatic leadership has a higher impact on affective commitment (b = 0.641, p = 0.001), H4, as compared to the effect of ethical leadership on affective commitment (b = 0.197, p = 0.001)**, H3**. These results led to the acceptance of hypotheses 3 and 4. Additionally, **H5** is also approved because affective commitment had a significant negative impact on intention to quit (b = -0.236, p = 0.002).

Table 4. Structural Model Assessment (Direct Effects)

Relationships	Std. beta	Lower bound	Upper bound	p value	Significance
Direct Effects					
H1 EL-> ITQ	-0.473	-0.165	-0.188	0.001	Yes
H2 CL -> ITQ	-0.316	-0.385	-0.081	0.002	Yes
H3 EL -> AC	0.197	0.078	0.088	0.002	Yes
H4 CL -> AC	0.641	0.652	0.769	0.001	Yes
H5 AC -> ITQ	-0.236	-0.016	-0.026	0.001	Yes

Source: Author's own

Note: EL= Ethical Leadership, CL= Charismatic Leadership, AC= Affective Commitment and ITQ= Intention to Quit

Mediation Analysis

To study the affective commitment as a mediator between ethical leadership and charismatic leadership and intention to quit, hypotheses 6 and 7 of this study were formulated. Mediation analysis, as defined by Zhao et al. (2010), is indicative of partial mediation when the direct effect remains significant in any hypothesis relationship of mediation. Table 5 presents the direct effect, the indirect effect and the total effect for mediation.

4.3 Affective Commitment as a Mediator between Ethical Leadership and Intention to Quit

Concerning the linkage between ethical leadership and intention to quit, Hypothesis 6 considers affective commitment as a mediator; a bootstrapping approach was employed (Preacher & Hayes, 2008). First, the direct effect of ethical leadership on intention to quit was tested without including the mediator. Results of Table 5 state that there is a substantial adverse direct effect (β = -0.519, $p < 0.05$), suggesting that ethical leadership individually significantly reduces employees' intention to quit. Subsequently, adding the mediator of affective commitment to the model, the significance of the indirect impact was evaluated using the path coefficients. The indirect effect of affective commitment on the link between ethical leadership and intention to quit is calculated as (Path a ×Path b) (0.197 * -0.236 = -0.046), showing a small but important mediated effect. Additionally, the overall contribution, or total effect, is calculated as (Total Effect = Direct Effect + Indirect Effect) (-0.473 + (-0.046) = -0.519). Thus, results revealed acceptance of H6, demonstrating that affective commitment partially mediates the relationship between ethical leadership and intention to quit.

4.4 Affective Commitment as a Mediator between Charismatic Leadership and Intention to Quit

Hypothesis 7 proposed that affective commitment mediates the relationship between charismatic leadership and desire to quit.

To assess this, bootstrapping with 5000 subsamples was used as per the guidelines of Preacher and Hayes (2008). First, the direct effect of charismatic leadership on intention to quit was examined without the mediator in the model. The results (refer to Table 5) stated a significant adverse direct effect (β = –0.316, $p < .001$), indicating that higher charismatic leadership is linked with lower intention to quit. After adding the mediator of affective commitment to the model, the significance of the indirect impact was evaluated using the path coefficients. In the linkage between charismatic leadership and intention to quit, the indirect effect of affective commitment is (Path a ×Path b) (0.641 * -0.236 = -0.151) H7, and the total effect of charismatic leadership on intention to quit is (-0.316 + (-0.151) = -0.467) (Total Effect = Direct Effect + Indirect Effect), which is significant. H7 is therefore accepted, indicating that affective commitment partially mediates the relationship between charismatic leadership and intent to quit.

Table 5. Total, Direct and Indirect Effects for Mediation Analysis

Hypothesised Path	Estimate (β)	Remarks
Total Effect		
CL → ITQ	-0.467	Significant
EL→ITQ	-0.519	
Direct Effect		
CL → ITQ	-0.316	Significant
EL→ITQ	-0.473	
Indirect Effect		
CL → AC→ITQ	-0.151	Significant
EL→AC→ITQ	-0.046	

Source: Author's own

Note: EL= Ethical Leadership, CL= Charismatic Leadership, AC= Affective Commitment and ITQ= Intention to Quit

5. Discussion and Conclusion

This research examined the dynamic between leadership styles (ethical and charismatic leadership) and intention to quit, with affective commitment as a mediator variable among employees in the service sector. The findings offer both theoretical insights and practical implications for organisations. They clearly show that ethical and charismatic leadership plays a significant role in reducing the employees' intention to quit, with affective commitment emerging as a key mediating link in this relationship. The findings reaffirm that leadership grounded in moral integrity and inspiring qualities helps to create a positive work environment, which in turn strengthens the emotional bond. Interestingly, charismatic leadership had a comparatively more substantial impact on affective commitment as compared to ethical leadership, and this indicates that clear vision, radiating confidence, and inspirational communication may create deeper ties with employees than simply adhering to the ethical standards alone.

Our findings align with the emerging literature that showcases that affective commitment is central to employee retention strategies (Akinyemi et al., 2022; Wickramasinghe & Perera, 2022). When leaders communicate a sense of purpose and act consistently with core values, they help to instil a sense of meaning among employees. This emotional attachment makes them less likely to quit, mainly when mediated through strong affective commitment. The partial mediation observed in this study further underlines that while leadership styles have a direct effect, this effect is amplified when the employees truly internalise their emotional bond to the organisation. These insights also strengthen the view that affective commitment should not be considered as a peripheral HR metric but as a strategic anchor for organisational stability. In fast-moving and high-pressure sectors like banking and IT, where turnover is a continuous challenge, the emotionally intelligent and visionary leader can be a powerful retention lever, even in the volatile settings (Detert & Burris, 2007; Schoemaker et al., 2018). In a similar vein, the findings suggest that affective commitment offers psychological resilience for employees dealing with change, and that both ethical and charismatic leadership help shield employees from the uncertainty in today's workplaces.

Ethical leadership, in particular, plays an instrumental role in shaping psychological safety, trust, and fairness within teams, and this behaviour is perceived as organisational support by the employees (Brown & Treviño, 2006; DeConinck, 2015). This sense of support creates a positive feedback loop, strengthening commitment over time and building shared moral values that enhance cohesion and a culture of accountability (Neubert et al., 2009). Our findings support previous studies (Li et al., 2022; Shafique et al., 2018), showing that ethical leadership fosters emotional ties that reduce intention to quit. Moreover, the study also supports that charismatic leadership, characterised by clear vision, personal magnetism, and role modelling, may be more effective in emotionally engaging employees. Grounded in transformational leadership theory (Bass, 1985), charismatic leadership works by creating a congruence between the employee's values and the organisation's mission. This fit enhances employees' intrinsic motivation and leads to a deeper connection to the workplace (Shamir et al., 1993). The stronger beta coefficient observed for charismatic leadership's impact on affective commitment suggests that inspiration may drive a more substantial impact as compared to ethical leadership. This aligns with earlier studies (Machokoto, 2019; Mangundjaya & Amir, 2021; Tufan, 2022), which found that charismatic leadership enhances emotional involvement and reinforces employee identification with organisational values. The present findings support that such leaders play an essential role in shaping cultures where employees feel seen, valued, and driven to contribute. By fostering this kind of environment, charismatic leadership becomes a crucial part of retention strategies, especially in emotionally demanding or transition-heavy environments.

Beyond leadership, this study offers broader practical implications for HR and organisational development. In today's corporate environment, the focus often skews toward transactional relationships, where employee-employer dynamics revolve around the performance metrics and compensation rather than mutual commitment (Cheng et al., 2022; Eisenberger et al., 2002; Rhoades & Eisenberger, 2002). It is important to note that competitive remuneration and benefits are important, but they are not sufficient in ensuring retention. Emotional elements such as trust, purpose, and identity are far more enduring in anchoring employees to an organisation. What truly keeps employees engaged in the long run are the emotional aspects like trust, purpose, and a sense of identity that help to build deeper, enduring connections that ultimately anchor employees to their workplace. Thus, companies must reframe their retention strategies to go beyond material incentives and practices like flexible scheduling, inclusive

decision-making and recognition systems that help cultivate belonging (Bhardwaj & Jain, 2023). High-commitment HR practices, when aligned with leadership behaviour, create a fertile ground for affective commitment (Kehoe & Wright, 2013). We extend existing research by supporting the idea that when such practices are embedded alongside ethical and charismatic leadership, the result is not just improved retention but higher engagement and morale.

A noteworthy contribution of this study is the empirical validation of affective commitment as a mediating construct. While previous literature acknowledged its role in shaping turnover intention, our model demonstrates how both ethical and charismatic leadership influence quitting behaviour more profoundly when this emotional connection is factored in. This answers recent scholarly calls (Donkor et al., 2022; Haque et al., 2019) to clarify the mechanisms through which leadership translates into behavioural outcomes like retention. Practically, this means leadership development initiatives should not compartmentalise ethics and inspiration. Organisations would benefit from cultivating leaders who are both principled and motivational, and ethics without inspiration may seem rigid, while charisma without values can lack authenticity. A balanced leadership style where integrity meets vision is what truly fosters commitment.

In conclusion, this study bridges an important gap in the literature by confirming that affective commitment mediates the relationship between ethical and charismatic leadership and intention to quit. It brings forth a dual message for both scholars and practitioners: first, that leadership shapes not only performance but emotional commitment; and second, that organisations must pay closer attention to the emotional dimensions of work in an era where talent retention is a growing challenge. By investing in leadership that inspires and acts ethically, and by reinforcing this with high-commitment HR practices, companies can create workplaces where employees do not just stay, but they thrive.

6. Limitations of the Study

This study's focus on the banking and IT service sectors of Northern India offers contextually rich insights, given the high attrition rates and stress levels endemic to these industries. However, generalizability remains limited due to cultural and sector-specific dynamics. Future studies should explore cross-industry and cross-cultural validations, as leadership effectiveness may vary across societal contexts and hierarchical structures.

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Development of the ELS-MRP Scale to Evaluate the Effect of Leadership Styles on Medical Representatives' Performance

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Abstract

Within the pharmaceutical industry in India, medical representatives are crucial as the principal point of contact with doctors. They are responsible for effective in-clinic performance, managing customer relationships with doctors, engaging them suitably to their needs, carrying out prescription sales, resolving concerns, and advising physicians in prescribing medications in a way that maximises profits for their organisations. Their performance creates a competitive edge for the organisation and is primarily influenced by the leadership styles of their leaders. However, both leaders and researchers face challenges in evaluating the efficacy of various leadership styles and their impact on the performance of medical representatives; hence, a new instrument is required to measure this construct, especially in the pharmaceutical industry, where it is completely missing. By creating a thorough assessment scale intended to assess the impact of various leadership styles and their impact on employee performance metrics of medical representatives, this study aims to overcome this difficulty. The scale would be coined as the ELS-MRP Scale (Effect of Leadership Styles on Medical Representatives' Performance Scale).

After a thorough review of the literature and in-depth interviews with managers and medical representatives in the pharmaceutical sector, a set of 10 Domains, 28 Sub-domains, and 72 items about employee performance and leadership styles has emerged. Judges' opinions, pre-pilot testing, and face validity were used to improve the scale and remove unimportant or irrelevant items to combine them into useful variables. The final scale comprises 28 items categorised into seven core domains. Using the Survey Monkey platform, a digital version of the survey was created and distributed to a sample size of 150, and the responses were received from 124 respondents (n=124). During the pilot testing phase, tests of Reliability, Normality, and Validity were conducted using "Jamovi 2.4.11". It shows high internal Reliability, Validity, and Normal data distribution. The scale is the first of its kind for the Indian pharmaceutical industry, where generic drugs capture the market, showing relevance in identifying the effect of major leadership styles on medical representatives' performance.

Keywords*: Leadership Styles, Employee Performance, Pilot Survey, Scale Development, Medical Representatives, ELS-MRP*

1. Introduction

The Indian pharmaceutical industry makes a significant contribution to the nation's economic stability. It demonstrates a global social commitment by producing high-quality medicines at affordable prices, earning the designation "pharmacy of the world" (Department of Pharmaceuticals, 2020). It ranks as the third biggest worldwide by volume and the fifteenth largest by value (Department of Pharmaceuticals, 2020). It constitutes around 8% of total Indian merchandise exports and around 2% of the GDP (Dutta & Gajbhiye, 2021). Unlike other businesses, this sector has demonstrated more resilience to economic disruptions, evidenced by India's over 18% increase in pharmaceutical exports during the pandemic-affected year of 2020–21, against diminished worldwide production and commerce (Dutta & Gajbhiye, 2021). It has consistently produced a trade surplus annually and has seen a CAGR of 9.43% (Department of Pharmaceuticals, 2021). The pharmaceutical sector must establish practical and implementable strategies, pursue continual technical advancements for competitive advantage, and, most importantly, possess a comprehensive perspective facilitated by strong leadership.

The Indian pharmaceutical industry is a worldwide frontrunner, representing around 20% of the world's generic drugs by volume and supplying affordable therapies to more than 200 countries. With exports projected at USD 25.39 billion in FY 2022-23, the enterprise has solidified its position as a fundamental component of global healthcare.

India's status as the preeminent vaccine producer, generating 60% of worldwide immunisations and fulfilling 90% of the World Health Organisation's demand for measles vaccines, underscores its significance in international immunisation efforts (Indian Pharmaceutical Industry, 2023). Among the world's most important and reasonably priced vaccine suppliers, India stands out as a leading provider of the DPT, BCG, and measles vaccinations. Many of the vaccinations used by UNICEF are produced in India. The World Health Organization relies on Indian producers for 40-70% of its BCG and DPT vaccines, and 90% of its measles vaccines.

The power of India in connection with pharmaceuticals is immense. As of today, India possesses the maximum number of US FDA quality standard-compliant pharmaceutical factories/manufacturing units outside the USA. The list is not limited to this; India also possesses 500+ API producing units, which cater to 8% of the entire global API business. India is also engaged in producing 60,000 products, which are generics in nature, within 60 therapeutic categories, amounting to 20% of the global supply. India is the pioneer of producing affordable and life-saving HIV medicines, which is considered the most significant societal achievement in the medical history of the world.

Leadership in today's highly competitive corporate world is largely about inspiring followers to take action, which in turn increases operational efficiency, fosters synergies, and ultimately makes the most of available resources. Now more than ever, sound leadership presence is essential to the success of businesses in the present day. Amidst ongoing changes in the broader ecological gears, the leader is cognisant of the significance of the technological revolution for survival in a competitive environment. He provides his followers with unique practices in a wide range of technological situations, assisting them in developing the values, skills, and intellectual discipline necessary to maximise their potential. A modern-day leader is in charge of harmonising and consolidating both human and material resources so that they are capable of manufacturing results or providing services effectively and efficiently, allowing individuals and businesses to improve their performance. Effective leadership involves influencing Employee Performance (EP) within an organisation. Effective leadership style (LS) is crucial for people to reach their maximum potential and contribute to the most important goal with passion and integrity (Walia, 2020).

Leadership tactics that inspire and lead teams to success must evolve alongside the healthcare industry. In this setting, it becomes evident that a crucial field of research is comprehending the complex interactions between leadership styles and the performance of medical representatives, as the medical representatives play a crucial function in promoting the medicines made by the corresponding pharmaceutical companies through the most effective medium for brand recall and frequent reminders (Bala & Sharma, 2019).

In this study, a survey was employed as the research method, and a questionnaire served as the research instrument. (Hinkin, 1995) It has been mentioned that in field research, questionnaires are the most common means of gathering data. Several scales have been developed over many years to measure the attitudes, views, and opinions of organisational members. These measurements are frequently used without first proving their validity and reliability, which might result

in possibly incorrect findings. Researchers are often left with conflicting results from further study, which leaves them with incomplete knowledge of the issue. Although different researchers may come to different results for a variety of reasons, one of the biggest challenges in survey research is always making sure that constructs are measured precisely.

The main objective of developing scales is still to produce reliable measurements of the underlying structures (Clark & Watson, 2019). The goal of this research is to create a thorough Leadership Style Scale that is specially designed to assess the various leadership philosophies used in the pharmaceutical sales industry to drive superior employee performance. This scale attempts to offer a structured framework for evaluating the effectiveness of different leadership styles in improving the performance of medical representatives by carefully examining the many facets of leadership. The research holds relevance as it can provide essential insights into the complexities of leadership in the pharmaceutical sales industry. Organisations may better understand how to optimise leadership practices to promote an excellent performance culture and improve sales team performance by outlining the unique traits and impacts of various leadership styles.

2. Literature Review

Employee performance is non-negotiable for the existence of any organisation. The prevailing business scenario, which is ever-changing, affects the overall performance of the organisation, thus challenging the status quo every moment. As such, continuous performance is the key to its survival, which is driven by its employees. While continuous and collective employee performance is required for the existence of an organisation, it also requires able leadership guidance for the sustainability of employee performance. In this section, we will examine a few academic works that explore the impact of leadership styles on employee performance.

In a study conducted by Deepak and Rajni (2022), the role of Transformational Leadership style (TRFLS) in enhancing team performance, fostering motivation, collaboration, and innovation in the IT Sector was researched. Their paper aims to explore how TRFLS impacts team performance.

They said that leadership means being able to inspire, build confidence, and provide support to teams working to reach the goals of the organisation. It is about guiding and encouraging people to move in the right direction and making things happen within a team or organisation. TRFLS is an extensively reliable style of leadership, characterised by its approach to generating focal changes in team members' perceptions and assumptions, thereby making them committed to the team's objectives or aims.

They also added TRFLS to help employees deal with their thoughts and feelings by giving them clear direction and feedback. Leaders are seen as truly transformational when they inspire a sense of doing what is correct and meaningful, while also helping followers strive for success and personal growth. They boost team morale and motivate followers to work together for the greater benefit of the team, company, or community, rather than just focusing on their interests. Transformational leaders excel at persuading, motivating, and encouraging their team members to generate new ideas. They have a talent for motivating their followers to work harder and exceed expectations, contributing significantly to the team's success. This makes team members feel more committed to their tasks and more willing to work together and understand how things work in the team.

Syharudin et al. (2022) investigated how Transactional Leadership Style (TRSLS), compensation, motivation, work experience, and job insecurity impact employee performance (EP) in the fish canning industry in Muncar District. They utilised SEM to analyse data collected from 150 production department employees across 15 fish canning companies. The study highlighted the critical role of human resources in organisational success, with performance reflecting the quality and quantity of employees' work. Human resource management (HRM) was emphasised for its pivotal role in optimising these resources.

TRSLS, as explained by the authors, motivates followers through self-interest, with leaders exchanging salary and status for work effort. Compensation was discussed in terms of job evaluation, determining job classification for salary purposes. Motivation was described as a psychological process driving individuals towards specific goals voluntarily.

Work experience was observed to positively impact employee commitment and motivation, although its direct effect on performance was considered insignificant. Job insecurity, measured across dimensions like responsibility and coordination, was found to influence employees' job attitudes. EP, defined as the quality and quantity of work output over a specified period, was identified as a key indicator of job success.

The authors concluded that TRSLS has a positive influence on EP in the production division of the fish canning industry. They noted both positive and negative impacts of factors such as compensation and motivation. While compensation positively affected performance, it was linked to increased job insecurity. Similarly, motivation positively influenced performance but had a negative association with job insecurity. Overall, the study emphasised the complex interplay between leadership, compensation, motivation, job insecurity, and EP in the fish canning industry, highlighting their significance for organisational growth and success.

Iqbal, Anwar and Haider (2015) mentioned that leadership style affects EP. They conducted this research on employees of Al-Ghazi Tractor Factory, Punjab, Pakistan. Their academic objectives were to investigate the effect of Autocratic Leadership Style (ATLS), Democratic Leadership Style (DMLS), and Participative Leadership Style (LS) on EP. The study used qualitative methodologies, and secondary research was used to provide enough discussion for the readers, allowing them to grasp more about the topic and the various aspects that are involved with it. Finally, it was determined that ATLS is beneficial in the short term while DMLS is helpful for long-term perspectives. And participative LS is most beneficial in the long run, with a favourable influence on EP.

They have identified that the historical perspective of their study states that an efficient leader must adjust their approach to the requirements of the circumstances in which they work. Different LS can be used to provide guidance, empowerment, and decision-making authority to team members. They also identified that the theoretical perspective of their study states that effective EP is dependent on the correct match between the leaders' capacity to lead and situational circumstances such as the leaders' skills, preferred style, and behaviour, and employee competency.

Next, they have explained all three LS. According to them, the autocratic approach is distinguished by the, 'I tell' mindset. Autocratic bosses direct their staff members' actions. The democratic method is distinguished by the, 'I share' mindset. A participative LS influences all followers in forming significant goals and employing methods or manoeuvres to achieve those goals.

Further, they have explored the problem in an interpretative way using descriptive statistics by using focus group discussions. This was integrated with secondary research data, and interpretation of the study was conducted, which was qualitative in nature.

They found that in an ATLS, clear guidance is given by leaders, but it can also cause them to dismiss team views. In some cases, however, an ATLS is suitable when the company is in a crisis. ATLS may produce impressive outcomes in a quick time frame. Excessive use of this style will distort production in the prolonged process. It may also result in arguments and conflicts.

They further found that DMLS emphasises management by feeding direction and support to the followers and departments while recognising input from individual followers. These leaders are worried about the operative discussion regarding their actions and power. This approach instils belief in followers, letting them achieve goals while also presenting successful team feedback.

Further, the authors clarified that in participative LS, the decision-making power remains with the followers, and leaders delegate this responsibility and are only involved in providing guidance to the trusted ones. In the short run, a participative leader will be ineffective. However, over time, this technique is more productive for work settings.

Finally, they found that the participative LS has a higher beneficial influence on EP since followers feel invested and convinced in doing their jobs and making different decisions.

Mohammad Saleh Enaizan Bataineh et al. (2022) aimed to examine how leaders who advocate for inclusion affect individuals' capacity to adapt to evolving work conditions and exhibit innovation in service-oriented sectors, particularly healthcare. The research focuses on privately owned hospital nurses in Jordan, a demographic significantly impacted by high-pressure work environments and the necessity for adaptability. A cross-sectional quantitative study technique was employed to collect data from 169 full-time nurses employed in several private hospitals in Jordan, utilising standardised survey instruments to evaluate Inclusive Leadership, Adaptive Performance, and Innovative Work Behaviour. The research used statistical analytical methods, including partial least squares (PLS) regression, to examine the direct and indirect relationships among the variables.

The results indicate that IL significantly and promptly influences AP, suggesting that when leaders exhibit openness, accessibility, and encouragement of other perspectives, employees demonstrate increased adaptability. Moreover, Innovative Work Behaviour serves as a partial mediator between ILLS and adaptive performance, indicating that leaders who advocate for inclusion motivate individuals to engage in creative thinking and implement innovative ideas, hence enhancing their capacity to adjust to emerging challenges in the workplace. The results align with previous studies indicating that employees exhibit enhanced performance when they perceive support, respect, and empowerment from their supervisors. The study indicated that persons who exhibit creative behaviours, such as pursuing enhancements, generating novel ideas, and trying various methods, demonstrate more adaptability to changes in the workplace.

The research contributes to the body of knowledge on organisational behaviour and leadership by experimentally proving that ILLS significantly influences employee adaptability and innovation. It underscores that AP is beyond just adherence to standard procedures; it encompasses the ability to adjust to evolving circumstances, resolve unforeseen challenges, and perpetually enhance work processes. The study has practical implications for hospital administrators and policymakers, advocating that training initiatives and leadership development efforts stress inclusivity and innovation to enhance staff performance. Due to the rapid and demanding environment of healthcare, companies may significantly benefit from leaders who cultivate psychologically safe workplaces where individuals feel at ease sharing ideas, taking risks, and adapting to change.

The research concludes by recommending that organisations implement policies that promote ILL practices, such as educating leaders to be approachable, transparent, and supportive of employees' professional growth. Moreover, it suggests that subsequent research should investigate the long-term impacts of ILLS on adaptive performance across various industries and cultural contexts. The findings underscore the significance of leadership in shaping employee adaptability and innovation, identifying ILLS as a vital enabler of high-performing and resilient organisations in the contemporary work environment.

The Impact of Situational Leadership Style (STLS) on EP with the Mediating Role of Job Satisfaction in the Health Sector of Afghanistan by Mohammad Tariq and Muhammad Fayaz (2024) provides an in-depth examination of how STLS influences EP, particularly within Afghanistan's healthcare sector, where limited resources, security concerns, and workforce instability exacerbate leadership challenges. The research is anchored in STLS, which posits that leaders must adapt their LS to employees' competence and commitment levels to enhance productivity and organisational success. This flexibility is essential in the healthcare industry, where staff encounter high-pressure circumstances and a wide range of experiences. The study aims to investigate the direct impact of STLS on EP and whether work satisfaction mediates this relationship, thereby enhancing our understanding of leadership's influence in this critical sector.

The study used a quantitative research approach, collecting initial data from healthcare personnel using standardised questionnaires to ensure a strong empirical base. The data were analysed using hierarchical regression analysis in SPSS, which allowed the researchers to investigate both the direct influence of STLS on performance and the mediating function of work satisfaction. The results strongly suggest that STLS has a beneficial impact on EP, suggesting that leaders who customize their approach to their employees' requirements may dramatically improve motivation, engagement, and overall workplace efficiency. Furthermore, the study discovers that work satisfaction is a crucial mediating element, implying that employees who are content with their tasks are more inclined to be productive, devoted, and eager to go beyond their core job obligations. This is especially important in the Afghan healthcare industry, where poor morale and high turnover rates have been recurrent issues.

According to the research, leaders who give direction, encouragement, and empowerment promote increased work satisfaction, which leads to a enhanced EP. The study also found that various types of leadership within the STLS framework have distinct effects on performance. For example, directive leadership (high task, low relationship behaviour) was found to be successful in instances when employees needed clear instructions and close monitoring, especially in new or inexperienced positions. In contrast, supportive leadership (high relationship, low task behaviour) was shown to be more successful in instances when employees were talented and experienced but needed encouragement and incentive to enhance and improve their performance level. These outcomes are consistent with

Hersey and Blanchard's STLS Model, which emphasises the significance of leadership adaptability across organisational situations.

The study's practical implications are substantial for healthcare organisations, non-governmental organisations (NGOs), and policymakers operating in Afghanistan. It recommends that organisations engage in programs for leadership training that focus on adaptation and staff development, assuring that leaders have the skills necessary to assess workforce preparedness and alter their LS effectively. Furthermore, the study emphasises the need to have a supportive workplace atmosphere in which people feel appreciated, heard, and inspired to do their best. Given the harsh working conditions in Afghanistan's healthcare industry, encouraging job satisfaction through inclusive leadership, fair remuneration, and professional development opportunities can result in increased retention rates, lower burnout, and better healthcare service delivery.

The study also proposes that future research should look into additional mediating variables, including organisational culture, emotional intelligence, and external environmental elements, to gain a more sophisticated understanding of the STLS and EP relationship. Additionally, while the current study relies on quantitative analysis, the authors suggest that future research use qualitative methods of inquiry, such as in-depth interviews and case studies, to capture healthcare employees' lived experiences and provide richer insights into leadership effectiveness.

In conclusion, Tariq and Fayaz (2024) add to the corpus of research on leadership and performance in resource-constrained contexts. Their findings emphasise the importance of STLS in determining EP, as well as the function of work satisfaction in moderating this link. Afghanistan's healthcare organisations may improve staff engagement, job happiness, and overall productivity by employing situationally adaptable leadership practices, resulting in more effective and sustainable healthcare service delivery. The report makes important suggestions for leaders, politicians, and HR professionals, arguing for the use of flexible leadership techniques that prioritise employee well-being and professional development. Given the persistent problems in Afghanistan's healthcare industry, the research emphasises the critical need for leadership development efforts that are aligned with employee requirements and the larger organisational environment.

2.1 Research Question

Does the proposed leadership style scale *ELS-MRP* have a high degree of Reliability and Validity?

2.2 Hypothesis of the study

H_l0 - The *ELS-MRP* scale does not establish acceptable levels of reliability and validity for gauging the effect of leadership styles on medical representatives' performance.

H_l1 - The *ELS-MRP* scale establishes acceptable levels of reliability and validity for gauging the effect of leadership styles on medical representatives' performance.

3. Methodical approach to the study

Three primary phases made up the research. Phase 1 involved the creation of new items, which were then evaluated by expert judges. Phase 2 examined the dimensionality of the scale, focusing on the updated version following expert evaluation. In the last stage, the validity and reliability of the scale were assessed, taking into account its internal structure and relationships to other factors. It is important to note that only two of the stages used different data sets (Ferrer-Urbina et al., 2024).

3.1 Instrumentations

The Effect of Leadership Styles on Medical Representatives' Performance Scale (*ELS-MRP*) is the instrument that has been designed to assess the impact of leadership style being used by leaders on the performance of Medical Representatives. The scale employs a Likert-style design featuring five response options (Ferrer-Urbina et al., 2024), ranging from 1= Strongly Disagree, 2= Disagree, 3= Neither Agree nor Disagree, 4= Agree and 5= Strongly Agree. The items in the *ELS-MRP Scale* are statements from the domains of Transformational Leadership, Transactional Leadership, Democratic Leadership, Autocratic Leadership, Situational Leadership, Inclusive Leadership, and Employee Performance.

3.2 Judges Opinion

After the scale creation, during the Judges' Opinion stage, it was shared with 20 Academic and Industry experts for their views and opinions. The original scale consists of 10 Domains and 28 Sub-domains with 72 items. In the judge's opinion, it was concluded to remove the sub-domains to keep the scale simple. In addition, the domain “Laissez-faire Leadership Style of First Line Manager” has been removed due to its poor relevance in sales at the first-line level. Next was the pre-pilot testing phase, in which the above scale was

shared with 10 participants from the industry to achieve face validity. After participation, the participants were asked to share their feedback about the construct of the survey. Valid changes suggested by the selected participants were taken into consideration and implemented to improve the feasibility of the questionnaire. Their feedback indicated that the scale was excessively long, which would hinder original and honest participation from the participants. It was noted that the inclusion of multiple items against each domain might render the survey a tick mark activity. Therefore, it was decided to limit the item numbers to 30, given the low level of understanding among the sample. A final scale has been created for the pilot survey covering all the domains like Transformational Leadership, Transactional Leadership, Democratic Leadership, Autocratic Leadership, Situational Leadership, Inclusive Leadership and Employee Performance with 28 relevant items.

3.3 Pilot Survey

For the Pilot survey, the questionnaire was uploaded to the SurveyMonkey portal, and a digital version of the survey was created, which was distributed among 150 samples who are working as Medical representatives in different pharmaceutical organisations in Eastern India. For the pilot survey, the snowball sampling method was used. While the survey was distributed among 150 participants, 124 participants shared their responses. The scope of the sample was the pharmaceutical industry operating in Eastern India.

3.4 Reliability Testing

The result of the pilot survey shows promising values of the coefficient of Cronbach's a and McDonald's w of all domains, namely Transformational Leadership, Transactional Leadership, Democratic Leadership, Autocratic Leadership, Situational Leadership, Inclusive Leadership, and Employee Performance. The coefficient value varies from 0 to 1, with values greater than 0.70 deemed good. In terms of Cronbach's alpha, McDonald's Omega values greater than 0.8 indicate high internal reliability (Feißt et al., 2019). Barring the domains of Autocratic Leadership and Employee Performance whose coefficients of Cronbach's a and McDonald's w are more than 0.7 and are deemed reliable, for the remaining domains, coefficients of Cronbach's a and McDonald's w are more than 0.8, also there are no or nominal differences between the coefficients of Cronbach's a and McDonald's w hence the scale can be considered as reliable.

Scale Reliability Statistics

	Cronbach's α	**McDonald's ω**
Scale	0.880	0.884

Item Reliability Statistics

	If item dropped	
	Cronbach's α	**McDonald's ω**
My manager values the ideas and skills I bring to meetings and joint field work.	0.863	0.865
My manager inspires me towards achieve the targets assigned in my division.	0.805	0.809
I have complete trust and faith in the acts and decisions of my manager.	0.869	0.873
I feel encouraged and motivated to work when my manager supervises me.	0.844	0.855

Figure 1. Scale Reliability Statistics of Transformational Leadership

Scale Reliability Statistics		
	Cronbach's α	**McDonald's ω**
Scale	0.850	0.854

Item Reliability Statistics

	If item dropped	
	Cronbach's α	**McDonald's ω**
My manager is highly task-oriented and focuses on getting the job done.	0.775	0.780
My manager sets clear-cut targets and holds team members accountable for their performance.	0.821	0.829
My manager motivates team members to achieve targets by encouraging us to earn rewards, such as incentives and trips abroad, for Achievers.	0.802	0.808
My manager makes quick decisions when necessary and ensures continuity of work at any cost.	0.837	0.841

Figure 2. Scale Reliability Statistics of Transactional Leadership

Scale Reliability Statistics		
	Cronbach's α	**McDonald's ω**
Scale	0.880	0.882

Item Reliability Statistics

	If item dropped	
	Cronbach's α	**McDonald's ω**
My manager fosters an environment where team members take ownership of their jobs and actively participate in decision-making.	0.854	0.857
My manager involves all team members in the decision-making process related to the work.	0.835	0.838
My manager considers my opinion on all team members for all existing and upcoming projects.	0.841	0.843
My manager is willing to consider and incorporate feedback from team members and others.	0.854	0.859

Figure 3. Scale Democratic Statistics of Democratic Leadership

Scale Reliability Statistics		
	Cronbach's α	**McDonald's ω**
Scale	0.761	0.765

Item Reliability Statistics

	If item dropped	
	Cronbach's α	**McDonald's ω**
My manager always retains the ultimate power of decision-making.	0.754	0.759
My manager does not consider suggestions made by team members because he lacks the time for them.	0.711	0.730
My manager likes the power that his leadership decision holds over subordinates.	0.670	0.695
My manager expects me to obey his orders without any ifs and buts.	0.674	0.715

Figure 4. Scale Reliability Statistics of Autocratic Leadership

Scale Reliability Statistics

	Cronbach's α	McDonald's ω
Scale	0.585	0.715

Note. Item 'My manager is a skilled communicator who can effectively convey his expectations, provide feedback, and build relationships with their followers.' correlates negatively with the total scale and probably should be reversed

Item Reliability Statistics

	If item dropped	
	Cronbach's α	McDonald's ω
My manager adapts a varied leadership style to the needs of team members as per the demands of the situation.	0.400	0.670
My manager provides support and guidance to the team members, helping us to develop our skills and achieve our targets.	0.391	0.588
My manager understands and empathises with his team members, recognising their unique needs and perspectives.	0.313	0.536
My manager is a skilled communicator who can effectively convey his expectations, provide feedback, and build relationships with their followers.	0.804	0.831

Figure 5. Scale Reliability Statistics of Situational Leadership

Scale Reliability Statistics

	Cronbach's α	McDonald's ω
Scale	0.804	0.831

Item Reliability Statistics

	If item dropped	
	Cronbach's α	McDonald's ω
My manager adapts a varied leadership style to the needs of team members as per the demands of the situation.	0.863	0.866
My manager provides support and guidance to the team members, helping us to develop our skills and achieve our targets.	0.694	0.708
My manager understands and empathises with his team members, recognising their unique needs and perspectives.	0.647	0.651

Figure 6. Scale Reliability Statistics of Inclusive Leadership

After removing the item 'My manager is a skilled communicator who can effectively convey his expectations, provide feedback, and build relationships with their followers', the reliability score of the scale is better, the coefficients of Cronbach's a and McDonald's w are 0.80 and 0.83, hence now the scale can be considered as reliable.

Scale Reliability Statistics		
	Cronbach's α	**McDonald's ω**
Scale	0.726	0.744

Item Reliability Statistics

	If item dropped	
	Cronbach's α	**McDonald's ω**
My manager remains humble about his abilities, openly admits mistakes, and creates an environment where everyone feels encouraged to share ideas without fear.	0.696	0.729
My manager listens without passing judgment and engages with team members with empathy to understand their situation.	0.708	0.718
My manager makes the team strong by helping everyone, welcoming different ideas, making sure everyone feels psychologically safe, and working together smoothly.	0.643	0.679
My manager fosters a work environment that respects and appreciates diverse cultural perspectives.	0.621	0.642

Figure 7. Scale Reliability Statistics of Employee Performance

Descriptives

	My manager values the ideas and skills I bring to meetings and joint field work.	**My manager inspires me to achieve the targets assigned to my division.**	**I have complete trust and faith in acts and decisions of my manager.**	**I feel encouraged and motivated to work when my manager supervises me.**
N	124	124	124	124
Skewness	-1.98	-2.37	-1.38	-1.71
Std error skewness	0.217	0.217	0.217	0.217
Kurtosis	4.61	6.82	3.44	3.72
Std error kurtosis	0.431	0.431	0.431	0.431

Figure 8. Scale Normality Statistics of Transformational Leadership

3.5 Test of Normality

For statistical approaches, Normality refers to the form of the data distribution for each metric variable and a relationship to the normal distribution of the benchmark. Skewness is a property that determines whether a data distribution is symmetric or skewed. Deviations from the mean tend to be greater in one direction than the other. Kurtosis determines whether the frequency distribution curve is peaked or flat. Testing for skewness and kurtosis is critical because if the data distribution is symmetric/skewed or peaked/flat, statistical procedures that require Normality should be used with caution. Kline (2011), Curran et al. (1996), Bryne (2010), and Hair et al. (2010) all advocated that skewness value should be $< \pm 2.0$ and kurtosis value should be $< \pm 7.0$ for determining distribution normality. For this data set, the values of Skewness and Kurtosis for all Domains are under acceptable limits; hence, the data can be considered as normally distributed.

As per the above values of Skewness and Kurtosis, all values depict normal distribution except for the item **"My manager inspires me towards achievement of the targets assigned in my division."** The skewness value is -2.37. Given that the value is only 0.37 and is additionally skewed, it is considered normally distributed.

As per the above values of Skewness and Kurtosis, all values depict normal distribution except for item **"My manager motivates team members to achieve targets by influencing us to earn rewards like incentives and Achiever's foreign trips."**, whose Skewness value is -2.21. Given that the value is only 0.21 and is skewed, it is considered normally distributed.

Descriptives				
	My manager is highly task-oriented and focuses on getting the job done.	**My manager sets clear-cut targets and holds team members accountable for their performance.**	**My manager motivates team members to achieve targets by encouraging us to earn rewards, such as incentives and trips abroad for Achievers.**	**My manager makes quick decisions when necessary and ensure continuity of work at any cost.**
N	124	124	123	124
Skewness	-1.45	-1.48	-2.21	-1.32
Std error skewness	0.217	0.217	0.218	0.217
Kurtosis	2.36	2.55	6.24	1.85
Std error kurtosis	0.431	0.431	0.433	0.431

Figure 9. Scale Normality Statistics of Transactional Leadership

Descriptives				
	My manager creates an environment where the team members take ownership of the job and allows them to participate in the decision-making process.	**My manager involves all team members in the decision-making process related to the work.**	**My manager considers my opinion on all team members for all existing and upcoming projects.**	**My manager is willing to consider and incorporate feedback from team members and others.**
N	124	124	124	124
Skewness	-1.42	-1.57	-0.911	-0.924
Std error skewness	0.217	0.217	0.217	0.217
Kurtosis	2.67	3.56	0.449	0.741
Std error kurtosis	0.431	0.431	0.431	0.431

Figure 10. Scale Normality Statistics of Democratic Leadership

As per the above values of Skewness and Kurtosis, all values depict a normal distribution for all items; hence it is considered normally distributed.

Descriptives				
	My manager always retains the ultimate power of decision-making.	**My manager does not consider suggestions made by team members because he lacks the time for them.**	**My manager likes the power that his leadership decision holds over subordinates.**	**My manager expects me to obey his orders without any ifs and buts.**
N	124	124	122	124
Skewness	-0.802	0.704	-0.178	0.155
Std error skewness	0.217	0.217	0.219	0.217
Kurtosis	0.0316	-0.574	-0.936	-1.02
Std error kurtosis	0.431	0.431	0.435	0.431

Figure 11. Scale Normality Statistics of Autocratic Leadership

As per the above values of Skewness and Kurtosis, all values depict a normal distribution for all items; hence, it will be considered normally distributed.

Descriptives				
	My manager adapts a varied leadership style to the needs of team members as per the demands of the situation.	**My manager provides support and guidance to the team members, helping us to develop our skills and achieve our targets.**	**My manager is a skilled communicator who can effectively convey his expectations, provide feedback, and build relationships with their followers.**	**My manager understands and empathises with his team members, recognising their unique needs and perspectives.**
N	124	124	124	124
Skewness	-0.936	-1.89	-1.58	-1.52
Std error skewness	0.217	0.217	0.217	0.217
Kurtosis	0.760	4.86	3.32	5.21
Std error kurtosis	0.431	0.431	0.431	0.431

Figure 12. Scale Normality Statistics of Situational Leadership

As per the above values of Skewness and Kurtosis, all values depict a normal distribution for all items; hence it is considered as normally distributed.

Descriptives				
	My manager remains humble about his abilities, openly admits mistakes, and creates an environment where everyone feels encouraged to share ideas without fear.	**My manager listens without passing judgment and engages with team members with empathy to understand their situation.**	**My manager makes the team strong by helping everyone, welcoming different ideas, making sure everyone feels psychologically safe, and working together smoothly.**	**My manager fosters a work environment that respects and appreciates diverse cultural perspectives.**
N	124	124	124	124
Skewness	-1.38	-0.936	-1.55	-0.966
Std error skewness	0.217	0.217	0.217	0.217
Kurtosis	1.79	0.280	3.19	1.69
Std. error kurtosis	0.431	0.431	0.431	0.431

Figure 13. Scale Normality Statistics of Inclusive Leadership

Descriptives				
	I consistently achieve my sales targets in the overall product basket.	**I consistently achieve my sales target in the new product basket.**	**I am consistently earning incentives and rewards from my organisation.**	**I regularly take initiatives to increase sales in my headquarters.**
N	123	123	122	124
Skewness	-1.21	-1.05	-1.27	-2.31
Std error skewness	0.218	0.218	0.219	0.217
Kurtosis	1.83	1.22	1.46	7.66
Std error kurtosis	0.433	0.433	0.435	0.431

Figure 14. Scale Normality Statistics of Employee Performance

As per the above values of Skewness and Kurtosis, all values depict normal distribution for all items hence it will be considered normally distributed.

As per the above values of Skewness and Kurtosis, all values depict normal distribution except for item **"I am regularly taking initiatives in order to increase sales in my headquarters."**, whose Skewness value is -2.31. Given that the value is only 0.31 and is skewed, it will be considered normally distributed. Additionally, the Kurtosis value is 7.66; however, with a sample size of 124, it will be considered a non-picked curve and thus normally distributed.

3.6 Test of Validity

Principal component analysis was performed using Varimax rotation to verify the validity of the scales, which is a method used to estimate the measurement model and allows for item reduction with low standardised loadings to assure construct validity. A five-factor theme was identified from 28 items with an Eigenvalue greater than 1; therefore, all 28 items are capable of measuring these five themes and are valid. Based on the nature of the themes, the naming of themes is done as follows.

Theme 1- People-oriented Approach (POA)

Theme 2- Employee Performance-oriented Approach (EPOA)

Theme 3- Situational and Inclusive-oriented Approach (SIOA)

Themes 4 and 5- Autocratic Leadership Approach (ALOA)

Initial Eigenvalues

Component	Eigenvalue	percentage of Variance	Cumulative percentage
1	10.3249	36.874	36.9
2	3.1759	11.343	48.2
3	2.7996	9.999	58.2
4	1.6172	5.776	64.0
5	1.0787	3.853	67.8
6	0.9250	3.303	71.1
7	0.8567	3.059	74.2
8	0.7250	2.589	76.8
9	0.6434	2.298	79.1
10	0.5936	2.120	81.2
11	0.5629	2.010	83.2
12	0.4774	1.705	84.9
13	0.4476	1.598	86.5
14	0.4424	1.580	88.1
15	0.4173	1.490	89.6
16	0.3796	1.356	91.0
17	0.3415	1.220	92.2
18	0.3043	1.087	93.3
19	0.2939	1.050	94.3
20	0.2792	0.997	95.3
21	0.2343	0.837	96.1
22	0.2135	0.763	96.9
23	0.1948	0.696	97.6
24	0.1783	0.637	98.2
25	0.1564	0.558	98.8
26	0.1364	0.487	99.3
27	0.1107	0.395	99.7
28	0.0898	0.321	100.0

Component Loadings

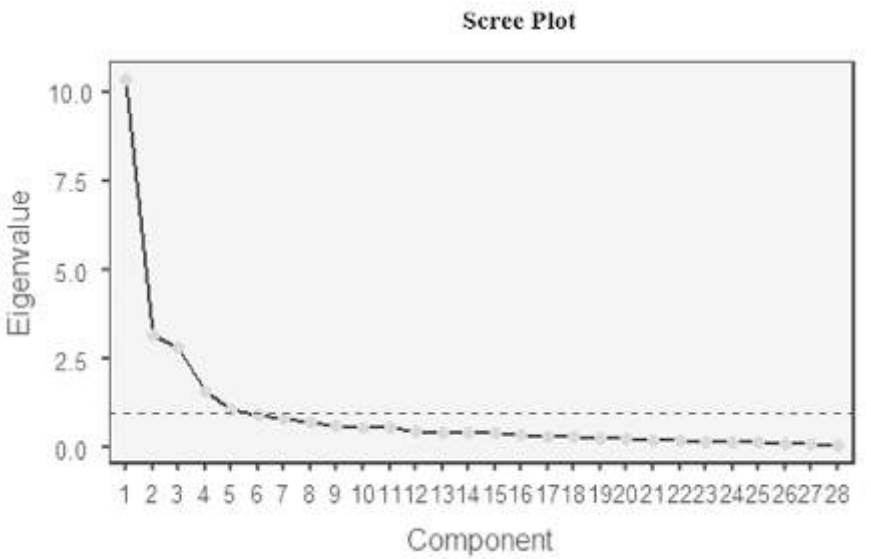
	Component					
	1	2	3	4	5	Uniqueness
My manager values the ideas and skills I bring to meetings and joint field work.	0.824					0.308
My manager inspires me to achieve the targets assigned to my division.	0.857					0.253
I have complete trust and faith in the acts and decisions of my manager.	0.749					0.370
I feel encouraged and motivated to work when my manager supervises me.	0.815					0.292
My manager is highly task-oriented and focuses on getting the job done.	0.861					0.231
My manager sets clear-cut targets and holds team members accountable for their performance.	0.728					0.415
My manager motivates team members to achieve targets by encouraging us to earn rewards, such as incentives and trips abroad, for Achievers.	0.812					0.292

Component Loadings

	Component					
	1	2	3	4	5	Uniqueness
My manager makes quick decisions when necessary and ensure continuity of work at any cost.	0.763					0.381
My manager fosters an environment where team members take ownership of their jobs and actively participate in decision-making.	0.742					0.293
My manager involves all team members in the decision-making process related to the work.	0.834					0.264
My manager considers my opinion on all team members for all existing and upcoming projects.	0.675					0.304
My manager is willing to consider and incorporate feedback from team members and others.	0.646					0.405
My manager always retains the ultimate power of decision-making.				0.714		0.279
My manager does not consider suggestions made by team members because he lacks the time for them.					0.790	0.289
My manager likes the power that his leadership decision holds over subordinates.				0.537		0.366
My manager expects me to obey his orders without any ifs and buts.					0.843	0.223
My manager adapts a varied leadership style to the needs of team members as per the demands of the situation.				0.612		0.344
My manager provides support and guidance to the team members, helping us to develop our skills and achieve our targets.	0.769					0.291
My manager is a skilled communicator who can effectively convey his expectations, provide feedback, and build relationships with their followers.			0.816			0.310
My manager understands and empathises with his team members, recognising their unique needs and perspectives.	0.710					0.302
My manager remains humble about his abilities, openly admits mistakes, and creates an environment where everyone feels encouraged to share ideas without fear.			0.657			0.517
My manager listens without passing judgment and engages with team members with empathy to understand their situation.			0.714			0.444
My manager makes the team strong by helping everyone, welcoming different ideas, making sure everyone feels psychologically safe, and working together smoothly.			0.747			0.420
My manager fosters a work environment that respects and appreciates diverse cultural perspectives.			0.802			0.334

Component Loadings						
	Component					
	1	2	3	4	5	Uniqueness
I consistently achieve my sales targets in the overall product basket.		0.869				0.170
I consistently achieve my sales target in the new product basket.		0.870				0.192
I am consistently earning incentives and rewards from my organisation.		0.832				0.233
I regularly take initiatives to increase sales in my headquarters.		0.643				0.482

Note: 'varimax' rotation was used



3.7 Kaiser-Meyer- Olkin (KMO) and Bartlett's Test

According to Shaima (2023), a key test that measures the degree of inter-correlation between the variables and the suitability of factor analysis to assess the sample's adequacy is the KMO and Bartlett test of Sphericity. The Kaiser-Meyer-Olkin statistic varies between 0 and 1. KMO and Bartlett's test are used to measure the sampling adequacy for the variables. The KMO test values in the table below are more than 0.5, which can be considered acceptable and valid to conduct the data reduction technique according to Kaiser (1974).

Bartlett's Test of Sphericity helps researchers determine whether to proceed with further study based on the factor analysis results. There is a substantial degree of correlation between the variables, as indicated by Bartlett's Test of Sphericity significant at the 1% level, making it suitable for Principal Component Analysis. As measured by the Bartlett test of Sphericity, the result is 0.001, or less than 0.05, which suggests that the variables have a very significant association.

Bartlett's Test of Sphericity		
χ^2	**Df**	**p**
2243	378	< .001

KMO Measure of Sampling Adequacy	**MSA**
Overall	0.879
My manager values the ideas and skills I bring to meetings and joint field work.	0.921
My manager inspires me to achieve the targets assigned to my division.	0.912
I have complete trust and faith in acts and decisions of my manager.	0.926
I feel encouraged and motivated to work when my manager supervises me.	0.948
My manager is highly task-oriented and focuses on getting the job done.	0.915
My manager sets clear-cut targets and holds team members accountable for their performance.	0.928
My manager motivates team members to achieve targets by encouraging us to earn rewards, such as incentives and trips abroad, for Achievers.	0.873
My manager makes quick decisions when necessary and ensures continuity of work at any cost.	0.924
My manager fosters an environment where team members take ownership of their jobs and actively participate in decision-making.	0.917
My manager involves all team members in the decision-making process related to the work.	0.920
My manager considers my opinion on all team members for all existing and upcoming projects.	0.906
My manager is willing to consider and incorporate feedback from team members and others.	0.911
My manager always retains the ultimate power of decision making with himself/herself.	0.860
My manager does not consider suggestions made by team members because he lacks the time for them.	0.749
My manager likes the power that his leadership decision holds over subordinates.	0.765
My manager expects me to obey his orders without any ifs and buts.	0.783
My manager adapts a varied leadership style to the needs of team members as per the demands of the situation.	0.927
My manager provides support and guidance to the team members, helping us to develop our skills and achieve our targets.	0.903
My manager is a skilled communicator who can effectively convey his expectations, provide feedback, and build relationships with their followers.	0.638
My manager understands and empathises with his team members, recognising their unique needs and perspectives.	0.877
My manager remains humble about his abilities, openly admits mistakes, and creates an environment where everyone feels encouraged to share ideas without fear.	0.723
My manager listens without passing judgment and engages with team members with empathy to understand their situation.	0.587
My manager makes the team strong by helping everyone, welcoming different ideas, making sure everyone feels psychologically safe, and working together smoothly.	0.684
My manager fosters a work environment that respects and appreciates diverse cultural perspectives.	0.755
I consistently achieve my sales targets in the overall product basket.	0.823
I consistently achieve my sales target in the new product basket.	0.726
I regularly take initiatives to increase sales in my headquarters.	0.885
I am consistently earning incentives and rewards from my organisation.	0.782

Based on the above statistical tests, it can be concluded that the data available from pilot testing is valid, and we can proceed to the next stage of research.

4. Discussion

The Indian pharmaceutical industry, being such an important contributor to the nation's economy, lacks research on its operations, which may give direction to its people for achieving better operational efficiencies. The primary objective of the study was to create a scale that can be used for measuring the impact of leadership styles being used by first-line managers on the performance metrics of medical representatives.

The coefficient value of Cronbach's alpha, McDonald's Omega, varies from 0 to 1, with values greater than 0.70 deemed good. If the values are greater than 0.8, then it indicates high internal reliability (Feißt et al., 2019). Barring the domains of Autocratic Leadership and Employee Performance whose coefficients of Cronbach's a and McDonald's w are more than 0.7, for the remaining domains, coefficients of Cronbach's a and McDonald's w are more than 0.8, also there are no nominal differences between the coefficients of Cronbach's a and McDonald's w hence the scale can be considered as reliable. Hence, the test of reliability stands true.

Testing for skewness and kurtosis is critical because if the data distribution is symmetric/skewed or peaked/flat, statistical procedures that require Normality should be used with caution. Kline (2011), Curran et al. (1996), Bryne (2010), and Hair et al. (2010) all advocated that skewness value should be $< \pm 2.0$ and kurtosis value should be $< \pm 7.0$ for determining distribution normality. For this data set, the values of Skewness and Kurtosis for all Domains are under acceptable limits, i.e skewness value is within the range of $< \pm 2.0$ and kurtosis is within the range of $< \pm 7.0$, barring the below items.

I. **"My manager inspires me towards the achievement of the targets assigned in my division."** The skewness value is -2.37. Given that the value is only 0.37 and is additionally skewed, it is considered normally distributed.

II. **"My manager motivates team members to achieve targets by influencing us to earn rewards like incentives and Achiever's foreign trips."** Given that the value is only 0.21 and is skewed, it is considered normally distributed.

III. **"I am regularly taking initiatives in order to increase sales in my headquarters."**, whose Skewness value is -2.31. Given that the value is only 0.31 and is skewed, it will be considered normally distributed. Additionally, the Kurtosis value is 7.66; however, with a sample size of 124, it will be considered a non-picked curve and thus normally distributed.

Hence, the test of Normality stands true.

A five-factor theme was identified from 28 items with an Eigenvalue greater than 1; therefore, all 28 items are capable of measuring these five themes and are valid. Based on the nature of the themes, the naming of themes is done as follows.

Theme 1- People-oriented Approach (POA)

Theme 2- Employee Performance-oriented Approach (EPOA)

Theme 3- Situational and Inclusive Oriented Approach (SIOA)

Themes 4 and 5- Autocratic Leadership Approach (ALOA)

The KMO test values in the table below are more than 0.5, which can be considered acceptable and valid to conduct the data reduction technique according to Kaiser (1974). As measured by the Bartlett test of Sphericity, the result is 0.001, or less than 0.05, which suggests that the variables have a very significant association. Hence, the test of validity stands true.

5. Conclusion

The ELS-MRP Scale's final 28-item version showed compelling evidence of validity and reliability. The scale's psychometric robustness and suitability for groups comparable to those studied in this study are supported by its internal structure, measurement invariance, and statistically significant relationships with related variables (Ferrer-Urbina et al., 2024). The ELS-MRP is a succinct and methodologically sound tool for assessing how leadership styles affect medical representatives' performance. It was created using modern psychometric approaches. Crucially, it is the first scale designed especially for the Indian pharmaceutical industry, where the abundance of generic medication marketplaces emphasizes how important it is to comprehend sales force leadership dynamics. According to these early results, there is a great deal of room for further study and real-world implementation of the scale in comparable organisational settings.

The ELS-MRP Scale, a psychometrically validated tool designed to evaluate the impact of leadership styles on medical representatives' performance, is presented in this paper. It provides a context-specific instrument based on modern measurement theory and is the first scale of its type designed specifically for the Indian pharmaceutical sector. The scale contributes to leadership research and performance evaluation in developing market environments because of its excellent validity, reliability, and adaptability to comparable professional populations.

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Exploring Job Quality from Different Perspectives: Development and Validation of a Causal-formative Scale

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Abstract

The present study aims to develop a formative scale of job quality. The study has been conducted in the northern region of India. The data was collected from the states of Punjab and Himachal Pradesh (India). The respondents were selected through a convenience sampling technique with the intent to cover the general population. As many as 371 employees constituted the sample of the study. PLS-SEM was used to confirm the reliability and validity of the scale. The present study provides an empirically tested formative construct of job quality. The study formulates a formative construct, which is a linear combination of causal indicators. The newly invented scale of job quality has established a good relationship with job satisfaction and turnover intention in its nomological network. The concept broadens the scope of job-related literature. So, it can be beneficial for formulating various new theories in this era of technology-oriented HRM. Designing a job in an HRM system should consider various factors that influence job quality, which in turn reinforce employees' adherence to specific job standards. The study offers a unique perspective on the job.

Keywords: *Confirmatory Tetrads analysis; Job quality, Scale validation, Causal-Formative construct*

1. Introduction

The highly volatile business environment considers talent or knowledge assets as the tangible assets for the organisations. Adequate attention is required in the acquisition and optimisation of human resources to effectively use these assets (Aman-Ullah et al., 2021). Human resources are considered a source of sustainable competitive advantage to advance an organisation (Bui et al., 2016). Only people can make or mar an organisation. Human resource management excellence has helped many organisations to rebound and turn around. With the passage of time, a person's knowledge, experience, skills, maturity, and wisdom enhance. Out of the many assets, only the human resources are appreciated. The management and nurturing of people can take an organisation to great heights. If the employees are satisfied with their jobs, the organisational goals can be attained easily (Daley, 2007; Nam & Lee, 2018; Rombaut & Guerry, 2020). It has been observed that people work not only to earn a living, but also that work is an important element for self-realisation, and the quality of working life is a key element to determine the quality of life (Poon et al., 2007; Khan, 2010; Bustillo et al., 2011). Job quality is an important factor that impacts the employee's well-being and behaviour and defines the success of an organisation (Garg & Dhar, 2017). The preset study aims to develop and validate a formative scale of job quality, and examines job quality in its nomological network. In the field of HRM, it is believed that this is the first study of its kind which covers all aspects of a formative scale development. The study explores a new underlying construct based on Causal factors of job quality. As observed through the review of literature, no such scale is available to measure job quality in the Asian context. Further, the study contributes to methodological gaps regarding the development of a formative scale. Overall, the present study is a modest attempt to fill the research gap.

1.1 Concept of Job Quality

Job quality is the extent to which a job has work and employment-related factors that nurture a positive attitude, along with psychological and physical well-being for an employee (Holman, 2013). A high-quality job may demand greater challenges and provide development opportunities, job security and high pay, resulting in positive job attitude and higher employee well-being (Raj Adhikari et al., 2011; Sutherland, 2011). Deducing the nature of low- or high-quality jobs is difficult as it is based on different indicators of the type of job quality (Adriaenssens & Hendrickx, 2019). Strategic human resource management studies reveal the presence of two types of job quality, viz. 'low-quality low commitment' characterised by lower skill requirements, task discretion and variety with low job security, low work flexibility and low compensation, and 'high-quality high-commitment' jobs categorised by empowered work organisation with a variety of skill requirements and high discretion allied to greater levels of pay, flexibility and job security (Schuler & Jackson, 1987; Wright & McMahan, 1992; Beckers et al., 2004; Bustillo et al., 2011; Nam & Lee, 2018; Dierdorff and Aguinis (2018). The objective of the present study was to develop and validate a formative scale of job quality and to study job quality in its nomological network.

2. Theoretical Background

Every type of job impacts employee well-being differently. Active jobs with high discretion to employees enhance their well-being with job satisfaction and are classed as high-quality jobs, whereas high-strained jobs with little control that undermine their coping ability are viewed as low-quality jobs.

Theory of Purposeful Work Behaviour supports an explanation for this variation (Barrick et al., 2013). The work striving of employees increases when individuals interpret positively the worth of their job. It can also be related to the Need Fulfilment Theory, where a person is satisfied with his job when he gets what he wants (Vroom, 1964). Job satisfaction varies as per individual expectations and is viewed as the positively valued outcome that a person gets from a job. The level of satisfaction impacts the work behaviour of employees, which is associated with their productivity and turnover (Fabi et al., 2015). Based on the theory of Self-Determination, individuals are motivated to evolve for personality development and behavioural regulations continuously (Deci et al., 1994). The growth tendencies and natural psychological needs address the self-motivation and level of personality integration in individuals. Employees with high growth need respond more positively to complex jobs in contrast to those with low growth need strength (Hackman & Oldham, 1976).

Theory of Work Adjustment (TWA) reveals various factors like work attitude, needs, interest, aptitude, education, training experience, personality traits and job satisfaction which determine an individual's adjustment to work (Seiler & Lacey, 1973; Dawis & Lofquist, 1984; Dawis, 2005). The theory of work adjustment further states that the Occupational Reinforcement Pattern (ORP) impacts the differentiation within jobs (Peterson et al., 2001). An occupation or job is reinforcing if it offers an environment that fulfils various human needs and has the potential to provide work values. These needs are categorised based on the intrinsic and extrinsic motivation that drives individual

growth and fulfilment.

The job quality based on job analysis focuses on work activities, human behaviour, and performance standards. Intrinsically, the factors like meaningful work, favorable social environment, physical environment, skill discretion, autonomy, good job prospects, flexibility, work- life balance, type of supervision and work stability add to the job quality which are positively related with job satisfaction and negatively related with turnover intentions of employees (Townsend, 2007; Gorjup et al., 2009; Findlay et al., 2013; Gallie, 2013; Nguyen et al., 2013; Cheng et al., 2019; Wang et al., 2022), Good quality jobs provide an opportunity to develop the employee skills and unleash their talents to accept the opportunities leading to high job satisfaction, commitment and psychological well-being (Gallie, 2013; Findlay et al., 2013; Fabi et al., 2015; Popaitoon, 2022). The mismatch between job quality dimensions and employee impact adversely affects individuals and organisations, leading to high employee turnover. The study undertaken by Hackman and Oldham (1976) proved that job quality directly impacts employee attitude and work behaviour. Literature supported the positive reaction of employees towards the 'core job dimensions' based on variety, autonomy, task identity, and feedback. Employees working on jobs with high core dimensions show high job satisfaction with lower turnover intentions (Findlay et al., 2013; Holman, 2013; Loughlin & Murray, 2013; Garg & Dhar, 2017; Cheng et al., 2019). Further, these employees with greater job satisfaction prove to be more committed and productive for the organisation, indicating the positive relation of job quality and job satisfaction on organisational performance (Menezes, 2012; Defloor et al., 2015; Cernas Ortiz & Davis, 2016; Ronda et al., 2016; Tan et al., 2019; Safari et al., 2020; Singla & Garga, 2021)

As per the previous literature, various factors comprise job quality. Nguyen et al. (2013) suggested six content domains, viz. achievement, independence, recognition, relationship, support, and working conditions, as the precursors of job quality. O* NET® authenticated these as a common language to describe various jobs (Peterson et al., 2001). The factors represent the importance of a work environment that encourages accomplishment, provides recognition, fosters harmony and stimulates initiative (Dawis, 1991). These act as self-assessors, enabling individuals to directly link their work values to their personal profile and, consequently, their job satisfaction. The physical working conditions, i.e., work settings and environmental conditions, represent the interaction between the worker and the physical job environment (McCormick et al., 1972). The favourable work environment through various policies and practices triggers positive employee behaviour that enhances the job satisfaction of employees. Herzberg's Two-Factor Motivation theory considers factors like recognition, achievement as the 'hygienic factors' while the others like work environment, inter-relationship between colleagues, supervision, independence as the 'motivators', i.e., the presence of which increases the job satisfaction (Singla & Garga, 2021). It could be used to examine the range of HR practices that organisations use to attain a competitive advantage. Supporting the Job analysis theory, the O*NET could assist in identifying the KSAs, i.e. knowledge, skill, ability and other characteristics prevalent in high-performance organisations.

The literature has found that all these factors were quite important for job quality. Finally, based on these findings, six statements were drafted, each covering a distinct cause.

2.1 Job Quality, Job Satisfaction and Turnover Intentions

The objective of the study was to develop and validate a formative scale of job quality. A single formative construct could not be estimated. So, some supportive variables are required to provide meaning to the aspects. Literature revealed a relation between Job satisfaction as an influential antecedent of Job Quality. Job satisfaction is described as a positive emotional state resulting from one's job experience (Locke, 1976). The process of how job dissatisfaction leads to quitting a job is described by the turnover model (Mobley, 1977; Gopalan, 2023), which theorises that job and working conditions affect employees' job satisfaction, resulting in their intention to stay or quit. Studies proved a significant negative relation between job satisfaction and turnover intentions, whereby higher job satisfaction suggests lower intentions to quit the job (Shore & Martin, 1989; Randhawa, 2007; Dechawatanapaisal, 2018; Nam & Lee, 2018; Cheng et al., 2019; Zhang et al., 2019; Singla & Garga, 2021). Satisfied employees perform their jobs with full interest and loyalty and have low intention to quit their jobs (Santhanam & Srinivas, 2019; Pattnaik & Panda, 2020; Lee et al., 2022). Considering the importance of Job satisfaction to influence the intentions of employees to quit the organisation, the study is designed to evaluate the relation between job quality, job satisfaction and turnover intentions. The overall synchronisation of relations between job quality, job satisfaction and turnover intention guided the development of the following hypotheses:

H1: There would be an effect of job quality on turnover intention.

H2: There would be an effect of job quality on job satisfaction.

H3: There would be an effect of job satisfaction on turnover intention.

H4: Job satisfaction would mediate the relationship between job quality and turnover intention.

3. Formative Scale Construction

It is believed that three types of scales exist, viz. reflective, causal-formative, and composite (design construct). From the measurement point of view, these are considered constructs. Reflective construct items are interchangeable (Singh & Bala, 2020). Removal of an item does not affect the real meaning of the scale (Benitez et al., 2020). A causal-formative scale has different properties as compared to a reflective scale (Yadav, 2022). A formative scale is a construct which is influenced by exogenous measured variables (Jörg Henseler & Schuberth, 2020). So, if an indicator is removed, an important part of the construct is also eradicated. However, more interestingly, there is an error term on the formative construct (Benitez et al., 2020). It means a comprehensive construction of an underlying formative construct cannot be complete as there is a possibility of some unexplained variance (Residual). More importantly, a formative construct is not constructed by its indicators, as such constructs always precede the indicators, whether they are causal–formative or reflective (effect) indicators (Bollen & Diamantopoulos, 2017). In the causal-formative measurement model, the construct is assumed to be caused by its indicators. The third type of construct is composite (Schuberth et al., 2018). Basically, these are designed constructs or forged constructs. More importantly, the error term is not plotted on the composite. It represents a weighted linear combination of observed indicators which measure a model completely to a concept (Jörg Henseler, 2015). In the composite model, the indicators are assumed to compose the construct. The figure highlights the formation of different constructs.

The present study relates to the construction of causal-formative construct-specific guidelines for constructing a formative scale. However, the literature mentions four important issues for constructing an index. It incorporates content validity, specification of indicator, collinearity and external validity (Diamantopoulos & Winklhofer, 2001). Apart from this, the guidelines for developing a reflective scale can be used by Geurts et al. (2005) and Metin et al. (2016), which focus on content validity, overlapping with other scales, concurrent and nomological validity, application of the scale to the general mass and cultural bias.

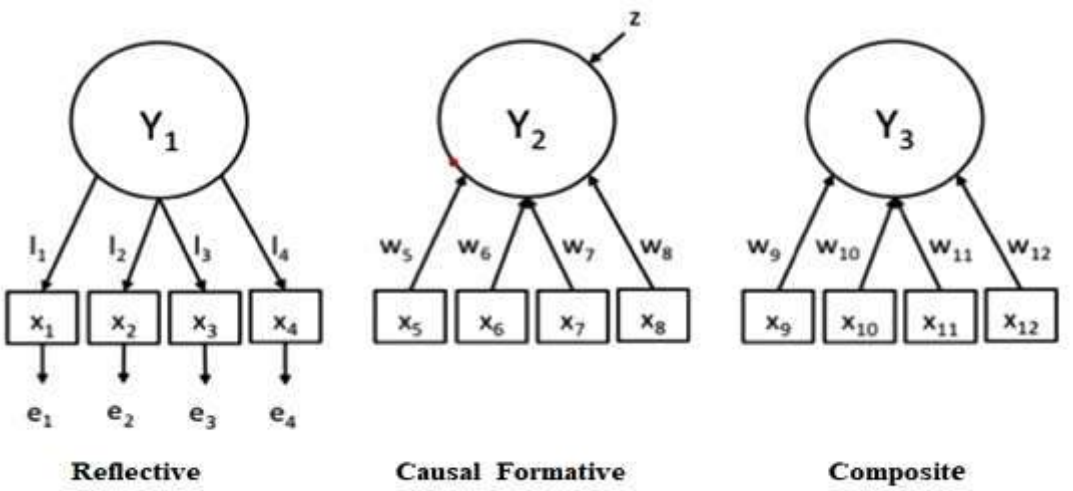


Figure 1. Types of Constructs

3.1 Content and Indicator Specifications

While developing a formative construct, it is of utmost significance to explain the scope of the construct (Diamantopoulos & Winklhofer, 2001; Ketchen, 2013). After reviewing the literature, it was found that mainly six factors influenced job quality. Thus, it was expected that job quality would be affected by these factors. Then these factors were converted into statements. More specifically, the items used as indicators must cover the entire scope of the latent variable as described under the content specification. At this stage, it was required to test two main

aspects: whether the available content was sufficient and valid to explain the underlying latent construct. In order to check the content validity, six experts were selected from the field of industrial psychology. All six statements were discussed in detail with them, and they were asked to provide their responses on a 4-point Likert scale regarding their relevance to job quality. Further, they were asked to suggest whether any modifications were required to change the wording of these statements. The items were changed accordingly. Finally, content validity was examined empirically by preparing a content validity index (CVI). The results showed that CVI was more than 0.78, and the modified Kappa (k*) value was more than 0.75 for each item, which ensured the content validity of the items (Yusoff, 2019). Finally, a universal item, "I have a quality job ", was framed, and all six experts agreed on the content of this universal item.

4. Methods

The present study has been conducted in the northern region of India. The data was collected from the states of Punjab and Himachal Pradesh. A convenience sampling technique was used to select the respondents with the intention to cover the general masses. The sample was collected from the employees working in different organisations. The data was collected online by making the form available on Google. The link for the form was sent to 548 employees. However, only 450 responses were collected. The collected data were subject to cleaning and validation. As the Google form was customised, there was no missing value in the data. As many as 60 unengaged responses were identified, which had almost zero variance. Hence, such responses were not considered. Further, 19 cases of extreme outliers were removed. So, 371 respondents constituted the sample for the study. The sample units included employees of different industries. The sample included 208 males and 163 females. The average age of the respondents was 39 years. The sample was collected from Punjab (269employees) and Himachal Pradesh (102 employees).

Finally, descriptive statistics were applied to this data. The results of skewness and kurtosis indicated that the data were not normal. The multivariate normality was examined through Royston's multivariate normality test along with the Q-Q plot. The Q-Q plot confirmed that the data were not multivariate normal (Figure 2). The results showed that the data were not multivariately normal ($H = 1219.56$, $p < 0.01$). Two techniques were considered capable of examining constructs, viz., covariance-based SEM and variance-based SEM. Under the covariance-based SEM, the multiple cause and multiple indicators (MIMIC) model can be used to test such a composite. However, covariance-based SEM is based on certain assumptions, like normality of data and a large sample size.

On the other hand, variance-based SEM is a non-parametric technique. It has the capacity to work on a small sample and non-normal data. In the present study, PLS-SEM was used. The data was analysed using Smart PLS software, version 3.4.

Further in the present study, the job satisfaction scale (N = 9) was adopted from Macdonald and Maclntyre (1997), and Turnover Intention (N = 5) was adopted from Shore and

Table 1. Content Validity Index

	E1	E2	E3	E4	E5	E6	Agree	I-CVI	UA	pc	k*
Item-1	4	3	1	3	3	3	5	0.83	0	0.09	0.82
Item-2	3	3	3	3	3	3	6	1.00	1	0.02	1.00
Item-3	3	3	3	3	4	3	6	1.00	1	0.02	1.00
Item-4	3	3	3	1	3	3	5	0.83	0	0.09	0.82
Item-5	3	3	3	3	4	2	5	0.83	0	0.09	0.82
Item-6	1	3	3	3	3	3	5	0.83	0	0.09	0.82
Proportion Relevance	0.83	1.00	0.83	0.83	1.00	0.83		0.89	0.33		
								S-CVI/ Ave	S-CVI/ UA		

Martin (1989). Both these scales were well-established and highly reliable. These scales carried good psychometric qualities. Furthermore, these scales were well-suited for the study's framework, as per a literature review. Some new scales were not suitable for the study, as we had considered various factors, such as dimensionality, number of items, and wording of items, while selecting the scale.

In the present study, 5000 bootstraps were performed. Table 1 provides demographic information about the respondents.

4.1 Confirmatory Tetrad Analysis (Confirming Formative Specification)

Although the conceptualisation of the scale was formative, more weightage was given to theoretical reasoning to formulate a construct item. However, there was a possible threat to the validity of SEM results when the measurement model was mis-specified. In the present study, confirmatory tetrad analysis was conducted to support the model specification on theoretical and conceptual reasons supported by the data. In simple words, CTA confirmed whether a construct was reflectively or formatively specified. According to the procedure, tetrads were made of items. A tetrad is the difference of the product of one pair of covariances with another. CTA PLS-CTA generate and select the tetrads. Finally, the bootstrapping method was used to confirm vanishing tetrads. As per the guidelines, all tetrads of reflective construct should be a vanishing tetrad. It means the difference of the tetrad should not be significantly different from zero. If the difference of any tetrad becomes significant, it suggests the alternative specification of a reflective construct. As 90 % Bonferroni-adjusted bootstrapped confidence interval for the significance difference contains zero between the lower class and upper class intervals for the 7th and 9th tetrads, this showed that among the nine tetrads, the 7th and 9th were not vanishing tetrads. Hence, the empirical results confirm that job quality should be specified as a formative construct.

4.2 Model Estimation

In the present study, the PLS-SEM technique was used to measure all types of constructs. In order to confirm formative composite and factors confirmatory composite, factor analysis was applied at the measurement level. As the data was collected from different industries, Finite Mixture of Mixture Partial Least Square Analysis (FMIX-PLS) was performed to address unobserved hetroginity in the model. The results confirmed that the model was appropriate for all the respondents without any segmentation of the sample.

A formative construct is required to have a nomological network (Jörg Henseler & Schuberth, 2020). It means that formative constructs cannot be estimated in isolation; at least, another variable should be measured with it (Schuberth et al., 2018). In the present study, job satisfaction and turnover intentions were measured. So, there was no problem of model identification as all the required parameters were attained. So, on the basis of the literature, a model was made.

4.3 Measurement Model Assessment

Unlike reflective constructs, the measurement of a formative construct is different. The reliability and validity are not applied to formative constructs. Rather than focusing on indicator weight and significance, it is more important to address indicator multicollinearity and the contribution of indicators. Table 3 exhibits that the weights of all six items were 0.252, 0.253, 0.303, 0.197, 0.160 and 0.153,

Table 2. Confirmatory Tetrad Analysis'

JQ	Tetrad value	T	P	CI low adj.	CI up adj.
1. JQ1,JQ2,JQ3,JQ4	0.019	0.766	0.444	-0.05	0.089
2. JQ1,JQ2,JQ4,JQ3	0.027	1.139	0.255	-0.038	0.092
3. JQ1,JQ2,JQ3,JQ5	-0.044	1.587	0.113	-0.122	0.033
4. JQ1,JQ3,JQ5,JQ2	0.071	2.76	0.006	0	0.144
5. JQ1,JQ2,JQ3,JQ6	-0.048	1.766	0.078	-0.123	0.027
6. JQ1,JQ2,JQ4,JQ5	0.012	0.357	0.721	-0.081	0.104
7.JQ1,JQ2,JQ5,JQ6	0.155	3.211	0.001	0.023	0.291
8. JQ1,JQ3,JQ4,JQ6	-0.002	0.071	0.943	-0.075	0.071
9. JQ1,JQ3,JQ6,JQ5	0.158	3.175	0.002	0.022	0.297

Table 3. Indicator Weights, Loadings and Collinearity

Construct	Loadings	T- value	Weight	T- value	VIF	P- value
JQ1 -> JQ	0.820	20.635	0.253	7.597	2.198	0.000
JQ2 -> JQ	0.856	39.393	0.253	10.852	2.424	0.000
JQ3 -> JQ	0.868	40.454	0.303	10.114	2.558	0.000
JQ4 -> JQ	0.733	16.530	0.197	6.019	1.688	0.000
JQ5 -> JQ	0.603	10.274	0.160	4.423	1.407	0.000
JQ6 -> JQ	0.566	7.862	0.153	3.934	1.207	0.000
JS1 <- JS	0.842	42.167	0.300	23.282	2.022	0.000
JS2 <- JS	0.818	36.430	0.262	17.591	1.998	0.000
JS3 <- JS	0.881	67.396	0.342	25.154	2.323	0.000
JS4 <- JS	0.809	28.322	0.286	14.715	1.823	0.000
T1 <- T	0.857	46.268	0.250	17.846	2.497	0.000
T2 <- T	0.859	50.236	0.238	18.035	2.614	0.000
T3 <- T	0.838	35.275	0.192	13.067	2.661	0.000
T4 <- T	0.895	64.215	0.245	18.822	3.464	0.000
T5 <- T	0.863	47.648	0.233	18.154	2.674	0.000

respectively. The calculated t-value for all these weights was more than 2.56. It showed that all the weights were highly significant. Among all the items, the weight of JQ3 was the highest. Multicollinearity among the indicators was another central issue in measuring a formative construct. The calculated value of the Variance Inflation Factor was less than 3, which confirmed that there was no serious issue of collinearity among the formative items (Jörg Henseler & Guerreiro, 2020). Apart from this, the loading of each formative item was greater than 0.50, indicating that each item was important and relevant. Further, a lower value of VIF showed that there was no problem of common method bias in the data (Kock, 2015).

The reliability and validity of job satisfaction and turnover intentions were also measured. Both constructs were reliable, as CR values for all the constructs were more than 0.70. The calculated value of AVE was more than 0.50, which indicated convergent validity of both constructs (Hair et al., 2020). The HTMT ratio between both constructs was less than 0.85, which ensured discriminant validity of both constructs (Jörg Henseler Hubona et al., 2016).

Table 4. Reliability and Validity

Construct	Cronbach's alpha	Composite reliability	AVE	HTMT
JQ	Not Applicable			
JS	0.859	0.904	0.702	0.59
TI	0.914	0.936	0.744	

4.4 Structural Model

The model was developed according to the requirements to validate the job quality composite with job satisfaction and turnover intention. The previous literature indicated that these two constructs should have a relationship with these scales. The results showed that job quality had a positive relationship with job satisfaction ($r = 0.38$, $p < 0.01$) and a negative relationship with turnover intention ($r = -0\ 02$, $p < 0.05$). Further, the indirect effect of JQ on TI was significant ($b = -0.21$, $p < 0.01$). It showed that job satisfaction mediated the relationship between job quality and turnover intention.

According to Hair et al. (2016), it is important to discuss the values of R2, F2 and Q2 in the model. The table shows that the R-squared values for job satisfaction and turnover intention are 0.14 and 0.28, respectively. The analysis revealed that 14% of the variance in job satisfaction was attributed to job quality, and 28% of the variance in turnover intention was explained by both job satisfaction and job quality. Further, the effect size of job quality on job satisfaction and turn over intention ranged between small and medium. Finally, the predictive relevance of the model was examined as per the guidelines of Shumeli (2016) and Q-square values were calculated. As per result Q2 of job satisfaction (0.04) and turnover intention (0.14) was more than 0.02 and showed small to medium predictive power at the variable level.

Overall, the results ensured the concurrent validity of the Job Quality Scale. Further, the symmetry of the relationship within these three variables indicated that the job quality scale has the potential to work in the nomological network of the other relevant constructs.

4.5 Redundancy Analysis

As per the guidelines of Hair et al. (2014), redundancy analysis was conducted to confirm the convergent validity of a formative construct. The term redundancy analysis stems from the information in the model being redundant in the sense that it is included in the formative construct and again in the reflective one. To conduct redundancy analysis, a universal item was framed, and scores of the respondents were attained on that item. As per the results, the relationship between the causal-formative construct and the single-item construct of the universal item should appear between 0.80 to 0.90. Figure 3 shows that the relationship between JQ and the universal item was more than 0.88, which ensured the convergent validity of the formative construct. Further, the figure also reflects the weights with t-value of significance and VIF values.

Table 5. Path Coefficients, Coefficient of Determination and Effect Size

	Original sample (O)	T-statistics (|O/STDEV|)	P- values
JQ -> JS	0.386	7.369	0
JQ -> T	0.023	0.492	0.623
JS -> T	-0.543	10.799	0
JQ -> JS -> T	-0.21	5.961	0
R -Square (Coefficient of Determination)			
	R-square	R-square adjusted	Q-square
JS	0.149	0.146	0.04
T	0.286	0.282	0.14
F- Square (Effect Size)			
	JQ	JS	T
JQ		0.175	0.001
JS			0.352
T			

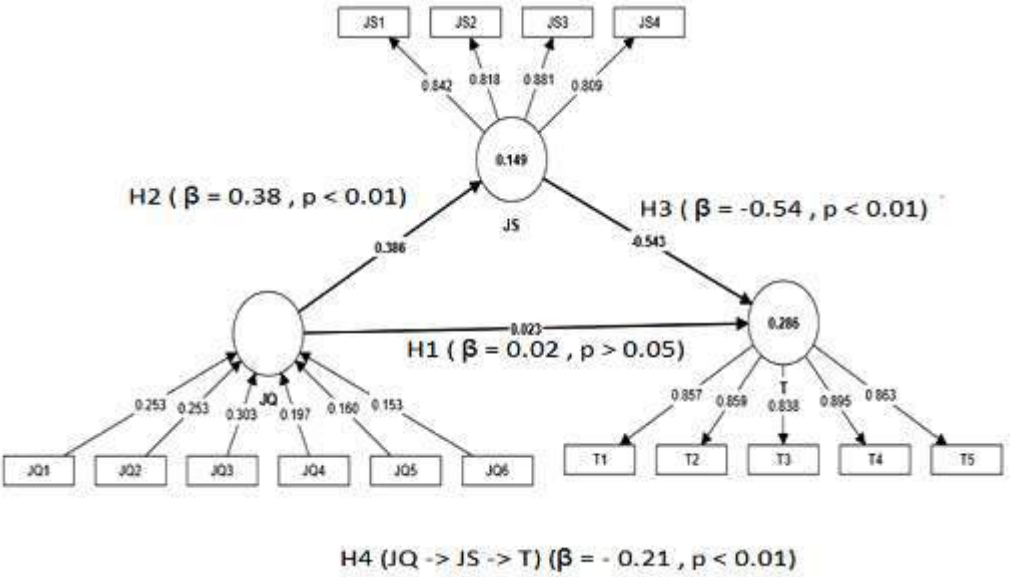
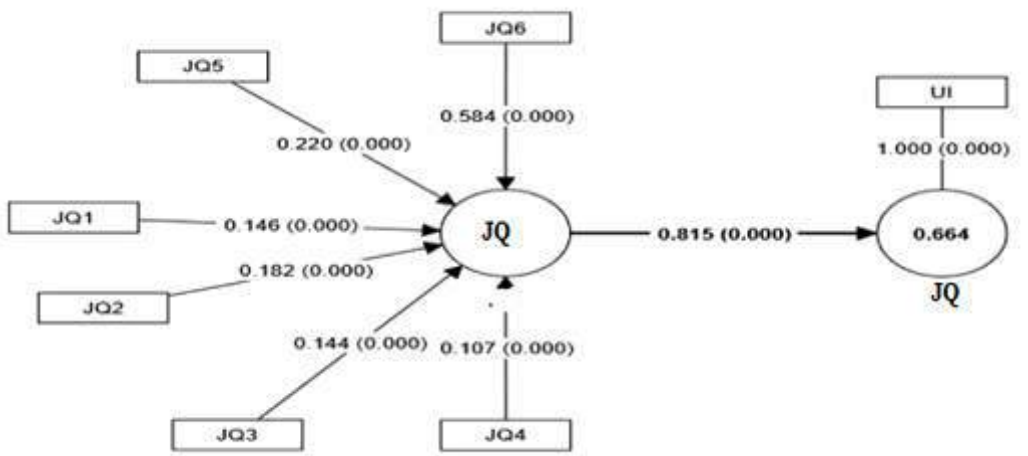


Figure 2. Model Estimation



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Measurement Invariance of composites based on culture.

To establish invariance, the job quality composite was compared across the respondents of two different cultures. The total sample was collected from the two states, viz. Punjab (N-269) and Himachal Pradesh (N-102) are both culturally and geographically different. The weights of composites were especially compared across the groups. The examination of invariance confirmed that the composite performed similarly among respondents from two different cultures. Since a composite could not be measured in isolation, the job satisfaction construct was used in conjunction with job quality. As per MICOM procedure, three steps need to be incorporated which examine three types of invariance, viz. compositional, configural and invariance of mean and variance with permutation test (Jörg Henseler, et al., 2016). Under this procedure, the test is run by 1000 permutations. The configural invariance was easily achieved as the model was the same for the two groups. The compositional invariance was examined by comparing the compositional scores across two groups. At step 2, if the original correlation remained more than the 5th percentile, then compositional invariance was established. Step 2, as shown in the table, confirms these results. Further, the permutation test was non-significant. Similarly, the invariance related to mean and variance, established as a permutation test, was not significant across the groups.

4.6 Reliability in the Formative construct

As no sense prevailed in examining the reliability of the formative scale at the measurement level, the reliability of the scale was examined through the test-retest method. According to this method, a similar questionnaire was sent to all the respondents, but only valid responses were considered. The Correlation of each was studied with repeated responses, but items showing a huge correlation ($r > 0.80$, N=51) confirmed the reliability of the construct.

Table 6. Measurement of Invariance (MICOM)

Step 2					
	Original correlation	Correlation permutation mean	5.0%		Permutation p- value
JQ	0.997	0.989	0.970		0.868
JS	1.000	0.999	0.997		0.727
T	0.999	0.999	0.998		0.456
Step 3a (mean)					
	Original difference	Permutation mean difference	2.5%	97.5%	Permutation p-value
JQ	-0.064	-0.001	-0.228	0.220	0.572
JS	0.123	0.001	-0.208	0.230	0.315
T	-0.079	0.001	-0.222	0.218	0.528
Step 3b (variance)					
	Original difference	Permutation mean difference	2.5%	97.5%	Permutation p-value
JQ	0.250	0.017	-0.557	0.591	0.414
JS	-0.124	0.013	-0.353	0.393	0.546
T	-0.082	0.008	-0.320	0.352	0.615

5. Discussion

The present study empirically tests the formative construct of job quality. As an effective HRM system plays a significant role in crafting a job description and job specification, the main components of a job analysis are work activities, human behaviour, performance standards and machine tools (Deseler, 2005; David, 2021). However, a well-crafted job must satisfy the employees, as their job is always attached to specific social standards and physical needs (Kaur & Randhawa, 2021). A quality job satisfies the needs of an employee. According to Maslow's need hierarchy theory, these needs can be categorised into physical, social and esteem needs. Based on the previous literature, an index of these components was made. Especially, the occupation reinforcement pattern was followed to select the variables for formulating an index of job quality. Furthermore, the base of O*NET was taken, which guided important characteristics of various occupations. The first variable was achievement, which reflected accomplishment through the job. It was revealed that job accomplishments reinforced the employees (Loughlin & Murray, 2013). Autonomy at the job was the other integral part of a quality job. An employee with autonomy can work freely and effectively. The previous literature supports this fact (Schuler & Jackson, 1987; Clarke, 2015). Recognition is related to status and prestige. Maslow advocates this factor as the potential motivator. A quality job always fosters collegial relationships (Kponou & Fomba Kamga, 2019). So, fostering relationships through a quality job always satisfies an employee. It is expected that a job should be stable and supported by the supervisor (Kundu & Lata, 2017). This type of job is considered a quality job. Favourable working conditions are of utmost significance for a quality job (Fabi et al., 2015; Singla & Garga, 2021; Uraon & Gupta, 2021). So, all these factors are antecedents of a quality job. In other words, these factors were related to the quality of the job. On the basis of an appropriate methodology, the items were constructed, and content validity was examined. The results of the present study revealed that all these factors fitted nicely into a construct. The results showed that job quality composite had to work potentially to work in related nomological networks as it was correlated with job satisfaction directly and turnover intentions indirectly (Findlay et al., 2013; Garg & Dhar, 2017; Cheng et al., 2019). The results empirically supported the hypotheses H2, H3 and H4. Due to mediation, there was a decline in the effect size of job quality on turnover intention. For this reason, empirical results did not support the hypothesis of H1.

Thus, the overall results advocate concurrent validity of the scale. Finally, the cross-cultural invariance ensured that different cultures had no impact on the measurement level of the newly explored formative construct. Further, an error term was proposed for the formative construct, considering the possibility that any index item could be added or removed in different global cultures. Overall, by following the procedure, the present study confirmed a new construct of formative nature.

6. Implications

The present study has numerous general, academic and methodological implications. It provides a valid formative construct for measuring job quality. So, the organisations can use this measurement tool to examine perceived job quality by their employees. An effective HRM system can use this scale at different intervals to identify the reasons for employee motivation gaps. The study is quite helpful in the matter of designing a job. Apart from job description and job specification, an HRM system should consider different factors of job quality that may reinforce employees' adherence to job standards. The study offers a unique perspective on the job. Organisations can also make various policies related to job quality.

The study has various academic implications. It provides an empirically tested new concept of job quality. The concept can enlarge the scope of job-related literature. So, it helps formulate specific other theories in the area of technology-oriented HRM.

The study can also be of great significance for developing nations, particularly in the absence of fixed job standards. In comparison to the USA, where the O* NET procedure is followed, the government in India can consider the results of this study for adopting specific job standards in the public and private sector organisations. For this purpose, the government would have to formulate various laws and rules for ensuring job quality at the employer's end. The present study can form the basis of such policies. This situation can lead to an improved standard of living. The establishment of quality job standards can also help in improving the integrity of the citizens of a country. Job quality can be incorporated as a fundamental duty.

The study has various methodological implications also. It provides specific standards for constructing a formative construct. It is the first study of its kind in the field of HRM

which has applied to confirm formative construct at the lower order. The study can also be helpful for researchers to conduct confirmatory studies related to formative constructs in HRM and other domains.

7. Conclusion

The present study has empirically examined a formative construct of job quality. The study is based on various theories. Most importantly, the study provides a new perspective to examine the job. The study was conceptualised on the basis of various theories. Various research landmarks were followed to formulate the index of job quality. The concept of job quality was unique and expected to be explored through its causes. Finally, it was concluded that a composite of a job can be framed from its antecedents. However, the results cannot be generalised as it is a new concept and needs verification by different cultures and nations.

8. Future Scope of Research and Limitations

The job quality variable can also be studied with other nomological networks of job-related variables. The job quality can be studied as a mediator and moderator in different theory-driven models. The issue can be further investigated at the global level and avoid its replication in different countries. No specific guidelines were available to measure formative constructs in the field of HRM. There was a dearth of scientific literature on the topic. As the sample of the study was limited, its results can be generalised. The scope of the study can be widened further by focusing on other regions of India. It can be extended to other different industries, to seek more reliable results.

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Appendix

	JOB QUALITY
1	My job allows accomplishment and the utilization of one's abilities
2	My job permits creativity and personal initiative
3	My job provides status and prestige
4	My job fosters collegial relationships and social service
5	My job is predictable and stable, with supervisors who manage well and provide appropriate training
6	My job is comfortable and provides a variety of work with little stress.
	JOB SATISFACTION (9) (Macdonald & Maclntyre, 1997)
1	Working conditions are good
2	I am satisfied with the financial incentives
3	I feel a strong sense of belonging with this Organisation
4	Organisation inspires the best in me by the way of job performance
5	All groups of the work force are equally dealt with (Age, Gender, Race, Religion)
6	Right amount of recognition is given for my work
7	Management is concerned about the well-being and satisfaction of employees
8	I am satisfied with the Leave policy
9	Salary is fair considering what others are paid
	TURNOVER INTENTIONS (Mobley, 1977)(Shore & Martin, 1989)
1	Your future in this organisation next year
2	Are you going to leave this organisation
3	Will you prefer to continue working in this organisation
4	Are you ready to spend your career in this organisation rather than other

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Assessing the Predictive Power of CAPM and Fama-French Five-Factor Model: A Panel Data Study on Non-Financial Firms in Sri Lanka

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Abstract

This study aims to investigate the applicability of the Capital Assets Pricing Model and the Fama-French Five-Factor Asset Pricing Model in determining the rate of return in equity of non-financial firms listed on the Colombo Stock Exchange, Sri Lanka. The study was carried out using secondary data for the period of five years from 2017 to 2021. The fixed effect model was found to be the appropriate model for both asset pricing models using the Hausman test. In CAPM and FF5FM, market risk premium has a significant and positive impact on the company's risk premium, while in FF5FM, size and value have a significant and negative impact. The empirical result of the study reveals that both asset pricing models are applicable for determining a company's risk premium of listed non-financial firms. According to the R-squared value, FF5FM outperforms CAPM in Sri Lanka by capturing more dimensions of risk and return that CAPM overlooks. The study's results help investors make informed decisions about portfolio selection and assess whether the current stock price aligns with its expected return.

Keywords: *Asset pricing, Capital assets pricing model, Expected return, Fama-French five-factor model, Portfolio, Panel data analysis*

1. Introduction

A well-functioning stock market prompts economic development of a country since it allows businesses to acquire funds from the general public quickly. The stock market is the market for the public to issue, purchase, and sell stocks that trade over-the-counter or on a stock exchange. An investment in the stock market is considered one of the many potential investment vehicles, where people can invest their money to reap the returns of investment growth over some time. Therefore, investing in stocks allows investors considerable financial control due to their flexibility and liquidity.

Investors in the stock market can be provided with significant financial benefits, including dividends and capital gains. In addition to that, they are afforded the easy handling of their money, safety against inflation, ease of conversion or liquidity, versatility of investment, hassle-free trading, flexibility and ownership stake in the company's brand. It is important to estimate the expected return for a risky asset to know whether the securities are correctly priced and to select the efficient portfolios. Therefore, several asset pricing models were introduced by many scholars. Markowitz (1952), as a founder of modern portfolio theory, determined that the risk could be reduced by bringing together securities with negative correlation. Although he took a serious step towards the calculation of risk and return, he did not make any judgments on how to determine the relationship between these two variables.

In this regard, the Capital Assets Pricing Model (CAPM) was developed by financial economists Treynor (1961,1962), Sharpe (1964), Lintner (1965) and Mossin (1966) independently. CAPM is used throughout the finance world for pricing risky securities, particularly stocks, and generating expected returns at a given risk. Another asset pricing model called the single-index model (SIM) has been developed by Sharpe (1963). It is a simple asset pricing model to measure both the risk and the return of a stock, and it is commonly used in the finance industry. Merton (1973) developed the Intertemporal Capital Asset Pricing Model as an alternative to the CAPM. It is a linear factor model with wealth as a state variable that forecasts changes in the distribution of future returns or income. Then, Arbitrage Pricing Theory (APT) was developed by the economist Ross (1976) as another alternative to the CAPM for explaining returns of assets or portfolios with the consideration of multiple risk factors. As an extension to CAPM, the Consumption-Based Capital Assets Pricing Model (CCAPM) was introduced by Douglas, Michael, and Robert (1989) to determine the expected return on an investment over multiple periods, utilising consumption beta instead of market beta.

Later, the Fama–French three Factor Model (FF3FM) was designed by Fama and French (1992,1993 and 1996) to describe stock returns. It includes market factors, size factors (small minus big or SMB), and value factors (High Minus Low - HML). The size factor informs investors about how returns are generated in companies with small market capitalisation compared to those with significant market capitalisation. On the other hand, the value factor tells investors how the returns are generated in companies that have a high book-to-market ratio compared to those having a low book-to-market ratio. Subsequently, Fama and French (2015) created the Fama-French five-factor model (FF5FM) by adding profitability and investment factors to the three-factor model. In addition to that, the human capital factor was added to FF5FM by Campbell (1996), Heaton and Lucas (2000), and Lustig (2013) to strengthen the multi-factor model of asset pricing as the latest model.

Several studies have been conducted to test the validity and applicability of various asset pricing models in different countries. Globally, Acraravci and Karaomer (2017); Blanco (2012); Dhaoui and Bensalah (2017); Karp and Vuuren (2017); Rizwan et al. (2014), and Zeren et al. (2018) carried out research in this context. In Sri Lanka, Abeyasekara and Nimal (2017), Manikrama and Udaya Kumara (2021), Nisantha (2018), Riyath and Nimal (2016), and Thafani and Ediriwickrama (2022) have conducted research. However, each researcher has a different opinion and found various results.

According to the Annual Report of CSE (2021), the number of participants in the stock market among the general public in Sri Lanka is only 702,052, which is only 3.16% of the total population in Sri Lanka. The level of awareness of the capital market was found to be very low, as most people are unfamiliar with how to make investment decisions in shares of a particular company and which factors to analyse when making such decisions. As per the findings of the previous studies done by Lasantha and Kumara (2021), behavioural biases such as herding, overconfidence and heuristics reduce market efficiency in Sri Lanka. From time to time, several

asset pricing models have been introduced by many scholars. However, there is confusion among investors regarding which model is best for pricing the assets. There is a need to provide investors with proper evidence regarding which method among the several methods is the most effective. Therefore, to motivate investors to make efficient decisions with high returns on stock in the future, research was conducted to test the applicability of CAPM and FF5FM in determining the stock return of non-financial firms in Sri Lanka.

2. Literature Review

2.1 Theoretical Framework

Numerous theories have been established by different scholars to explain asset prices, ranging from single-component models to multi-factor models. To calculate the return on stocks, each model addresses the issues that the preceding model had recognised as constraints.

2.1.1 Sharpe's Single Index Model

The Sharpe's Single Index Model was established by Sharpe (1963) to build an optimal portfolio, particularly in the finance industry, while taking into account crucial factors to determine the weight to be given to individual securities. It is used as a simple asset pricing model to calculate a stock's risk and return. This model was used under the presumptions that all investors have comparable expectations, that random disturbance terms will occur, that each security will have the same period used to measure risk and return, and that the price fluctuations of one security in comparison with another will not solely be influenced by the characteristics of those two securities. However, the notable drawback of this model was found to be that it focuses only on volatility, not its direction of upside and downside.

2.1.2 Capital Assets Pricing Model (CAPM)

It is a model for pricing assets that describes the extent to which the risk and expected return of securities are associated with one another. The association between risk and return developed by the security market line is described as the CAPM. The relationship is linear. It explains the nature of the connection between a security's systematic risk and expected return (Sharpe, 1964). Additionally, it makes the following assumptions: an investor makes investment decisions based on an evaluation of risk and return, which is measured through expected returns and standard deviation; an investor can purchase or sell a stock in an infinite number of units; an investor's acquisition and sales cannot affect prices; there are no costs associated with transaction; and there are no personal income taxes. Nevertheless, there are several restrictions associated with the irrational presumptions that there should be perfect and efficient markets, uniform expectations, no taxes, no transaction costs, and no arbitrage opportunities.

2.1.3 Consumption-based capital asset pricing model (CCAPM)

It is an extension of CAPM that explains predicted return premiums over the risk-free rate using a consumption beta rather than a market beta. The studies of Robert Lucas (1978) and Douglas Breeden (1979) set the groundwork for this idea. The CCAPM uses a more realistic arrangement of numerous periods, whereas the CAPM is derived in a static, one-period context. The main conclusion of the CCAPM is that "consumption risk," or how much uncertainty in consumption would result from owning the asset, is connected to expected return on an asset. Significant projected returns are offered by assets that generate much uncertainty because investors seek compensation for assuming consumption risk.

2.1.4 Intertemporal Capital Asset Pricing Model

The ICAPM, Robert Merton's replacement for the CAPM, was created in 1973. It is a linear factor model that predicts variations in the distribution of future returns or income using wealth as the state variable. A consumption-based CAPM assumes that investors will hedge their exposed positions. It generates linear discount factor models in which factors are state variables related to the investor's consumption portfolio decisions.

2.1.5 Arbitrage pricing theory (APT)

According to the multi-factor asset pricing theory (APT). The return on assets is predicted based on the linear relationship between the asset's expected return and various macroeconomic factors that represent uncontrollable risks. In contrast to the CAPM, the APT suggests that markets can temporarily overprice with the market eventually correcting itself and bringing the securities back to their fair value.

2.1.6 Fama-French Three-Factor Model (FF3FM)

The FF3FM was built on the CAPM by adding size and value factors to the market risk factors already included. Fama and French developed the model in the 1990s, which is essentially a regression analysis of previous stock prices. Three variables in this model include business size, book-to-market values, and market excess return $E(R_m)-R_f=b[E(R_m)-R_f)]+SMB+HML$. According to French and Fama (2015), this model is incomplete for predicting expected returns because its three factors fail to account for a significant portion of the variation in average returns associated with profitability and investment. Therefore, based on the evidence, they were motivated to add another two factors.

2.1.7 Fama and French Five Factor Model (FF5FM)

Researchers have built upon the FF3FM in recent years by incorporating additional factors. In 2015, Fama and French revised their model to include five factors. In addition to the original three factors, the updated model introduces profitability, which accounts for the observation that companies with higher projected future earnings tend to achieve higher stock market returns. The notion of internal investment and returns is related to the fifth component, referred to as "investment," which suggests that businesses that use their earnings to fund significant expansion initiatives are more likely to suffer stock market losses.

2.2 Empirical Review

Numerous studies have examined the national and worldwide applicability of CAPM and FF5FM in order to enlighten current and potential investors who want to receive a good return from the security market.

In this regard, in the Sri Lankan context, Thafani and Ediriwickrama (2022) conducted a study to evaluate the validity of the FF5FM in Sri Lanka. Weighted average least-squares regression analysis was used to analyse 30 portfolios based on two factors, investment and profitability, across three separate sample periods. Their findings indicated that the FF5FM is applicable in Sri Lanka throughout the research period. However, the factors of profitability, size and investment were significant in none of the portfolios. Manikrama and Udaya Kumara (2021) conducted the study to evaluate the reliability of the FF3FM and CAPM. A regression analysis was performed using Monthly data from a sample of 35 listed companies out of 285 companies listed in the CSE. The outcomes showed that the CAPM's single independent factor, the market risk factor, has a significant beneficial influence on stock returns.

Additionally, it was discovered that the market risk factor has a favourable effect on returns when the three independent components of the FF3FM were taken into account to explain the companies' returns. On the other hand, the predicted rate of return is barely impacted by the size or value considerations. The results indicate that the FF3FM outperforms the CAPM in the CSE, but that the market risk component has a broader and more significant impact on the predicted rate of return than the size and value factors do.

Maduranthagan and Shantha (2021) carried out a study aimed at assessing the effectiveness of the FF3FM in accounting for the variations in stock returns among various stocks for various financial enterprises listed on CSE. The portfolios were built under the Fama and French (1992) methodology. The data analysis was employed using multiple regression and correlation analysis to produce both descriptive statistics and inferential statistics. In accounting for cross-sectional variation in stock returns, the results assert that FF3FM performs better than CAPM.

Abeyasekara and Nimal (2017) conducted another study to investigate whether the Fama-French Three Factor Model (FF3FM) can capture the differences in average stock returns across various stocks on the CSE and compare its performance to the CAPM and FF3FM. The study discovered that the market factor, size factor, value factor, and momentum factor are all included in the four-factor model, which satisfactorily accounts for the deviation in the cross-section of average stock returns in the CSE. Further, FF4FM outperforms both the CAPM and FF3FM.

Riyath and Nimal (2016) conducted a study to determine which model best explains the variations in average stock returns for companies listed on the CSE. The study depicts that the FF3FM and the FF4FM were more effective in explaining the differences in stock returns across the various stocks when time series regressions were applied. Among these, the FF4FM proved to be superior and outperformed the FF3FM, the Reward Beta Model (RBM) and CAPM.

In the global context, Wedagama et al. (2022) examined the CAPM, FF3FM, and FF5FM to analyse which one is the most effective in explaining return on portfolio and security in the cement companies in Indonesia. The findings demonstrated that the FF5FM is superior to the FF3FM and CAPM in terms of its ability to anticipate return on equity or

portfolio. Martins and Williams (2015) tested the applicability of FF5FM in pricing the assets of the Brazilian market novelty and found that the FF5FM performs better than previous work in the three-factor model. However, market, size, and value factors continue to have the same explanatory power as before.

Minh (2019) investigated the applicability of FF5FM among State-Owned Enterprises in Vietnam. Researchers used monthly returns of common stocks that were listed on two Stock Exchanges from the period of 2009 to 2017. Researchers discovered that the FF5FM outperforms the CAPM and the FF3FM. However, the FF5FM falls short when initial portfolios are constructed from stated capital, which was not an aim of the model's creation; hence, it is inadequate to explain average returns in the Vietnamese stock market. Huang (2019) attempted to test whether the FF5FM was reliable in the Chinese stock market. The study's results showed that the FF5FM outperformed other models in explaining individual stock returns. The model's performance is only marginally improved by the addition of the investment and profitability factors, indicating a small explanatory power for stock returns.

Acaravci and Karaomer (2017) assessed the applicability of the FF5FM in Istanbul for the period between July 2005 and June 2016, considering 132 months. Researchers developed intersecting portfolios in terms of size, market-to-book ratio, profitability, and investment characteristics over the period. The study concluded that FF5FM appeared to be reliable in the BIST. Additionally, fluctuations in excess portfolio returns are explained by FF5FM. For the Turkish stock market, Erdinç (2017) attempted to evaluate CAPM, FF3FM, and FF5FM for the period of the sample from June 2000 to May 2017. Findings of the study disclosed that the CAPM and FF3FM were less effective in explaining the typical variation in stock returns than FF5FM. Additionally, the CAPM was powerless to explain the sorted portfolios' monthly excess returns.

However, some other studies rejected FF5FM and suggested applying other previously developed models in various countries. Mollaahmetoglu (2020) explored the validity of FF5FM in Borsa Istanbul and the German Stock Exchange. Panel data analysis was employed for the period from 2009 quarter 2 to 2018 quarter 4 with two types of market indices. The findings showed that FF5FM may not be valid for the companies listed on one particular Index. Zeren et al. (2019) examined the applicability of FF5FM among eighteen companies listed on the Istanbul Stock Market Sustainability Index. When the additional two variables were added to the three-factor model to create the FF5FM, it was discovered that there was a positive and significant association of the profitability factor. However, the investment factor's coefficient was not statistically significant.

Foye (2018) carried out the study to test the FF5FM in 18 developing markets from Latin America, Asia and Eastern Europe. The result discovered that the particular model provided a better explanation of stock returns in Eastern Europe and Latin America. Nevertheless, it produces dismal results for the Asian sample and does not offer an advantage over the conventional three-factor model. In light of this, it was concluded that it is impossible to separate investment or profitability factors in Asia, and that the five-factor model is insufficient for explaining stock performance in the area. Kursenko (2017) attempted to test the applicability of the multi-factor CAPM in the United States stock market, finding that empirical tests of the model revealed that neither profitability nor investment factors contribute to explaining the variation in portfolio returns. Therefore, the researcher concluded that the FF5FM is not a valid model.

According to the empirical review discovered in Sri Lanka, numerous studies were conducted to compare the CAPM, FF3FM and FF4FM. The FF5FM model is the most recent model introduced for asset valuation. However, only one study (Thafani & Ediriwickrama, 2022) was conducted to determine the application of FF5FM in Sri Lanka. Although tested in Sri Lanka, the results were derived from a weighted average least squares regression model. Further research revealed that none of the portfolios considered size, profitability, or investment as significant during the study period. Therefore, to provide future investors with guidance on how to obtain a high return from stocks, this study directly compares the FF5M and CAPM models using panel data regression analysis.

The following hypotheses were formulated for this study:

H1: The CAPM significantly explains the variation in stock returns of non-financial firms in Sri Lanka.

H2: The FF5FM significantly explains the variation in stock returns of non-financial firms in Sri Lanka.

H3: The FF5FM has significantly higher explanatory power than the CAPM in predicting stock returns in non-financial firms in Sri Lanka.

3. Methodology

3.1 Research Design

It is an explanatory study, focusing on cause-and-effect relationships. Researchers use hypotheses and theories to explain the relationship between the variables. According to the statistics at the end of 2021, there were 297 companies listed on the CSE in Sri Lanka, and they were categorised under 20 different sectors. Among them, 50 non-financial firms with higher market capitalisation were selected as a sample for the study. The purposive sampling method was used to select the sample by focusing only on large-cap firms; the sample excludes small and medium-sized firms, which may behave differently in terms of financial performance, risk, governance, or market sensitivity. The secondary data were collected from the quarterly reports of selected firms for five years, from 2017 to 2021, on the CSE website and individual websites of selected firms. The total observation of the study is 1000.

3.2 Research Model

According to the existing developed model to examine CAPM and FF5FM, the dependent variable of both models in stock abnormal return is measured by risk premium and the independent variables are market factor, size factor, value factor, profitability and investment.

The operational model for CAPM is based on the formula of CAPM (Treynor, 1961).

$E(R_i)-R_f=b[E(R_m)-R_f)]$

According to Karp and Vuuren (2017). This is written as:

$b(E(R_m)-R_f)=E(R_i)-R_f)$

Where:

$E(R_i)$ = Expected asset's return

R_f= Risk free rate

b = Beta of assets

$E(R_m)$ = Expected market return

$E(R_i)$ = Company2 s risk premium

$b[E(R_m)-R_f)$ = Market risk premium

The operational model for FF5FM which is based on the formula of FF5FM (Fama, 2015)

$E(R_i)-R_f= [E(R_m)-R_f)]+SMB+SMB+HML+RMW + CMA$

$E(R_i)-R_f$= Company' s risk premium

$E(R_m)-R_f$= Market risk premium

SMB = Size

HML = Value

RMW = Profitability

CMA = Investment

4. Results and Discussions

4.1 Descriptive Statistics

Table 1 presents descriptive statistics of the study. It provides basic summary statistics for the dependent variable – the company's risk premium (CMPR)- and the independent variables: market risk premium (BMPR), size (SMB), value (HML), profitability (RMW), and investment (CMA).

Table 1. Descriptive Statistics

Variables	Observations	Mean	Std.Dev	Min	Max
CMPR	1000	-0.0252	0.2854	-1.0680	2.9130
BMPR	1000	-0.0222	0.2247	-0.3310	0.7900
SMB	1000	10.1097	0.5239	8.4300	11.8600
HML	1000	0.3770	0.7149	0	7.8900
RMW	1000	0.0826	1.6393	-0.0500	51.8310
CMA	1000	29.9921	843.5774	-99.2710	26637.29

Source: Data analysis (2022)

As per the summary of 1000 observations given in Table 1, the systematic risk of selected companies is closer to the mean value, as the standard deviation is 0.2247, and the difference between the minimum value and maximum value is very low. Investment factor of selected companies shows the maximum value of 26637.29, which exhibits a high standard deviation; therefore, it has a high variation from the mean. The company's risk premium, value and profitability of the selected companies are closer to the mean value because the standard deviations of them are very low. However, they are less close to the mean than the company's risk premium.

4.2 Pairwise Correlation Analysis for CAPM and FF5FM

Table 2 presents the strength of the relationship between variables in CAPM and FF5FM, such as risk premium of the company (CMPR) and independent variables – market risk premium (BMPR), size (SMB), value (HML), profitability (RMW) and investment (CMA).

The above table illustrates that there is a significant and positive relationship between firm size and the company's risk premium ($r = 0.0940$, $p < 0.01$). Market risk premium has a significant and negative relationship with the company's risk premium ($r = -0.2316$, $p < 0.01$). However, the rest of the variables, such as value, profitability and investment, have an insignificant relationship with the company's risk premium since the p-value is higher than 0.05.

4.3 Multicollinearity Test for FF5FM

In order to test multicollinearity between independent variables, tolerance test and variance inflation factor test (VIF) are employed on independent variables When the value of VIF is less than 10 with the value of tolerance is above 0.1, it indicates that there is no multicollinearity problem in the particular regression model (Menard, 1955 and Myers, 1990).

Table 2. Correlation Analysis for CAPM and FF5FM

	CMPR	BMPR	SMB	HML	RMW	CMA
CMPR	1.0000					
BMPR	-0.2316** 0.000	1.0000				
SMB	0.0940** 0.002	0.0290 0.360	1.0000			
HML	-0.0604 0.056	-0.0180 0.570	-0.0448 0.157	1.0000		
RMW	0.0113 0.720	-0.0090 0.776	0.0233 0.462	-0.0177 0.575	1.0000	
CMA	-0.0493 0.119	0.0060 0.851	-0.0147 0.642	-0.0044 0.891	-0.0015 0.962	1.0000

Source: Data analysis (2022)

*** Correlation is significant at the 0.01 level (2taild)*

** Correlation is significant at the 0.05 level (2taild)*

Table 3. Multicollinearity Test for FF5FM

Variable	VIF	(1/VIF) Tolerance
BMPR	1.00	0.99874
SMB	1.00	0.99645
HML	1.00	0.99740
RMW	1.00	0.99907
CMA	1.00	0.99971
Total	1.00	

Source: Data analysis (2022)

As per the data shown in Table 3, the tolerance value for each variable is higher than 0.1, and none of the variables have a VIF value higher than 10. Therefore, it is noted that there is no close relationship between independent variables under FF5FM. It allows the researcher to continue further statistical analysis with the existing model.

4.4 Unit Root Analysis

A unit root test examines the stationarity of the data series used in this study. The presence of a unit root in a time series defines the null hypothesis, and the alternative hypothesis defines the time series as stationary.

According to the data presented in Table 4, the variables of the company's risk premium, market risk premium, profitability, and investment are stationary. Given the significant p-value ($p<0.01$), the data is stationary. The size and value factors are significant at 1st difference.

4.5 Panel Data Regression Analysis

Panel data are also called longitudinal data or cross-sectional time-series data. It has observations on the same variables in various periods. There may be various effects of individual or group, time, or both, which are measured by fixed and/or random effect models. The Hausman Specification test is commonly used to determine the most appropriate panel data analysis for testing hypotheses. According to Hausman and Taylor (1981), if the coefficients are not significant (p-value> 0.05), the random effects model will be used. If they are significant (p-value < 0.05), the fixed effects model can be used.

4.6 Hausman Specification Test

In the Hausman specification test, the preferred model of the null hypothesis is the random effect, while the favoured model of the alternative hypothesis is the fixed effect. The null hypothesis states that there is no correlation between the two variables. A decision will be made that if the p-value is less than 0.05, the null hypothesis will be rejected.

Table 5 presents the result of the Hausman Specification test for the two models. The fixed effect model is deemed the appropriate model for CAPM and FF5FM, given that the p-value is less than 0.05. Tables 6 and 7 present the results of the fixed-effect and random-effect models used in the Hausman specification test.

Table 4. Unit root analysis for CAPM and FF5FM

Variable	Level		1st difference	
	Statistics	Prob	Statistics	Prob
CMPR	-17.2510	0.0000		
BMPR	-27.9017	0.0000		
SMB	-0.2738	0.3921	-11.6092	0.0000
HML	-1.1498	0.1251	-15.0989	0.0000
RMW	-20.1702	0.0000		
CMA	-25.6837	0.0000		

Source: Data analysis (2022)

Table 5. Hausman Specification Test

Model	Chi-square statistic	P value
CAPM	13.763058	0.0002
FF5FM	16.083476	0.0066

Source: Data analysis (2022)

Table 6. Panel Data Regression Analysis for CAPM

	Fixed effect		Random effect	
	Coefficient	**p - value**	**Coefficient**	**p - value**
BMPR	1.183233	0.0001	1.150412	0.0002
Constant	-136.7488	0.000	-136.9960	0.0000
Observation	1000		1000	
F – statistic	281.7614		14.01371	
Prob (F-statistic)	0.000		0.000	
R^2	0.936889		0.013847	
Adjusted R^2	0.933564		0.012859	

Source: Results from panel data analysis (2022)

Table 6 presents the results derived from fixed effect and random effect. Both models have been applicable for CAPM because there is a significant difference at 1%. However, the Hausman test shows that the fixed effect model is an appropriate model for concluding the CAPM. According to the results, the risk premium has a positive and significant impact on the company's risk premium at the 0.01 level, with a coefficient of 1.183233. Overall adjusted R-squared in the fixed effect model is 0.933564 with a p-value of 0.000. The analysis indicates that the independent variable accounts for 93.3564% of the company's risk premium, meaning that 93.3564% of the observed variation is attributed to the independent variable used in this model. It can be concluded that market risk premium highly explains the company's risk premium of listed companies on CSE.

Table 7. Panel Data Regression Analysis for FF5FM

	Fixed effect		Random effect	
	Coefficient	**p – value**	**Coefficient**	**p - value**
BMPR	0.893833	0.0016	0.871374	0.0021
SMB	-141.2912	0.0000	-139.7700	0.0000
HML	-22.61790	0.0233	-18.37417	0.0591
RMW	0.045862	0.9712	0.054038	0.9661
CMA	0.001179	0.6335	0.001233	0.6181
Constant	1297.984	0.0000	1280.833	0.0000
Observation	1000		1000	
F – statistic	310.2631		38.14131	
Prob (F-statistic)	0.000		0.000	
R^2	0.946608		0.160974	
Adjusted R^2	0.943557		0.156753	

Source: Results from panel data analysis (2022)

According to the Hausman test results from the FE model, the market risk premium has a positive and significant impact on the company's risk premium at the 0.01 level (b = 0.893833, p = 0.0016). Size and value have a negative and significant impact on companies' risk premium at 0.01 and 0.05 levels, respectively (b = -141.2912, p = 0.0000, b = -22.61790, p = 0.0233). Profitability and investment have an insignificant impact on the company's risk premium (p=0.9712, 0.6335). The coefficient of determination (R2) is 0.946608, and the adjusted R-squared is 0.943557. This indicates that 94.3557% of the variation in the company's risk premium is explained by the variables in this model, with the remaining 5.6443% attributed to other factors not included in the model. F statistic 310.2631, P value 0.000, say that the model is appropriate for explaining the risk premiums of companies listed on CSE.

5. Conclusion

This study investigates the applicability of the CAPM and FF5F models among companies listed in the CSE, Sri Lanka, using panel data regression analysis. It is carried out using the quarterly data from 50 non-financial firms whose shares are listed on the Colombo Stock Exchange based on high market capitalisation for the period of five years from 2017 to 2021. The fixed effect model was found to be the appropriate model for both selected asset pricing models in the Hausman test. In CAPM, the market risk premium has a significant and positive impact on a company's risk premium. In FF5FM, market risk premium has a significant and positive impact on the company's risk premium, while size and value have a significant and negative impact. However, profitability and investment have an insignificant impact on the company's risk premium. The empirical result of the study reveals that both asset pricing models are widely used for determining a company's risk premium of listed non-financial firms. As per the value of Adjusted R-squared, FF5FM outperforms CAPM. Unlike the CAPM, which considers only market risk, the FF5FM includes other important factors, making it more effective at explaining stock returns. This finding is consistent with the studies done by Minh (2019); El Abd (2017); Acaravci and Karaomer (2017); Desban and Jarjir (2016); Thafani and Ediriwickrama (2022), and Wedagama et al. (2022). The study will provide organisations with guidance on managing key elements, including profitability, investment, size, market, and value factors, to ensure the company remains stable in the market over a long period.

Additionally, it will give empirical support for the model that is best suited for calculating the risk premium of a company and the variables that must be taken into account when valuing the assets. Investors can make better decisions when investing in large-sized companies, based on the study's findings, as it used companies with higher market capitalisation as a sample. Future research can be carried out for small and medium market capitalisation non-financial firms or financial firms to assess whether the explanatory power of FF5FM and CAPM varies across different firm sizes. Furthermore, additional factors beyond the five in the FF5FM, such as investor sentiment, could better explain the risk and return dynamics of the stock market.

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Determinants of CEO Remuneration: Evidence from Indian-Listed Companies

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Abstract

This study delves into the drivers of executive compensation, aiming to assess the factors influencing CEO remuneration amongst the 734 firms listed on the National Stock Exchange from 2013-14 to 2022-23. A balanced panel data approach has been used in this study. Particularly, the fixed effect estimation technique is used to examine the relationship between CEO remuneration and firm specific factors during the period 2013-14 to 2022-23. Our analysis reveals that the impact of Number of Employees, Profit After Tax, Dividend Payout Ratio, Dividend Yield, Firm Age and Firm Size is positive on CEO remuneration whereas the impact of Earnings Per Share, Growth in Market Capitalisation and Value at Risk is negative on CEO remuneration. The results are robust across the sub-samples based on the firm's debt-to-equity ratio, size, and age. These findings offer a data-driven framework for boards to design performance-oriented yet fiscally prudent pay packages. Practitioners are encouraged to adopt fair, competitive, and performance-linked compensation strategies based on firm-specific financial and structural indicators. To ensure CEO compensation aligns with sustainable value creation rather than short-term metrics, the analysis offers practical guidance for policymakers, who can enhance corporate governance norms, establish regulatory benchmarks, and strengthen disclosure standards. From a theoretical perspective, our study sheds light on the unique context of executive pay within India's corporate landscape, enriching the ongoing discourse on CEO remuneration in emerging markets. This study can be considered one of the early studies examining the association between CEO remuneration and firm-specific performance from an emerging economy perspective.

Keywords: *CEO Remuneration, Debt to Equity Ratio, Earnings Per Share, Firm Size, Firm Age*

1. Introduction

This study investigates the firm-specific variables that impact CEO remuneration in Indian publicly listed companies. The increasing gap between CEO earnings and typical employee wages has become a global point of discussion, raising questions about fairness, performance-based pay, and the efficacy of corporate oversight. According to the Institute for Policy Studies, in 2018, 80% of S&P 500 companies paid their CEOs more than 100 times the median employee salary, with 50 firms surpassing a 1000:1 pay ratio. Additionally, AP News reported that 2023 CEO pay at S&P 500 companies rose by nearly 13%, reaching a median of $16.3 million. This increase notably outpaced the 4.1% growth in wages and benefits for private-sector employees, further widening the compensation gap. This disparity is particularly noticeable in India, where CEO salaries often significantly exceed the country's per capita GDP, making the issue particularly significant. In 2024, the median CEO compensation in India rose to ₹9.3 crore, reflecting a 35% increase from ₹6.9 crore in 2020. The average CEO salary has climbed to ₹13.8 crore (2024) —representing a 40% rise compared to pre-pandemic levels—while promoter CEOs have seen an average earning of ₹16.7 crore (The Economic Times updated by PTI, April 09, 2024). Within the IT industry, Infosys CEO Salil Parekh earned ₹ 662.4 million (approximately $7.9 million) in FY2024, marking a 17.3% year-on-year increase (Reuters, June 03 2024). TCS CEO K Krithivasan received ₹253.59 million ($3.04 million), placing him among the more modestly paid CEOs among the top four Indian IT firms (Reuters, May 09, 2024).

Meanwhile, former Wipro CEO Thierry Delaporte topped the pay chart with ₹166 crore ($20 million) in FY2024—the highest compensation among Indian IT leaders (Business Standard, August 09 2024). Additionally, The Economic Times reported the average CEO-to-median employee pay ratio among Nifty 100 companies was 278 times in FY2022. Although the goal of maximizing shareholder value is often used to justify high CEO pay, the specific economic factors driving such compensation are not clearly understood. This research attempts to clarify these complexities by analyzing the financial variables that influence CEO pay in the Indian context, using data from 734 companies listed on the NSE between the fiscal years 2013-2023. The outcomes highlight that a firm's financial stability is an instrumental predictor of CEO remuneration, which has been substantiated by research that has concluded a favourable association between firm performance and CEO remuneration. However, in many cases, no clear link between the two is observed.

Large firms in rapidly growing sectors also offer lucrative remuneration to attract and retain proficient leaders. Furthermore, firms with higher debt levels may pay heavily to appoint CEOs willing to undertake riskier financial strategies. The theoretical basis for this study is rooted in agency theory, as outlined by Jensen and Meckling (1976), which states the agency problem between owners and executives arises from the separation of ownership and managerial control. This supports the rationale for correlating CEO remuneration to firm performance to harmonize these objectives better. Firm size, performance and existing market conditions are the key determinants of executive remuneration, as outlined in Murphy's (1999) study.

Additionally, Bebchuk and Fried (2003) contend that executive remuneration can indicate a manager's gains rather than shareholder value, highlighting the regulatory role of corporate governance. Finkelstein and Hambrick (1996) have emphasized the significance of firm-level assessment by providing empirical evidence that CEO characteristics significantly influence firm performance. For evaluating the evolving patterns in India, comparative insights from Kato and Kubo (2006) on CEO remuneration in Japan serve as a valuable benchmark; recent evidence from Edmans et al. (2023) highlights the impact of firm size, profitability and market conditions in determining CEO remuneration. Additionally, a rise in median pay and a heightened focus on performance-linked rewards has been evidenced in the Deloitte India Executive Performance and Rewards Survey (2025).

Many unresolved questions exist in the Indian context despite all the existing research efforts. Is there a stable correlation between financial performance and CEO remuneration across different industries? How do corporate governance and ownership structures limit the effect of financial elements on CEO remuneration? Are specific performance measures more dependable signals than others? Additionally, it's crucial to examine the impact of recent legislative reforms, like the Companies Act 2013, on CEO compensation practices. To address these gaps, this study examines the pay structures of 734 companies listed on the NSE from 2013-14 to 2022-23. Significant financial and regulatory changes during this period provide a rich framework for investigation. The study aims to comprehensively identify the economic drivers affecting

CEO salaries in India by employing robust econometric models that consider firm and industry-specific variables. A thorough exploration of ownership patterns, company leverage, and board composition promises to reveal more about the role of corporate governance in remuneration decisions. This inquiry goes beyond surface-level narratives to delve into the complexities of financial factors influencing CEO pay in the Indian context. By analyzing a substantial dataset and employing rigorous methodologies, this study seeks to bridge crucial research gaps and shed light on this subject. The insights gained can inform regulatory interventions, enhance corporate governance practices, and foster more informed discussions about CEO compensation in India. Ultimately, this research seeks to reconcile the "Indian contradiction" of soaring CEO pay amidst widespread economic disparities, offering valuable insights for cultivating a fairer and more sustainable corporate landscape.

The subsequent part of the paper is structured as follows: Section 2 summarises the legal framework regulating CEOs in India. Section 3 performs a literature review on various financial factors influencing CEO remuneration, including but not limited to the number of employees, profit after tax, earnings per share, and debt-equity ratio. Section 4 outlines the data sources and research methodologies employed. Section 5 presents the findings and analysis of the study. Finally, Section 6 offers a summary and conclusion.

2. Regulatory Framework regarding Chief Executive Officer in India

Indian companies include both public and private companies in the country. In India, the ownership structure of public and private companies differs. Public companies open to public subscription raise significant capital but are subject to stricter regulations (minimum of seven shareholders). Private companies, on the other hand, provide privacy and flexibility (minimum of two shareholders) but limit public capital raising. Furthermore, one-person companies and producer companies cater to specific industries. Minimum paid-up capital requirements vary, ranging from ₹1 lakh for private to ₹5 lakh for public, to ensure capital adequacy for various scales of operation. Foreign investment can flow through automatic approval for up to 100% FDI in certain sectors and government approval above these limits or in sensitive industries. Foreign Institutional Investors can also invest up to 24% in listed companies, encouraging global participation. Recent amendments to the Companies Act 2013 provide greater flexibility for start-ups and SMEs while increasing transparency through CEO and board remuneration disclosures. Sec. 2(26) defines "Chief Executive Officer" as a person appointed by the Board of Directors responsible for the company's overall management. The Act does not specify any educational or professional requirements for CEOs. They must, however, have "managerial competence" and be fit and proper to hold the office, according to Sec. 2(55). The Act requires a transparent appointment process, often involving nomination and search committees, to ensure thorough candidate evaluation. The Board of Directors makes the final decision and is responsible for selecting the best fit for the company's specific needs (Sec.196). The Companies Act of 2013 does not specify residency or citizenship requirements for individuals appointed as CEOs in Indian corporations. The Act does not expressly prohibit either Indian residents or non-residents from serving as CEOs. Indian citizens and foreign nationals can be appointed CEOs in Indian corporations, subject to the other eligibility criteria outlined in Sections 149(3) and 2(34). Sec. 2(76) of the Act prohibits appointing related parties as CEO. This prevents conflicts of interest and ensures objective leadership. To avoid power concentration, an individual can hold the CEO position in no more than two publicly traded companies simultaneously (Sec.203). For non-compliance, the Registrar of Companies may impose fines, legal proceedings, and reputational harm on companies (Sec.450). Section 196(3) provides that a CEO may be disqualified from holding the position. Within 30 days of appointment or any subsequent change, the company should file Form DIR-12 with the ROC containing the CEO's name, DIN (Director Identification Number) issued by the Ministry of Corporate Affairs, date of appointment or cessation, whether a managing director or whole-time director. Furthermore, the company's annual return (Form MGT-7) filed with the ROC should include the CEO's name, DIN, whether a managing or whole-time director and details on the remuneration received. To maintain compliance and transparency, companies must ensure accurate and timely CEO information updates with the ROC. The ROC keeps a digital archive of company information, including CEO information submitted through these forms and filings. The Companies Act of 2013 doesn't mandate appointing a CEO in all companies. However, it regulates the appointment of MDs and whole-time KMPs (Section 196). Companies can have a CEO and an MD, and their specific authorities depend on the company's internal governance structure, not a hierarchy dictated by the Act. No specific tenure limit is prescribed for CEOs in the

Companies Act 2013, unlike Reserve Bank of India guidelines for commercial banks. The Board of Directors, as per Section 177, has the authority to appoint and manage the company, which **includes determining the remuneration of the CEO and other managerial personnel.** This is generally addressed in the company's Articles of Association or through a Service Contract with the CEO. CEO remuneration within the prescribed limit requires approval by a majority of shareholders via an ordinary resolution during a general meeting for companies with a paid-up share capital of ₹10 crore or more. Section 2(78) defines remuneration as "any money or its equivalent given to a director," which includes salary, allowances, commission, performance-based bonuses, stock options, retirement benefits, and perquisites as defined in Section 197(1). The maximum managerial remuneration payable by a public company to its directors, including the CEO, is capped at 11% of its net profit in that fiscal year, calculated by Section 198. Exceeding this limit necessitates a special resolution passed by at least 75% of shareholders present and voting in a general meeting and approval from the Central Government, subject to Schedule V conditions. Schedule V of the Companies Act outlines the factors the Central Government considers when approving excess remuneration, such as company profitability, industry norms, CEO performance, and overall economic conditions.

3. Literature Review and Hypothesis Formulation

A larger workforce can indicate a company's size, complexity, and growth potential. Higher CEO compensation may signify the company's efforts to attract and retain top talent capable of managing such a large organization (Lau & Vos, 2004). Additionally, it can serve to retain talented CEOs capable of managing a geographically dispersed and complex workforce (Finkelstein & Hambrick, 1996). Agency theory posits that higher compensation incentivizes CEOs to make decisions in the interest of shareholders, thereby mitigating potential agency costs (Jensen & Meckling, 1976). Empirical findings, however, offer mixed evidence. While some studies suggest a positive association, attributing higher CEO compensation to managing larger workforces (Edmans et al., 2023), others raise fairness concerns, especially when employee wages stagnate or benefits are cut (Freeman, 1984). Moreover, a larger workforce may lead to increased bureaucracy, potentially hindering communication and decision-making (Bebchuk & Fried, 2004).

CEO compensation is also often influenced by net sales growth, as higher remuneration packages may signal the company's commitment to attracting top talent capable of leading a successful organization (Zhou, 2000). From an agency theory perspective, tying CEO pay to performance metrics like Profit After Tax (PAT) aligns managerial interests with those of shareholders. Tournament theory similarly suggests such linkages motivate CEOs to maximize profitability (Haleblian & Finkelstein, 1993). Some studies indicate a positive association between PAT and CEO compensation (Ali et al., 2021; Sridhar et al., 2015; Brick et al., 2006), reflecting strong financial health and growth prospects. However, Kato and Kubo (2006) argue for a negative association, suggesting that not all firms link CEO pay to PAT. Eisenhardt et al. (1988) introduce the concept of CEO risk aversion, highlighting a preference for guaranteed Income over variable, performance-based compensation, potentially resulting in short-term decision-making to secure PAT-linked bonuses. Watts and Zimmerman (1986) warn that earnings management is a tactic to manipulate PAT figures and meet compensation targets. Bebchuk and Fried (2004) caution that CEOs may prioritize short-term profit boosts—such as through one-time asset sales—at the expense of long-term investments like research and development.

Earnings Per Share (EPS) has emerged as a critical metric in evaluating CEO performance. Under agency theory, high EPS signals effective leadership in maximizing shareholder value, potentially justifying increased CEO remuneration. Stakeholder theory supports this view, emphasizing that strong financial performance benefits a broader range of stakeholders. Nonetheless, concerns persist that high EPS might be achieved through short-term tactics, raising doubts about the integrity of CEO compensation (Grey, 2010). Thus, a balanced approach is advocated, incorporating both short-term performance and long-term value creation. The literature on EPS and CEO pay remains divided. While some researchers highlight a positive association and cite its importance in building investor confidence, others warn against a narrow focus on EPS. Healy (1985) argues that over-reliance on EPS as a performance metric may promote short-termism, emphasizing the need for more comprehensive measures to ensure sustainable CEO compensation. Rossetto (2021), drawing on expectancy theory, suggests that tying compensation with enterprise value reinforces positive expectations and motivates CEOs to enhance overall corporate net worth.

Substantial dividend payouts, reflected by a high payout ratio, also affect CEO compensation. They are often seen as indicators of a company's financial health and commitment to shareholder wealth, potentially attracting investors seeking stable returns. Agency theory supports the linkage of CEO pay to dividends, positing that such alignment incentivizes management to prioritize shareholder interests. Tournament theory adds that consistently high dividends enhance a company's appeal to prospective CEOs, expanding the talent pool and encouraging higher performance. However, the empirical evidence is mixed. Some studies have reported positive results, while others have stated a negative correlation between dividend payouts and CEO remuneration. Geiler and Renneboog (2016) observed that CEOs may implement payout policies to increase equity-based compensation at the cost of long-term financial stability.

Freeman (1984) also stated that cost-cutting measures harming long-term stakeholder interests may be adopted to prioritize dividends. The debt-equity ratio initiates another perspective to the discussion of CEO remuneration. Jensen & Meckling, 1976; Core et al. (1999) evidenced that financial prudence and effective risk management are signalled by a low debt-equity ratio justifying higher CEO remuneration under an agency theory. Meanwhile, Bebchuk and Fried (2003) and Coles et al. (2006) argued that CEOs maintaining low debt-equity ratios may limit long-term growth opportunities due to low debt financing. Gabaix and Landier (2008) stated that some sectors, as per industry-specific norms, reward CEOs with high remuneration just for practising debt-averse strategies irrespective of their capabilities. Similarly, Altman (1968) and Ohlson (1980) identified that the Interest Coverage Ratio (ICR), which measures a company's interest payment ability, provides a signal of its strong financial management. According to agency theory, aligning CEO remuneration with ICR encourages financial discipline and stability (Jensen & Meckling, 1976). Hackbarth et al. (2006) deduced that a high and stable ICR justifies higher CEO remuneration since it attracts and retains investors.

Firm size is another variable widely examined in CEO remuneration research. Larger firms typically command greater market share, revenue, and operational complexity, which may justify higher CEO compensation (Lau & Vos, 2004; Gabaix & Landier, 2008). According to agency theory, managing more substantial resources creates more opportunities to generate shareholder value, warranting higher pay (Jensen & Meckling, 1976). However, stakeholder theory raises a necessary counterpoint: larger organizations have broader societal responsibilities, and size alone may not equate to effective leadership (Freeman, 1984). Empirical findings are again mixed. Some studies confirm a positive relationship, suggesting that larger firms offer CEOs broader platforms for impact, thus justifying higher pay (Core et al., 1999).

Additionally, industry benchmarks often reinforce premium compensation practices in large firms (Gabaix & Landier, 2008). Lau and Vos (2004) note that CEO pay sensitivity increases with company size. Conversely, other studies point out that complex organizational structures can obscure CEO contributions, leading to excessive compensation not aligned with individual performance (Tosi et al., 2000). Signalling theory also plays a role—experienced CEOs are often drawn to established firms, where they command higher salaries (Elsaid et al., (2011)), while mature companies may use generous pay to deter opportunistic behaviour in the absence of rigorous shareholder oversight (Bebchuk & Fried, 2004).

The impact of firm age on CEO remuneration is similarly nuanced. One school of thought suggests a positive relationship, arguing that older firms attract competent leaders with accumulated experience and reputational capital. These firms may offer higher CEO pay to reflect the historical accumulation of human capital (Datta & Iskandar Datta, 2014). Ozkan (2007) even suggests that the overall relationship between CEO pay and firm performance is weak, indicating that many CEOs are highly compensated regardless of how well their companies perform. Based on the above discussion, we formulate the following hypothesis:

H1: All else equal, firm-specific factors affect the CEO remuneration.

4. Variables, Data, and Methodology

4.1 Variables

Following previous studies (Blanes et al., 2020), we have used CEO remuneration as the dependent variable. The explanatory variables used in this study include Number of Employees(*NOE*), Growth in Net Sales (*GNS*), Profit After Tax (*PAT*), Revenue Earnings in Forex (*REFX*), Enterprise Value (*EV*), Earnings Per Share (*EPS*), Dividend Payout Ratio (*DP*), Free Cash Flows to Equity (*FCFE*), Free Cash Flows to the Firm (*FCFF*), Growth in Market Capitalisation (*GMC*), Debt Equity Ratio (*D/E*), Interest Coverage Ratio (*ICR*), Return on Net worth (*RONW*), Dividend Yield (*DIV*), Net worth (*NW*), Growth in Profit After Tax (*GPAT*), Value at Risk (*VaR*), Firm Age (*FAGE*) and Firm Size (*FS*). (Definition of Variables is given in Table 1).

Table 1. Definition of Variables

Variables	Measures	Predicted Sign
Dependent Variables		
CEO Remuneration (*CEOR*)	Ln (CEO Remuneration)	
Firm-Specific Variables		
Number of Employees (*NOE*)	Ln (Number of Employees)	+/-
Growth in Net Sales (%) (*GNS*)	((New Net Sales - Old Net Sales) / Old Net Sales) * 100%	+/-
Profit After Tax (*PAT*)	Net Income – Income Tax	+/-
Revenue Earnings in Forex (*REFX*)	Ln (Revenue Earnings in Forex)	+/-
Enterprise Value (*EV*)	Market Capitalization + Total Debt - Cash & Cash Equivalents	+/-
Earnings Per Share (*EPS*)	Net Income Attributable to Common Shareholders / Number of Shares Outstanding	+/-
Dividend Payout Ratio (%) (*DP*)	(Dividend per Share / EPS) * 100%	+/-
Free Cash Flows to Equity (*FCFE*)	Net Income + Depreciation & Amortization - Changes in Working Capital - Capital Expenditures - Net Cash Outflow from Financing Activities	+/-
Free Cash Flows to the Firm (*FCFF*)	Net Income + Depreciation & Amortization - Changes in Working Capital - Capital Expenditures - (Interest Expense * (1 - Effective Tax Rate))	+/-
Growth in Market Capitalisation (%) (*GMC*)	((New Market Capitalisation - Old Market Capitalisation) / Old Market Capitalisation) * 100%	+/-
Debt to Equity Ratio (*D/E*)	Total Debt/ Shareholder's Equity	+/-
Interest Cover Ratio (%) (*ICR*)	(Earnings Before Interest and Taxes / Interest Expense) * 100%	+/-
Return on Net worth (%) (*RONW*)	(Net Income / Shareholder Equity) * 100%	+/-
Dividend Yield (%) (*DIV*)	(Annual Dividend per Share / Current Stock Price) * 100%	+/-
Net worth (*NW*)	Total Assets – External Liabilities	+/-
Growth in Profit After Tax (%) (*GPAT*)	((New Profit After Tax - Old Profit After Tax) / Old Profit After Tax) * 100%	+/-
Value at Risk (*VaR*)	Value at Risk	+/-
Firm Age (*FAGE*)	Ln (Current Year – Year of Incorporation)	+/-
Firm Size (*FS*)	Ln (Total Assets)	+/-

4.2 Data

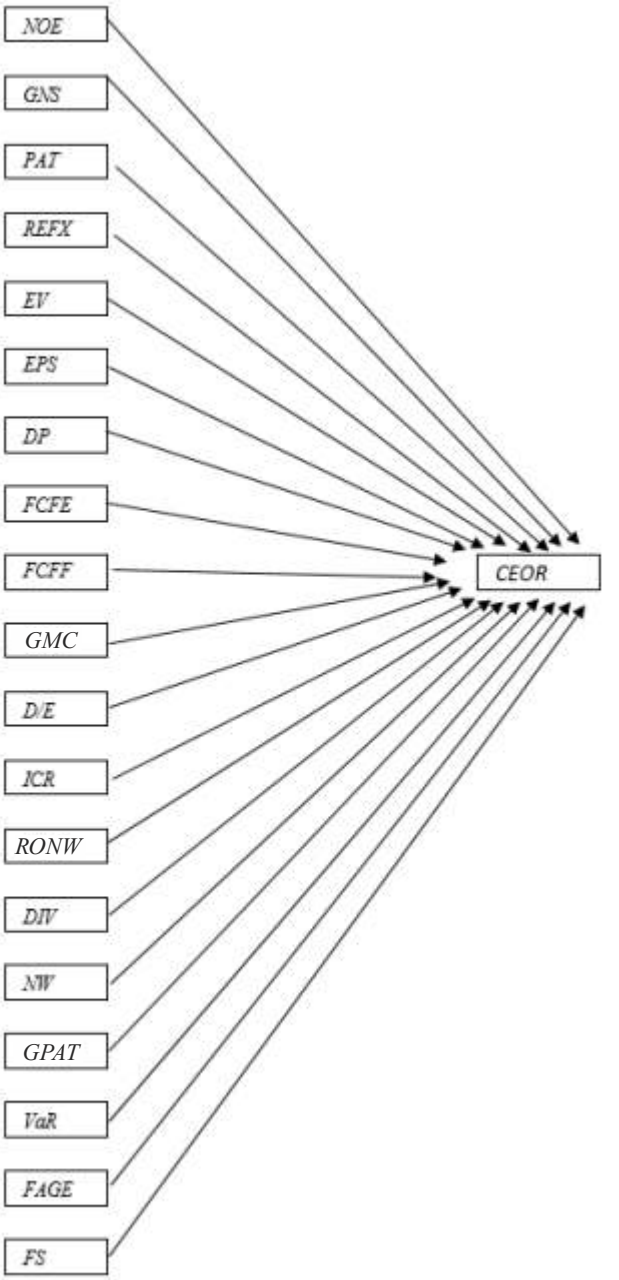
Data from 2776 companies listed on the National Stock Exchange were acquired, but after excluding those without continuous data, our final dataset comprises 734 companies. We ensured a balanced panel dataset by including only those companies with continuous data from 2013-2014 to 2022-23. Data was collected from the Prowess IQ CMIE and Bloomberg databases. For a more detailed examination, we organized the data into sub-groups. Companies were classified based on size, with those in the top tertile of total assets termed large firms and those in the lower tertile as small firms. Firm age categorization involved labelling companies in the upper tertile as matured firms and those in the lower tertile as young firms. Additionally, based on debt-to-equity ratio, companies were divided into those with low and high debt-to-equity ratios.

Table 2 presents descriptive statistics for the sample. The average net sales of the firms have steadily increased over time, possibly due to factors like market expansion, product improvements, or rising demand. Similarly, enterprise value has shown an upward trend, suggesting that investors perceive these firms as more valuable.

Factors such as successful acquisitions or efficient operations may contribute to this rise. Net worth has also grown, indicating improving financial health likely due to retained earnings or prudent economic management. Workforce expansion has occurred over the study period, possibly driven by business growth or increased production capacity. However, there was a decline in market capitalization growth during COVID-19, reflecting global economic uncertainties and investor caution.

Table 3, presenting the correlation matrix, indicates no significant multicollinearity issues, as correlation coefficients are small and most are statistically insignificant. The absence of multicollinearity is further validated by the value of the Variance Inflation Factor (VIF) of explanatory variables, which is less than 5.

4.3 Models Specification and Estimation Method



Assuming the linear relationship between the firm-specific factors and CEO remuneration, a panel data model is specified as follows:

$$CEOR_{it} = \alpha + \beta_1 NOE_{it} + \beta_2 GNS_{it} + \beta_3 PAT_{it} + \beta_4 REFX_{it} + \beta_5 EV_{it} + \beta_6 EPS_{it} + \beta_7 DP_{it} + \beta_8 FCFE_{it} + \beta_9 FCFF_{it} + \beta_{10} GMC_{it} + \beta_{11} D/E_{it} + \beta_{12} ICR_{it} + \beta_{13} RONW_{it} + \beta_{14} DIV_{it} + \beta_{15} NW_{it} + \beta_{16} GPAT_{it} + \beta_{17} VaR_{it} + \beta_{18} FAGE_{it} + \beta_{19} FS_{it} + \epsilon_{it} \ldots . (1)$$

Where $CEOR_{it}$ CEO remuneration $_{it}$ is the disturbance term, i is the company from 1 to 734, and t is the value of years from 2013-2023. The b parameters capture the possible effect of explanatory variables on CEO remuneration. The Company-specific factors used in the study are as follows: *NOE* is the Number of Employees, *GNS* is the Growth in Net Sales, *PAT* is the Profit After Tax, *REFX* is the Revenue Earnings in Forex, *EV* is the Enterprise Value, *EPS* is the Earnings Per Share, *DP* is the Dividend Payout Ratio, *FCFE* is the Free Cash Flows to Equity, *FCFF* is the Free Cash Flows to the Firm, *GMC* is the Growth in Market Capitalization, *D/E* is the Debt to Equity Ratio, *ICR* is the Interest Coverage Ratio, *RONW* is the Return on Net worth, *DIV* is the Dividend Yield, *NW* is the Net worth, *GPAT* is the Growth in Profit After Tax, *VaR* is the Value at Risk, *FAGE* is the Firm Age and *FS* is the Firm Size.

"In our research, we utilized panel data models with industry-level clustering of standard errors to tackle unobservable heterogeneity and endogeneity issues in estimating CEO remuneration. We chose panel data methods over pooled regression because they better handle these complexities. Fixed and random effect models are widely employed within static panel data models. We conducted statistical tests such as the LM and Hausman tests to determine the most appropriate approach for CEO remuneration estimation. The results consistently favoured the fixed-effect model over the random-effect model. The fixed-effect model enables the control of unobserved heterogeneity, capturing individual-specific effects not accounted for by observed variables. In this model, "fixed effects" means that while the intercept varies across individuals (companies), each individual's intercept remains constant over time. We evaluated the accuracy of the models using F-statistics." Gupta and Mahakud (2020). While prior research has significantly contributed to understanding CEO remuneration, several methodological gaps persist. These include limited explanatory variables and inadequate consideration of firm-specific risk and volatility. Many also rely on shorter time frames and smaller samples. This study addresses these gaps through a robust fixed-effects panel model, comprehensive variable selection, industry-level clustering, and a decade-long dataset of 734 consistently reporting Indian firms.

5. Discussion of results

5.1 Whole Sample Results

"Table 4 presents the panel data findings regarding how firm-specific characteristics influence CEO remuneration across all firms included in this exploration. The LM and Hausman tests confirm that the fixed effect model is appropriate for this analysis. The F-statistics p-value is significant at the 1% level, indicating the model's suitability. Furthermore, the adjusted R^2 indicates the proportion of variation explained by the independent variables affecting the dependent variable."

Table 2.

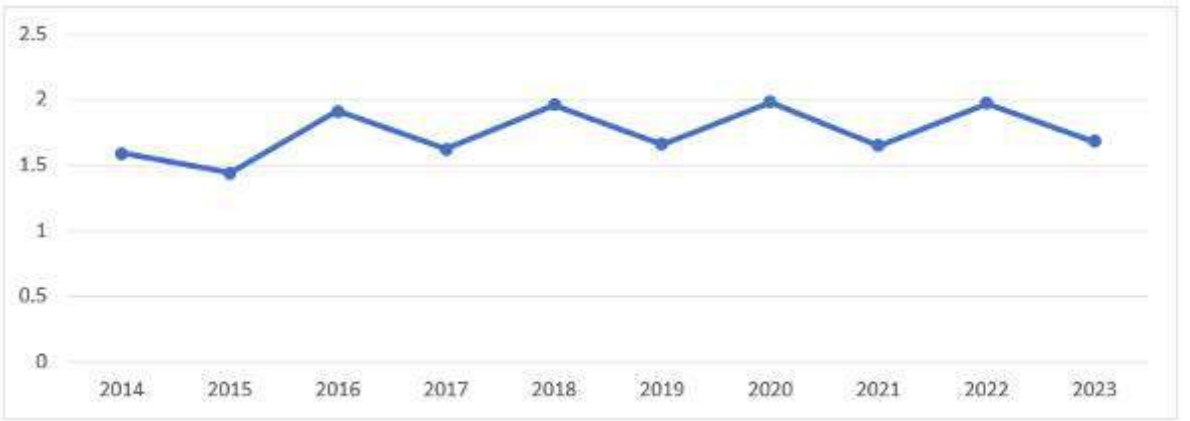
Table 2	CEOR	NOE	GNS	PAT	REFX	EV	EPS	DP	FCFE	FCFF	GMC	D/E	ICR	RONW	DIV	NW	GPAT	VaR	FAGE	FS
Whole Sample data	1.74e+07	2728.87	31.44	191.02	471.10	10109.63	11.82	18.76	267.11	489.66	24.37	1.38	48.46	9.81	106.87	1988.09	-67.87	33.23	37.11	4412.31
2014	1.59e+07	2533.43	95.39	157.09	344.05	6771.21	8.15	15.66	198.31	284.26	35.09	1.41	60.44	10.84	64.76	1268.02	1776.88	33.29	32.71	3073.46
2015	1.48e+07	2517.73	93.79	159.22	362.33	7903.93	8.46	19.11	208.73	277.04	56.65	1.15	66.57	10.37	159.36	1507.11	1778.26	33.29	33.67	3354.11
2016	1.91e+07	2637.92	16.08	143.86	389.96	7868.77	9.34	14.44	232.11	362.17	20.56	1.61	49.58	10.07	162.36	1676.66	1419.67	33.31	34.64	3656.31
2017	1.62e+07	2694.22	10.83	183.11	441.91	9631.14	10.91	20.96	299.29	403.69	46.21	1.38	49.78	10.08	72.02	1769.63	1283.89	33.31	36.62	3850.36
2018	1.96e+07	2672.77	19.25	152.31	433.68	9386.76	9.94	19.15	197.78	258.37	22.97	1.34	61.53	10.03	81.99	1894.63	-6374.51	33.18	36.62	3972.02
2019	1.66e+07	2711.31	19.47	189.37	513.65	9781.39	11.98	18.35	212.44	281.23	-10.44	1.43	60.52	10.06	89.24	2087.98	-898.88	33.18	37.61	4335.01
2020	1.98e+07	2736.56	0.25	138.54	503.64	9746.27	10.31	22.32	265.11	423.62	-34.25	1.36	37.06	7.92	86.81	2096.59	-172.66	33.12	38.67	4748.11
2021	1.66e+07	2845.71	4.29	218.16	464.61	12402.49	11.68	19.61	433.66	675.31	120.06	1.34	28.64	8.86	104.29	2261.83	64.67	33.22	39.62	5348.29
2022	1.97e+07	3086.03	34.31	313.17	604.48	14694.83	16.32	16.76	345.38	619.48	84.81	1.33	40.51	10.31	120.11	2511.82	196.31	33.22	40.52	5730.79
2023	1.68e+07	3084.83	20.79	318.63	643.72	14981	18.28	21.26	278.88	639.38	3.61	1.31	32.41	9.76	127.92	2691.22	866.11	33.22	41.48	6019.09

"Notes: Table 2 reports descriptive statistics on the variables used in the study. For the definition of variables, please refer to Table 1."

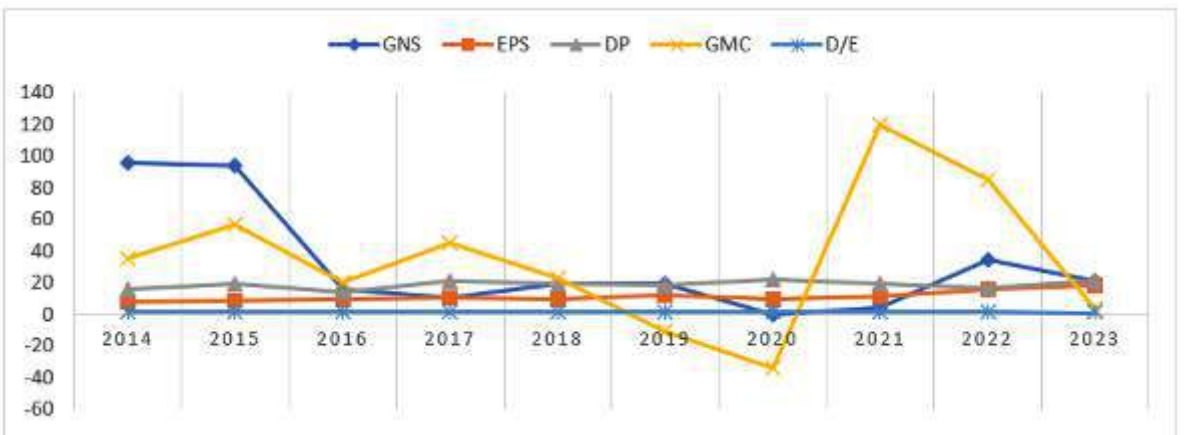
Table 3. Correlation matrix of the explanatory variables

	CEOR	NOE	GNS	PAT	REFX	EV	EPS	DP	FCFE	FCFF	GMC	D/E	ICR	RONW	DIV	NW	GPAT	VaR	FAGE	FS
CEOR	1.0000																			
NOE	0.4693	1.0000																		
GNS	-0.1435	-0.2467	1.0000																	
PAT	0.4634	0.5691	-0.0790	1.0000																
REFX	0.2257	0.2779	-0.0838	0.3360	1.0000															
EV	0.4997	0.6289	-0.1095	0.8061	0.3176	1.0000														
EPS	0.2231	0.2448	-0.0961	0.3505	0.1502	0.3022	1.0000													
DP	0.3164	0.2746	-0.1467	0.2742	0.1464	0.3026	0.2689	1.0000												
FCFE	0.4581	0.5579	-0.1133	0.7510	0.3076	0.7515	0.2776	0.2550	1.0000											
FCFF	0.4490	0.6097	-0.1404	0.7789	0.3063	0.7754	0.2506	0.2256	0.8357	1.0000										
GMC	-0.0284	-0.0463	0.0392	-0.0502	0.0002	-0.0827	-0.0560	-0.0378	-0.0725	-0.0585	1.0000									
D/E	-0.0480	-0.0251	0.0762	0.0029	-0.0581	0.0033	-0.1027	-0.1643	0.0228	0.0197	0.0249	1.0000								
ICR	0.0603	0.0010	0.0297	0.1130	0.0491	0.1064	0.0795	0.0818	0.0643	0.0216	-0.0467	-0.0180	1.0000							
RONW	0.1100	0.1361	0.0234	0.2917	0.0713	0.1669	0.2369	0.0994	0.1262	0.1323	0.0067	0.0299	0.0799	1.0000						
DIV	0.4469	0.4325	-0.1778	0.5254	0.2580	0.5021	0.4736	0.6960	0.4316	0.4017	-0.0496	-0.1711	0.1058	0.2398	1.0000					
NW	0.4679	0.8087	-0.1434	0.6230	0.2970	0.6792	0.3470	0.3794	0.6829	0.6528	-0.0774	-0.2431	0.0899	-0.0219	0.5273	1.0000				
GPAT	-0.0692	-0.0921	0.2397	-0.1425	-0.0583	-0.1210	-0.1523	-0.1846	-0.0928	-0.0832	0.1485	0.0656	-0.0682	-0.0301	-0.1895	-0.1039	1.0000			
VaR	-0.4091	-0.4082	0.1357	-0.3800	-0.1744	-0.4320	-0.3880	-0.3793	-0.3487	-0.3463	0.0520	0.1465	-0.0734	-0.1613	-0.5377	-0.4837	0.1331	1.0000		
FAGE	0.1432	0.1218	-0.0763	0.2112	0.1009	0.1379	0.1298	0.1163	0.1675	0.1627	0.0187	0.0243	0.0084	0.0198	0.2106	0.1789	-0.0800	-0.1299	1.0000	
FS	0.4679	0.6006	-0.1197	0.7700	0.3249	0.8197	0.2349	0.2418	0.7716	0.8047	-0.0581	-0.0129	0.0376	0.0122	0.4128	0.7986	-0.0666	-0.3540	0.1914	1.0000

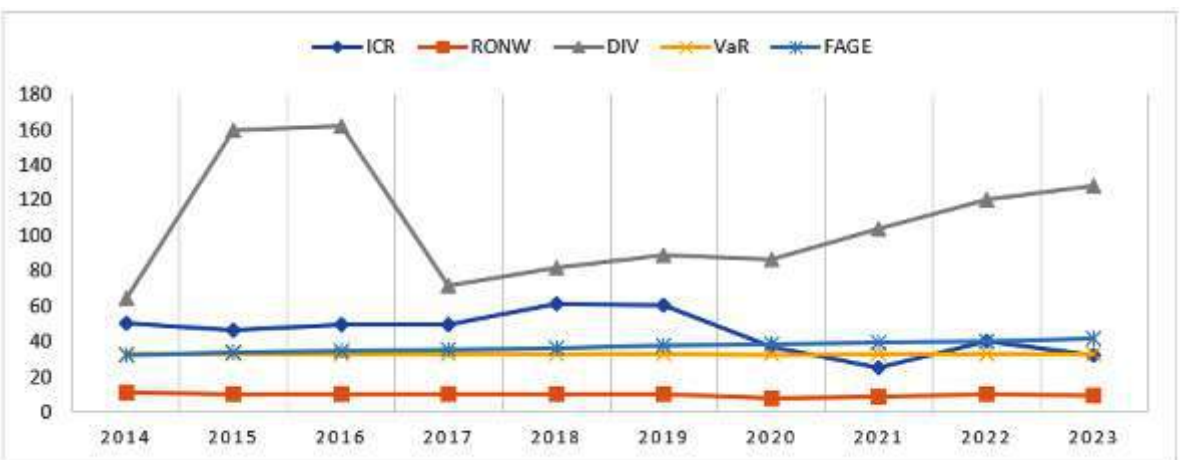
"Notes: *, **and ***show the 10%, 5% and 1% level of significance, respectively. For a definition of variables, please refer to Table 1:"



Graph 1. Trends in CEO Remuneration (*CEOR*) from 2014 to 2023

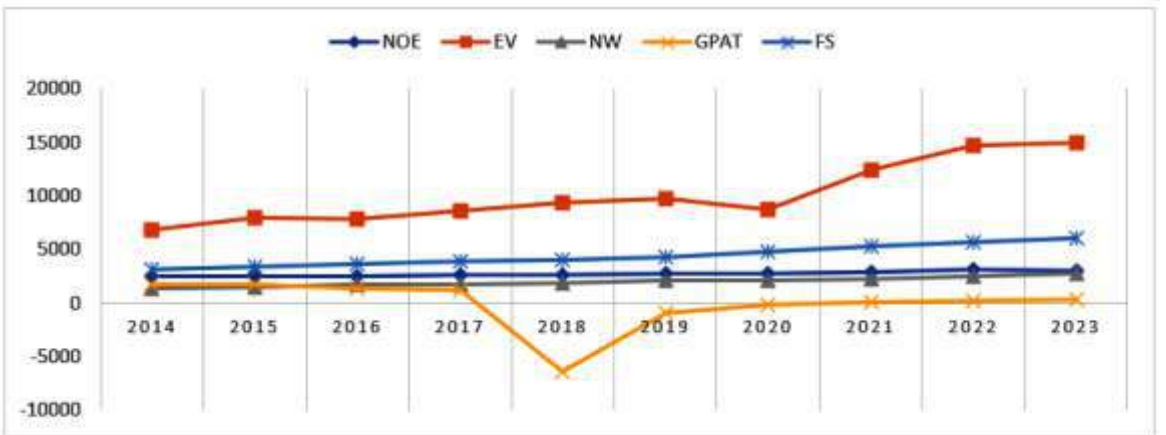


Graph 2. Trends in Growth in Net Sales (*GNS*), Earnings Per Share (*EPS*), Dividend Payout Ratio (*DP*), Growth in Market Capitalisation (*GMC*), Debt Equity ratio (*D/E*) from 2014 to 2023



Graph 3. Trends in Interest Cover Ratio (*ICR*), Return On Networth (*RONW*), Dividend Yield (*DIV*), Value at Risk (*VaR*), Firm Age (*FAGE*) from 2014 to 2023

Graph 4. Trends in Profit After Tax (*PAT*), Revenue Earnings in Forex (*REFX*), Free Cash Flows to Equity (*FCFE*), Free Cash Flows to the Firm (*FCFF*) from 2014 to 2023



Graph 5. Trends in Number of Employees (*NOE*), Enterprise Value (*EV*), Networth (*NW*), Growth in Profit After Tax (*GPAT*), Firm Size (*FS*) from 2014 to 2023

Our research discloses a positive and significant correlation between the number of employees (*NOE*) within firms and CEO remuneration, confirming our hypothesis. This finding aligns with previous research (Edmans et al., 2023). Larger companies typically have more intricate operations, broader market presence, and higher revenue. CEOs overseeing such firms often receive elevated compensation due to the extensive scope of their duties. Moreover, according to agency theory, CEOs serve as agents for shareholders (the principals), and their remuneration is designed to harmonize with shareholder objectives. As firms expand and hire more personnel, overseeing the actions of CEOs becomes increasingly challenging. The increased employee count may result in higher monitoring costs. To address this, companies may offer higher compensation to attract and retain skilled CEOs capable of effectively managing large-scale organizations.

Our study demonstrates that increased net sales (*GNS*) correspond to higher CEO remuneration, validating our hypothesis. This outcome is consistent with the prior research conducted by Zhou (2000). CEO compensation frequently correlates with performance indicators such as sales growth. Strong growth in net sales typically enhances profitability, stock valuation, and overall company performance. CEOs who drive such growth may receive increased bonuses, stock options, or other performance-based incentives.

The coefficient associated with profit after tax (*PAT*) shows a positive relationship with CEO remuneration in firms,

Table 4. Firm-specific Characteristics and CEO remuneration (Fixed effect estimation results for All the Firms)

	OLS	FE	GMM
NOE	0.151(0.013) ***	0.104(0.019) ***	0.003(0.001) **
GNS	0.044(0.015) **	0.019(0.008) **	0.014(0.004) **
PAT	0.031(0.018) *	0.027(0.012) **	0.006(0.002) **
REFX	0.015(0.008) *	0.017(0.012)	0.006(0.005)
EV	0.096(0.017) ***	0.012(0.004) **	0.016(0.008) **
EPS	0.062(0.015) ***	0.030(0.011) **	0.011(0.005) **
DP	0.047(0.015) **	0.030(0.011) **	0.012(0.005) **
FCFE	0.085(0.017) ***	0.015(0.009)	0.001(0.004)
FCFF	0.016(0.018)	0.006(0.010)	0.008(0.014)
GMC	0.016(0.013)	0.015(0.007) **	0.001(0.003)
D/E	-0.003(0.001) **	-0.002(0.001) **	-0.002(0.001) *
ICR	0.001(0.001)	0.001(0.001)	0.0006(0.0006)
RONW	0.001(0.001)	0.001(0.001)	0.001(0.001)
DIV	0.110(0.014) ***	0.037(0.014) **	0.023(0.009) **
NW	0.078(0.015) ***	-0.006(0.013)	-0.018(0.012)
GPAT	0.038(0.011) **	0.007(0.006)	0.003(0.003)
VaR	-0.334(0.029) ***	-0.781(0.067) ***	-1.396(0.175) ***
FAGE	0.061(0.023) **	0.283(0.039) ***	0.568(0.073) ***
FS	0.011(0.004) **	0.040(0.017) **	0.011(0.002) **
Const.	5.784(0.082) ***	6.825(0.136) ***	13.885(0.303) ***
Hausman Test		162.75(0.0000)	
LM Test		19488.78(0.0000)	
F-Test	F (20, 7318) = 201.96 (0.0000)		
Wald Test		chi2(20) = 500.20 (0.0000)	5266.72(0.0000)
Sargan Test			117.1433(0.0000)
AR (1)			0.1089
AR (2)			0.1024
Adj-R^2	0.3539	0.2912	

Notes: We estimate controlling for heteroskedasticity and firm-level clustering. Standard errors are reported in parentheses.
**, **and ***show the 10%, 5% and 1% significance level respectively*

echoing previous research (Attaway, 2000; Sridhar et al., 2015). CEOs serve as representatives for shareholders, and their compensation should reflect shareholder interests. Higher levels of *PAT* often indicate successful firm performance, and CEOs contributing to this profitability are duly rewarded. Hickfang and Holder (2018) suggest that CEOs may undertake risks to maximize *PAT*, with compensation structures like stock options incentivizing risk-taking aligned with shareholder wealth (Agency Theory). According to the Expectancy Theory, individuals are motivated by their expectations of rewards. CEOs anticipate higher compensation for meeting *PAT* targets. Compensation linked to *PAT* growth reinforces positive expectations and incentivizes CEOs to improve profitability. Signalling theory addresses information asymmetry between CEOs and shareholders, where high CEO compensation signals confidence in the firm's prospects (Attaway, 2000). Strong *PAT* indicates financial health and growth potential, and CEOs are rewarded for achieving this, thus reinforcing positive signalling.

Our findings demonstrate a positive association between enterprise value (*EV*) and CEO remuneration, which aligns with previous research outlined in the literature review. Peetz (2015) suggests that CEOs may strategically undertake risks to bolster enterprise value, with compensation structures like stock options incentivizing risk-taking that aligns with shareholder wealth (Agency Theory). The argument based on Market Perception and

Reputation suggests that a high enterprise value signals investor confidence in the firm's prospects. CEOs who maintain or increase the enterprise value of companies are perceived as successful and competent and have been rewarded with high remunerations. Kline et al. (2017) evidenced that CEOs who effectively apply risk management strategies and raise the enterprise value are compensated by the risk-return trade-off propounded by the risk-return trade-off theory.

We found a positive correlation between earnings per share (EPS) and CEO remuneration, indicating that an increase in EPS conveys greater profitability and shareholder wealth maximization. Aligned with agency theory, CEOs may be paid elevated remuneration like bonuses or stock options to achieve improved EPS. Li and Young (2016) found that CEOs anticipate rewards through higher remunerations or stock options based on performance. Thus, high EPS can incentivize CEOs to intensify their efforts, enhancing firm performance (Expectancy Theory).

Likewise, aligning with the findings of Jensen and Meckling (1976), our study reveals a positive correlation between the dividend payout ratio and CEO remuneration. Increased dividend payouts in companies are linked with higher CEO compensation. This implies that companies may signal financial soundness through dividends, positively impacting CEO remuneration.

In summary, our analysis indicates a negative correlation between the debt-to-equity ratio and CEO remuneration, consistent with prior findings documented in the study (Bebchuck & Fried, 2003). When debt levels become burdensome, it jeopardizes the company's financial well-being. Risk-averse CEOs may be cautious about accepting high compensation packages during such circumstances. Moreover, board directors may be less inclined to authorize substantial CEO pay when the company's financial stability is uncertain. Furthermore, loan agreements frequently contain covenants that impose restrictions on executive compensation, potentially hindering companies with high debt from offering excessively generous packages to CEOs.

Our research indicates that higher dividends paid out are associated with higher CEO remuneration, confirming previous findings of Geiler et al. (2016). Elevated dividend payouts often indicate a company's focus on maximizing shareholder returns, which may align with CEO compensation linked to performance metrics such as share price growth. CEOs incentivized by increases in stock price might deliver enhanced outcomes for shareholders, potentially warranting higher compensation. Consistent dividend distributions signal robust financial performance, further justifying increased CEO remuneration. Boards rewarding CEOs for steering the company toward profitability is a strategy to retain talent and attract qualified candidates. Conversely, the impact of *VaR* on CEO remuneration is negative.

Our analysis reveals that firm size exhibits a positive correlation with CEO remuneration, which aligns with Murphy's earlier study (1999). Larger firms often have more intricate operations, necessitating a higher level of expertise and experience from the CEO. This complexity could justify higher compensation to attract and retain qualified individuals capable of effectively managing such enterprises. CEOs of larger firms may have a greater impact on overall company performance and shareholder value, as their decisions can influence a broader range of stakeholders. Consequently, they may receive higher pay. Larger firms frequently compete for talent globally, necessitating competitive compensation packages to attract top CEOs. This competition can drive up CEO pay across various companies. Agency theory asserts that managers may prioritize their gains over those of owners. In larger firms, the potential for agency costs may be higher. Hence, higher compensation packages with performance-based incentives can be viewed as a means to mitigate this risk and align CEO interests with shareholder value creation.

Similarly, firm age demonstrates a positive relationship with CEO remuneration, consistent with earlier findings of Baker et al. (1988). Established firms with a lengthy track record of success may have a stronger brand reputation, attracting high-calibre CEOs who command premium salaries due to the prestige of leading renowned companies. Older firms will likely have well-established business models and predictable revenue streams, offering a lower-risk profile that appeals to CEOs. Boards may be more inclined to offer higher compensation packages in such cases. Firms with a more extended history may have developed or acquired more resources like financial reserves or wide networks of associates, providing CEOs more flexibility and higher remunerations for undertaking organizational growth initiatives.

5.2 Firm age effect

Younger firms may offer lower salaries but higher equity stakes or performance-based bonuses to attract and retain talented CEOs. However, as the firm matures and becomes better established, CEO remuneration may rise, reflecting the company's growth, stability, and success.

Table 5. Firm-specific Characteristics and CEO remuneration (Fixed effect estimation results for Young and Mature Firms)

	Young Firms			Mature Firms		
	OLS	FE	GMM	OLS	FE	GMM
GRL L1.			-0.056(0.018) **			-0.044(0.013) **
NOE	0.184(0.019) ***	0.184(0.019) ***	0.246(0.021) ***	0.184(0.025) ***	0.182(0 .025) ***	0.206(0.019) ***
GNS	0.050(0.022) **	0.044(0.022) *	0.037(0.029)	0.066(0.027) **	0.069(0.028) **	0.068(0.028) **
PAT	0.017(0.026)	0.017(0.026)	0.007(0.038)	0.021(0.034)	0.013(0.035)	0.027(0.031)
REFX	0.024(0.011) **	0.024(0.011) **	0.002(0.012)	0.025(0.015) *	0.026(0.015) *	0.029(0.011) **
EV	0.108(0.023) ***	0.108(0.024) ***	0.163(0.032) ***	0.109(0.032) **	0.117(0.032) ***	0.258(0.024) ***
EPS	0.065(0.021) **	0.065(0.021) **	0.035(0.027)	0.073(0.026) **	0.071(0.026) **	0.034(0.022)
DP	0.055(0.021) **	0.055(0.021) **	0.071(0.024) **	0.065(0.027) **	0.063(0.027) **	0.006(0.027)
FCFE	0.107(0.024) ***	0.106(0.024) ***	0.052(0.031) *	0.032(0.031)	0.031(0.031)	0.004(0.029)
FCFF	0.018(0.027)	0.018(0.027)	0.005(0.033)	0.058(0.032) *	0.056(0.032) *	0.031(0.027)
GMC	0.018(0.019)	0.022(0.020)	0.001(0.023)	-0.011(0.024)	-0.008(0.025)	-0.042(0.024) *
D/E	-0.012(0.003) ***	-0.012(0.003) ***	-0.021(0.003) ***	0.006(0.001) **	0.006(0.001) **	0.003(0.001) **
ICR	0.001(0.001)	0.001(0.001)	0.001(0.001) **	0.001(0.001)	0.001(0.001)	0.001(0.001) **
RONW	0.001(0.001)	0.001(0.001)	0.001(0.001)	-0.001(0.001)	-0.001(0.001)	-0.001(0.001)
DIV	0.108(0.022) ***	0.108(0.022) ***	0.054(0.028) **	0.103(0.026) ***	0.105(0.026) ***	0.081(0.023) **
NW	0.004(0.022)	0.003(0.022)	0.001(0.026)	0.099(0.035) **	0.097(0.035) **	0.052(0.029) *
GPAT	0.044(0.016) **	0.043(0.016) **	0.051(0.023) **	0.043(0.0204) **	0.042(0.021) **	0.057(0.019) **
VaR	-0.254(0.039) ***	-0.254(0.039) ***	-0.194(0.038) ***	-0.415(0.061) ***	-0.414(0.061) ***	-0.472(0.049) ***
FAGE	0.224(0.036) ***	0.222(0.037) ***	0.004(0.465)	-0.214(0.084) **	-0.225(0.085) **	-2.609(1.553) *
FS	0.161(0.034) ***	0.162(0.034) ***	0.191(0.039) ***	-0.045(0.049)	-0.046(0.049)	-0.0238(0.043)
Cons	5.083(0.115) ***	5.071(0.117) ***	5.454(0.577) ***	6.535(0.198) ***	6.549(0.202) ***	10.745(2.684) ***
Hausman Test		4.48 (0.0007)				
LM Test		0.00 (1.0000)			0.00 (1.0000)	
F-Test	F (20, 2978) = 128.21 (0.0000)	F (20,2969) = 127.28 (0.0000)		F (20, 2979) = 62.63 (0.0000)	F (20, 2970) = 62.94 (0.0000)	
Wald Test			2550.89(0.0000)			2719.31(0.0000)
Sargan Test			48.406(0.0653)			110.989(0.0000)
AR(1)			0.1014			0.1213
AR(2)			0.7342			0.1223
Adj-R^2	0.4591	0.4627		0.2913	0.2960	

*Notes: We estimate controlling for heteroskedasticity and firm-level clustering. Standard errors are reported in parentheses. *, **and ***show the 10%, 5% and 1% significance level respectively*

Older firms may prioritize experience and proven track records, leading to higher compensation for seasoned CEOs. Conversely, younger firms may value innovation and entrepreneurial spirit, potentially offering higher rewards for younger CEOs who bring fresh perspectives and agility. Market norms and peer comparisons within the industry also influence CEO compensation. Therefore, consistent with prior arguments, we divide the firms based on firm age into young and matured firms to examine the impact of firm-specific characteristics on CEO remuneration across each type. The influence of firm-specific characteristics remains broadly consistent with the results obtained from the whole sample. Interestingly, while the impact of the debt-to-equity ratio is harmful for young firms, it is positive for mature firms. This suggests that firm-specific characteristics play a significant role in determining CEO remuneration regardless of firm age.

5.3 Debt to Equity Ratio Effect

A high debt-to-equity (*D/E*) ratio indicates greater financial risk for a company. If a CEO increases debt financing, it exposes the company to potential financial distress if they cannot meet debt obligations (Agency Theory). To address this agency problem, CEO compensation can be linked to maintaining a healthy *D/E* ratio. This incentivizes CEOs to effectively manage risk and prioritize shareholder value by offering higher pay when the *D/E* is kept within an acceptable range and reducing pay or imposing penalties for excessive debt. Investors might perceive a company with a high *D/E* ratio as riskier. The company might keep CEO compensation lower than its peers to counteract this perception. This could signal to investors that the company prioritizes financial prudence and debt reduction and closely ties CEO compensation to company performance. Conversely, a company with a low *D/E* ratio and strong financial position might offer higher CEO compensation, signalling confidence in the CEO's ability to generate shareholder value and attract top talent. Overall, a high *D/E* ratio could result in lower CEO remuneration through various mechanisms, aiming to discourage risky decisions, encourage sustainable profit strategies, and signal a commitment to financial responsibility and long-term value creation (Aslam et al., 2019). Therefore, in line with previous arguments, we segment firms based on their debt-to-equity ratio into low and high debt-to-equity firms to examine the impact of firm-specific characteristics on CEO remuneration in high debt-to-equity firms. The influence of firm-specific characteristics remains broadly consistent with the results obtained from the whole sample. Interestingly, while the impact of the dividend payout ratio is negative for high debt-to-equity firms, it is positive for low debt-to-equity firms. This suggests that firm-specific characteristics significantly determine CEO remuneration regardless of the debt-to-equity ratio.

5.4 Firm Size Effect

CEOs at the helm of larger companies typically command higher salaries than their counterparts in smaller firms. Several factors drive this trend. Firstly, larger companies are inherently more complex to manage due to their diverse product lines, global operations, and larger workforce. This complexity necessitates skilled leadership capable of making strategic decisions with significant impact. Secondly, bigger companies compete worldwide for top executive talent, and CEOs with the necessary experience and skills are in high demand. To attract and retain them, these companies offer competitive compensation packages (Joyce & Slocum, 2012). Finally, there's a perception that CEOs of larger firms have a greater influence on the overall economy and shareholder success, potentially justifying higher pay in the eyes of boards of directors. However, firm size is just one piece of the puzzle. Company performance, industry norms, market benchmarking practices, board dynamics, economic conditions, corporate governance structures, and regulatory oversight influence CEO compensation. In rare instances, smaller firms may offer competitive packages to attract experienced CEOs who can drive growth and innovation. Table 6 shows the estimated result of the impact of firm-specific characteristics on CEO remuneration across firm sizes, and the findings are more or less in line with the whole sample result.

6. Conclusion

This study delves into the impact of firm-specific factors on CEO remuneration within NSE-listed firms spanning from 2013-14 to 2022-23, post the implementation of the Indian Companies Act, 2013. Our findings reveal a significant positive relationship between firm-specific factors and CEO remuneration, echoing earlier studies such as Finkelstein and Hambrick (1990) and Ismail et al. (2014). We observe that factors like the number of employees, net sales growth, enterprise value, earnings per share, firm age, and firm size significantly influence CEO remuneration.

Table 6. Firm-specific Characteristics and CEO remuneration (Fixed effect estimation results for Low and High Debt to Equity ratio Firms)

	Low Debt to Equity Firms			High Debt to Equity firms		
	OLS	FE	GMM	OLS	FE	GMM
GRL L1.			0.0173(0.021)			0.008(0.021)
NOE	0.147(0.023) ***	0.147(0.023) ***	0.144(0.025) ***	0.183(0.017) ***	0.184(0.018) ***	0.213(0.021) ***
GNS	0.061(0.027) **	0.053(0.027) *	0.047(0.029)	0.047(0.021) **	0.052(0.021) **	0.024(0.028)
PAT	-0.121(0.035) **	-0.121(0.035) **	-0.159(0.037) ***	0.113(0.023) ***	0.111(0.023) ***	0.059(0.033) *
REFX	0.026(0.014) *	0.025(0.014) *	0.048(0.015) **	0.003(0.011)	0.003(0.011)	0.002(0.012)
EV	0.154(0.027) ***	0.163(0.028) ***	0.181(0.028) ***	0.085(0.025) **	0.083(0.026) **	0.082(0.039) **
EPS	0.094(0.025) ***	0.092(0.025) ***	0.066(0.025) **	0.036(0.021) *	0.035(0.021) *	0.012(0.024)
DP	0.089(0.025) **	0.084(0.025) **	0.064(0.026) **	-0.054(0.021) **	-0.053(0.021) **	-0.018(0.026)
FCFE	0.152(0.033) ***	0.151(0.033) ***	0.135(0.037) ***	0.053(0.021) **	0.054(0.021) **	0.063(0.023) **
FCFF	-0.078(0.036) **	-0.081(0.036) **	-0.054(0.038)	0.002(0.023)	0.003(0.023)	0.008(0.031)
GMC	-0.011(0.023)	-0.002(0.024)	-0.007(0.027)	0.017(0.018)	0.013(0.018)	0.003(0.024)
D/E	0.128(0.167)	0.089(0.174)	6.976(3.537) **	0.001(0.001)	0.001(0.001)	0.001(0.002)
ICR	0.001(0.001)	0.001(0.001)	0.001(0.001) **	-0.001(0.001)	-0.001(0.001)	-0.001(0.001) **
RONW	0.002(0.001) **	0.002(0.001) **	0.002(0.001) **	-0.002(0.001) **	-0.002(0.001) **	-0.001(0.001)
DIV	0.082(0.025) **	0.085(0.025) **	0.069(0.022) **	0.127(0.019) ***	0.127(0.019) ***	0.098(0.024) ***
NW	0.242(0.032) ***	0.244(0.032) ***	0.168(0.039) ***	0.006(0.017)	0.004(0.017)	0.018(0.021)
GPAT	0.037(0.021) *	0.037(0.021) *	0.029(0.023)	0.038(0.014) **	0.037(0.014) **	0.054(0.021) **
VaR	-0.264(0.057) ***	-0.259(0.057) ***	-0.288(0.054) ***	-0.352(0.036) ***	-0.354(0.036) ***	-0.367(0.048) ***
FAGE	0.101(0.043) **	0.107(0.043) **	0.122(0.045) **	-0.018(0.029)	-0.025(0.029)	-0.024(0.042)
FS	-0.161(0.045) ***	-0.164(0.045) ***	-0.025(0.058)	0.034(0.028)	0.037(0.028)	0.065(0.041)
Cons	5.688(0.149) ***	5.646(0.151) ***	4.965(0.368) ***	5.881(0.111) ***	5.902(0.111) ***	5.718(0.221) ***
Hausman Test		14.70 (0.0012)				
LM Test		11.90 (0.0000)			12.65(1.0000)	
F-Test	F (20, 2979) = 80.61 (0.0000)	F (20, 2970) = 80.82 (0.0000)		F (20, 2979) = 98.11(0.0000)	F (20,2970) = 98.12(0.0000)	
Wald Test			1246.07(0.0000)			1449.37(0.0000)
Sargan Test			45.559(0.1090)			48.632(0.1626)
AR(1)			0.4532			0.4289
AR(2)			0.5663			0.5686
Adj-R^2	0.3468	0.3510		0.3931	0.3971	

*Notes: We estimate controlling for heteroskedasticity and firm -level clustering. Standard errors are reported in parentheses. *, **and ***show the 10%, 5% and 1% significance level respectively*

Table 7. Firm-specific Characteristics and CEO remuneration (Fixed effect estimation results for large and small firms)

	Small Firms			Large Firms		
	OLS	FE	GMM	OLS	FE	GMM
GRL_L1.			0.001(0.023)			0.005(0.017)
NOE	0.137(0.021) ***	0.137(0.021) ***	0.149(0.023) ***	0.161(0.022) ***	0.162(0.022) ***	0.134(0.021) ***
GNS	0.016(0.022)	0.008(0.022)	0.067(0.027) **	-0.045(0.025) *	-0.043(0.026) *	-0.054(0.028) **
PAT	0.001(0.029)	0.005(0.029)	0.016(0.037)	0.118(0.031) ***	0.111(0.031) ***	0.109(0.031) ***
REFX	0.033(0.013) **	0.033(0.013) **	0.033(0.015) **	0.026(0.013) **	0.027(0.013) **	0.028(0.013) **
EV	0.132(0.024) ***	0.136(0.025) ***	0.087(0.032) **	0.138(0.031) ***	0.139(0.032) ***	0.168(0.036) ***
EPS	-0.073(0.021) **	-0.073(0.021) **	-0.064(0.024) **	0.031(0.025)	0.031(0.025)	0.007(0.025)
DP	0.011(0.022)	0.009(0.022)	0.008(0.024)	0.057(0.024) **	0.059(0.024) **	0.016(0.025)
FCFE	0.045(0.027) *	0.043(0.027)	0.068(0.032) **	0.131(0.026) ***	0.129(0.026) ***	0.116(0.025) ***
FCFF	0.053(0.027) *	0.051(0.027) *	0.006(0.033)	-0.047(0.031)	-0.046(0.031)	-0.022(0.033)
GMC	0.031(0.019)	0.036(0.021) *	0.023(0.027)	0.002(0.022)	0.001(0.023)	0.016(0.025)
D/E	0.002(0.001)	0.002(0.001)	0.002(0.002)	0.005(0.002) **	0.005(0.002) **	0.007(0.002) **
ICR	0.001(0.001)	0.001(0.001)	0.001(0.001)	0.001(0.001)	0.001(0.001)	0.001(0.001)
RONW	-0.001(0.001)	-0.001(0.001)	-0.001(0.001)	-0.002(0.001) *	-0.002(0.001)	-0.001(0.001)
DIV	0.201(0.025) ***	0.201(0.025) ***	0.222(0.028) ***	0.061(0.022) **	0.059(0.022) **	0.075(0.021) ***
NW	0.082(0.023) **	0.083(0.023) ***	0.088(0.026) **	0.088(0.024) ***	0.087(0.024) ***	0.105(0.027) ***
GPAT	0.011(0.016)	0.011(0.016)	0.0102(0.024)	0.031(0.018) *	0.027(0.018)	0.015(0.018)
VaR	-0.231(0.037) ***	-0.224(0.037) ***	-0.222(0.047) ***	-0.429(0.058) ***	-0.422(0.058) ***	-0.485(0.061) ***
FAGE	0.280(0.034) ***	0.284(0.034) ***	0.245(0.042) ***	-0.163(0.039) ***	-0.169(0.039) ***	-0.159(0.041) ***
FS	0.131(0.033) ***	0.133(0.033) ***	0.563(0.219) **	-0.327(0.052) ***	-0.328(0.052) ***	-1.285(0.365) ***
Cons	4.942(0.117) ***	4.896(0.121) ***	6.550(0.509) ***	7.044(0.162) ***	7.051(0.163) ***	10.437(1.276) ***
Hausman Test		11.27(0.0044)				
LM Test		11.23(0.0000)			13.67(0.0000)	
F-Test	F (20, 2979) = 70.13(0.0000)	F (20,2970) = 70.11(0.0000)		F (20, 2979) = 40.56(0.0000)	F (20,2970) = 40.30(0.0000)	
Wald Test			593.68(0.0000)			809.45(0.0000)
Sargan Test			43.943(0.1428)			36.044(0.4195)
AR(1)			0.2023			0.2245
AR(2)			0.3226			0.3140
Adj-R^2	0.3156	0.3200		0.2088	0.2140	

*Notes: We estimate controlling for heteroskedasticity and firm-level clustering. Standard errors are reported in parentheses. *, **and ***show the 10%, 5% and 1% significance level respectively*

Notably, our analysis highlights a nuanced impact of the debt-to-equity ratio on CEO remuneration, with an adverse effect observed for young firms and a positive impact for mature firms. This discrepancy could stem from mechanisms wherein excessive debt incurs financial penalties for CEOs, prompting adjustments in base salary, bonuses, or stock options. Moreover, performance metrics that gauge incentive pay may prioritize maintaining a healthy debt-to-equity ratio. Furthermore, our results exhibit robustness across different econometric methods, with fixed-effect estimations yielding similar findings to GMM estimation results. This study enhances the literature by investigating how firm-specific characteristics influence CEO remuneration in the context of ongoing regulatory reforms in India's emerging economy, with its unique market structure and macroeconomic environment. It also explores the impact across various firm types, categorized by size, age, and debt-to-equity ratio. It offers valuable insights for stakeholders such as boards, corporate analysts, regulators, policymakers, and investors. The study addresses key research gaps by providing a detailed analysis of financial health, corporate governance, and legislative reforms like the Companies Act 2013. It offers practical implications to support informed decision-making and improve corporate governance and regulatory practices in India. Despite conducting several robustness tests, our study acknowledges limitations, such as the potential for a broader period and the inclusion of additional firm-specific factors.

Nevertheless, our findings have practical and theoretical implications for practitioners and academia. The study provides critical insights for policymakers and corporate practitioners by establishing the significant influence of firm-specific financial indicators on CEO remuneration. Policymakers like SEBI and MCA should implement reforms mandating disclosure of performance-linked compensation metrics and set standardized pay benchmarks. Introducing conditional pay caps for financially weak or high-risk firms can enhance fiscal responsibility. Boards and NRCs must tailor CEO compensation based on firm age, size, and leverage, while HR teams should align pay structures with predictive indicators like *REFX* and *FCFE*. Transparent performance evaluation systems will empower investors and auditors to hold firms accountable. Future studies could broaden the scope by looking at a more extended period to see if the link between company-specific factors and CEO pay changes over time. They could also delve deeper into governance factors and specific company traits, including board structure, investor protection, etc. Our study concludes that firm-specific factors are crucial in determining CEO remuneration within listed firms.

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How Fintech Innovations Shape Investor Evaluations of Banking Sector Competitiveness in Asia?

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Abstract

The study aimed to evaluate the impact of fintech on investors' evaluation in the Asian banking industry between 2017 and 2023, taking into account the moderating effect of country competitiveness. The study employed cross-country analysis, examined stock returns using the Fama-French Three Factor Model (FFTFM), and used a sample of 92 privatised commercial banks in Asia. Fixed effect models from panel regression analysis were used. The interaction term (fintech*country competitiveness) was a jointly important factor of stock evaluation, according to the results. The study contributed to the body of knowledge about the linkages between fintech funding and stock returns that were influenced by country competitiveness. Fintech innovations and funding trends are reshaping the competitive landscape, harnessing fintech-driven opportunities and establishing fintech as a cornerstone of financial services. Fintech is a new technology, and there is limited availability of pre-2017 data due to the sector's recent emergence.

Keywords: *Fintech, investors' perception, moderating effect, country competitiveness and stock evaluation.*

1. Introduction

The fintech industry did not exist in the early 2000s. The development of fintech and its history can be traced back to 2008, due to the global financial crisis, during which people lost trust in banks. Later, the emergence of fintech evolved, and people were allowed to access banks, which led to building trust in fintech applications. This initiative aims to drive up not only fintech demand but also competitive motivations to increase the number of fintech start-ups and make it a fast-growing industry. As fintech has experienced rapid growth, raising capital for banks has been easy on the stock market. When there is fintech news in the markets, it creates positive market sentiment, and investors' attitudes towards the stock markets become positive, which drives up demand for stocks, leading to a positive stock valuation. Another critical factor has been included, which is country competitiveness, which has led banks to increase fintech funding and remain competitive in the market. However, an environment is important, and the government plays a vital role in it, where banks raise their funding for fintech to disrupt their traditional business models.

When fintech funding is higher, banks can increase shareholders' wealth, which positively impacts their stock valuation. Higher country competitiveness may attract quality investors, leading to adequate liquidity and capital flow in the stock market. As a result, the stock market will be more efficient, enabling investors to assess the company's performance more accurately, which will be reflected in the share price. However, Asia lags in country competitiveness and fintech funding, resulting in a significant proportion of underbanked small and medium enterprises (SMEs) and consumers. This raises a concern about investor perceptions, which may weaken stock returns due to low profitability. The study investigates whether country competitiveness strengthens or weakens the relationship between fintech innovations and stock returns, addressing Asia's unique challenges in investors' perception and stock market efficiency.

2. Literature Review

The best price for stocks or options may be found using agency theory, an economic theory (Linder & Foss, 2015). Additionally, businesses may make choices when they are unsure about taking on new risks. According to agency theory, businesses typically plan to overinvest when faced with uncertainty (Zhu et al., 2020). If agency theory is applied in this study, it will examine fintech as a tool that banks can utilise to determine the optimal amount of funding for fintech, thereby achieving the best stock price. If the theory is correct, this might lead to investors evaluating the stocks. The impact of competition on innovation and business analytics was examined by Ashrafi and Zareravasan (2022). They created a model and theorised from the dynamic capability (DC) viewpoint to look at how various business analytic techniques affect innovation and competitive advantage. Sutanto and Sudarsono (2018) investigate the relationship between company resources and Indonesian banks' competitiveness. If the dynamic capability view theory is used in this study, fintech will be addressed as a resource. By using it, a bank may raise performance and expand capacity in order to achieve the desired goal, which, if successful, might lead to higher stock returns.

Fintech's impact on stock returns has been the subject of several studies (Li et al., 2017; Asmarani & Wijaya, 2020; Sapulette et al., 2021; Carlini et al., 2022; Wang et al., 2023) in the literature. After Carlini et al. (2022) examined the effect of fintech on stock returns using European and North American banks, they concluded that bank investment had an impact on stock markets. Li et al. (2017) discovered a positive association between fintech financing and stock returns.

On the other hand, Sapulette et al. (2021) discovered a comparatively less detrimental effect of fintech on larger banks, while Asmarani and Wijaya (2020) found that fintech has no significant effect on retail banks' stock returns listed on the Indonesia Stock Exchange using fintech as funding value and CAPM as stock returns. Wang et al. (2023) discovered, however, that investors' risks were reduced as a result of fintech development. However, Senarathne and Long (2019) showed that competitiveness is negligible when compared to returns on ordinary stocks, whereas Zhuang and Zhang (2020) found that fintech has a comparative edge over stock returns. Existing literature has not empirically examined the relationship between fintech innovations and stock returns using the Capital Asset Pricing Model (CAPM) framework, nor has any study investigated the moderating effect of country competitiveness in this relationship, especially in the Asian banking sector context. In this study, the following hypothesis has been proposed to be investigated:

H1: Fintech has a significant positive effect on bank stock returns.

H2: Fintech influences stock returns with the moderating effect of country competitiveness.

Table 1. Literature Matrix

Variables	Measurement	Data	Citations	Expected Significant
DV:				
Stock Returns	CAPM using the Fama-French 3-Factor Model	Eikon DataStream, Kenneth R. French data library	Zhuang & Zhang (2020), Li et al. (2017), Asmarani & Asmarani & Wijaya (2020), Sapulette et al. (2021), Carlini et al. (2022), Faulkender & Wang, (2006), Wang et al. (2023) .	Positive
IV:				
Fintech	Funding as a proxy	CB Insights and Crunchbase	Li et al. (2017), Asmarani & Wijaya (2020), Sapulette et al. (2021), Carlini et al. (2022), Wang et al. (2023).	Positive
Country competitiveness	IMD World Competitiveness Index as a proxy	IMD World Competitiveness Index	Senarathne & Long (2019) & Sutanto and Sudarsono (2018).	Positive
GDP growth	Economic growth	WB and IMF	Huy et al. (2020) & Mirzaei et al. (2013)	Positive
Inflation	CPI Index as a proxy	WB and IMF	Huy et al. (2020) & Mirzaei et al. (2013)	Negative
Interest rate	Lending rate	WB and IMF	Huy et al. (2020) & Mirzaei et al. (2013)	Positive
Cash	Cash	Eikon DataStream	Faulkender & Wang (2006).	Positive
Earnings	EBIT	Eikon DataStream	Faulkender & Wang (2006)	Positive
Dividend	Dividend	Eikon DataStream	Faulkender & Wang (2006)	Positive
Interest expenses	Interest expenses	Eikon DataStream	Faulkender & Wang (2006)	Positive
Leverage	Total equity over TA	Eikon DataStream	Faulkender & Wang (2006)	Negative
COVID-19	COVID-19 is also a dummy variable that takes the binary number 1 for the COVID-19 period, and zero otherwise.	Binary number for 2020-2022	Benni (2021) & Sapulette et al. (2021).	Positive/Negative

3. Research Methodology and Data

This section presents the design research methodology and describes the different sections of data and estimation.

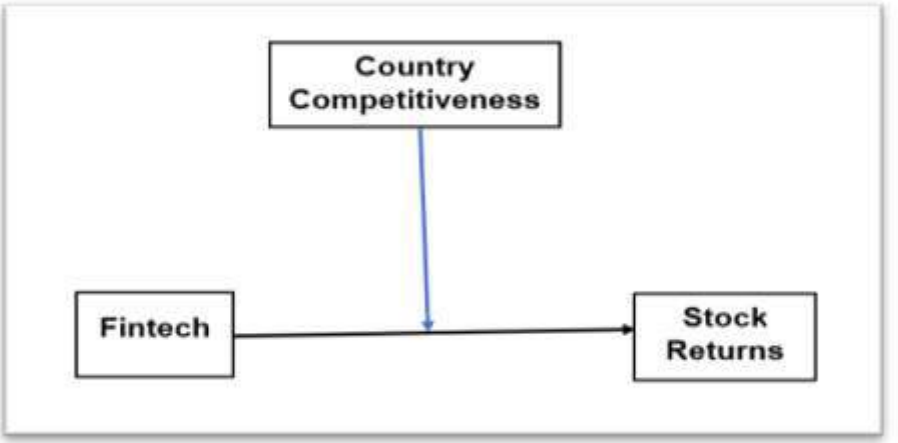

Figure 1. Research framework using moderating effect

3.1 Determination of Sample and Data

The research study selected banks that were considered financially sound and received fintech financing from fifteen Asian nations (India, China, Malaysia, Saudi Arabia, Thailand, UAE, Qatar, Jordan, Philippines, Indonesia, Taiwan, Hong Kong, Singapore, Japan, South Korea) and seven banks from each country. This study uses data from 2017 to 2023 because fintech is a new technology, and there is limited availability of pre-2017 data. This time frame captures fintech's significant growth while ensuring accurate and relevant analysis. Fintech funding data was collected from CB Insights and Crunchbase (2023), macro-level data was sourced from the World Bank (2023) and IMF (2023), firm-level data was obtained from Eikon DataStream (2023), and country competitiveness data was collected from the IMD World Competitiveness (2023). Fintech is the independent variable in this study, whereas national competitiveness is the moderating factor, and stock price is the dependent variable for the chosen Asian banks. Time series and cross-sectional data were also used in the data collection process. The study used a non-probability sampling strategy called purposive sampling, in which particular standards for sample selection were pre-established.

In this research, country competitiveness data have been obtained from IMD, which provides a measure of the Global Competitiveness Index. For this study, the final sample consists of data from IMD representing 15 countries in terms of their World Competitiveness Index scores.

3.2 Variable Measurement

3.2.1 Stock Returns (DV)

Several aspects of stock prices and the factors that influence them have been examined in earlier research. Similar to Zhuang and Zhang (2020), they examined how fintech events affected the value of commercial bank stock. Li et al. (2017) used the Fama-French three-factor model to investigate the impact of fintech funding on stock performance. Asmarani and Wijaya (2020) used the same Fama-French three-factor model to analyse stock returns and fintech. Furthermore, Faulkender and Wang (2006) investigated cash holding in the context of corporate finance policy, evaluating stock returns (CAPM) using the Fama-French three-factor model. Thus, in the current research, stock prices have been assessed using the adjusted closing prices for the year that was observed, and stock returns (CAPM) have been analysed using the Fama-French three-factor model. The study

$$E(R_i) = R_f + \beta_1 [E(R_m - R_f] + \beta_2 E(SMB) + \beta_3 E(HML) \ldots\ldots (i)$$

Here, R_i is the return on asset i, R_f is the risk-free interest rate, and R_m is the return on the value-weighted market portfolio. SMB is the equal-weighted average of the returns on the three small stock portfolios minus the three big stock portfolios. Similarly, HML is the average return on a portfolio of high book-to-market equity stocks minus the average return on a portfolio of low book-to-market equity stocks, constructed to be neutral concerning size.

3.2.2 Fintech (IV)

The financial value of funding is one of the proxies used in numerous studies on fintech as an independent variable. The proxy employed by Sapulette et al. (2021) was fintech financing. Fintech financing was utilised as a stand-in by Carlini et al. (2022). Fintech financing expressed in US dollars has been utilised as a stand-in in this study.

3.2.3 Country Competitiveness (Moderating Variable)

Stock performance may be impacted by the relationship between fintech and country competitiveness. Better stock returns are the result of fintech solutions' increased profitability (Zhuang & Zhang, 2020; Carlini et al., 2022; Li et al., 2017). Fintech financing stimulates investor confidence and improves market sentiment. When a country's competitiveness is supported, investors may become more enthusiastic and willing to increase their investment in a bank's shares. According to Senarathne and Long (2019), the banking sector's creative business strategies and the nation's competitiveness have a beneficial impact on stock performance. Considering the veracity of the aforementioned claim, the purpose of this study is to examine whether national competitiveness influences the correlation between fintech and stock returns in the Asian banking sector.

3.2.4 Bank-Level Variables

Cash may give management the money they need to invest in non-monetary enterprises. Research on the cash holdings of corporations has demonstrated via empirical investigations that an increase in equity should be a prerequisite for every dollar added to cash reserves (Faulkender & Wang, 2006). Cash is used in this study as a proxy for a bank-specific variable. Earnings (EBIT) gauge company attributes that might affect the firm's worth. EBIT was used by Faulkender and Wang (2006) to measure profits. Faulkender and Wang (2006) investigated whether a rising dividend should be a criterion for determining the worth of a dollar added to cash reserves. In line with the previously described study, dividends are controlled for in this analysis in order to examine bank-specific characteristics. High-leverage companies' equity worth decreases with each extra dollar of cash compared to a low-leverage company (Faulkender and Wang, 2006). Leverage was defined as total debt divided by total assets. A company's interest coverage has an impact on shareholder earnings distribution or investment decisions. According to Faulkender and Wang (2006), a company that exhibits good interest coverage has a lower percentage of its cash and cash flow allocated to debt, hence increasing its available money for distribution or investment.

3.2.5 Macro-Level Variables

Research suggests that macroeconomic conditions impact stock returns. Economic growth is found to have a beneficial impact on the stock price of commercial banks by Huy et al. (2020). According to Assefa et al. (2017), interest rates significantly lower stock returns. According to Mirzaei et al. (2013), greater inflation rates are associated with worse returns. Conversely, country-level data such as GDP, inflation, and interest rates lead to imbalanced data, which is why utilising a dummy can yield accurate conclusions. Fu and Mishra (2020) discovered that the COVID-19 pandemic has resulted in noteworthy surges in digital financial applications. Benni (2021) concluded that the pandemic has expedited the financial digitisation process. COVID-19 has been employed in this investigation as a dummy variable.

3.3 Regression Models

The panel data regression models applied in this study are under the following:

$$Sr_{jt} = a + b_1 FT_{jt} + b_2 Cash_{jt} + b_3 Earnings + b_4 Div_{jt} + b_5 Lev_{jt} + b_6 TA_{jt} + b_7 GDPgrowth_{jt} + b_8 Irate_{jt} + b_9 MS_{jt} + b_1 Covid_{jt} + \mu_{jt} \ldots (1)$$

The relationship between macroeconomic indicators and firm-level factors—more especially, how they affect firm growth—was studied by Manganelli and Popov (2013). In a similar vein, Huay et al.'s study from 2022 sought to determine how the existence of more robust institutions influences financial development at higher levels, which in turn supports business expansion. Expanding on this idea, the current study investigates the relationship between fintech, a firm-level indicator, and macroeconomic factors, such as a nation's competitiveness, examining how these factors affect banks' stock performance as evidenced by their stock returns.

In this study, we employ a standard econometrics methodology in which non-interacted regression is calculated first and then interacted regression. To guarantee

accurate results for renormalisation, we first estimate a multiple regression model and then use the demeaned technique, as shown by Balli and Sorensen (2012). The relationships under investigation are then examined further by integrating the demeaned interaction variables into the same econometric model.

$$Sr_{jt} = \alpha + \beta_1 FT_{jt} + \beta_2 Com_{jt} + \beta_3 FT*Com_{jt} + \beta_4 Cash_{jt} + \beta_5 Earnings + \beta_6 Div_{jt} + \beta_7 Lev_{jt} + \beta_8 Iexp_{jt} + \beta_9 GDPgrowth_{jt} + \beta_{10} CPI_{jt} + \beta_{11} Covid_{jt} + \mu_{jt}$$

Where SR_{jt} denotes stock return, FT as fintech, Com as competitiveness, and FT*Com as an interactive term, cash as cash, Earnings as earnings, Div as dividend, Lev as leverage, Iexp as interest expense, GDPgrowth as real GDP growth, CPI, or consumer price index, Covid as a binary variable, j as the number of banks, t as a year, α as the intercept, β1–β11 as slope parameters, and μ as error, unobservable, or residual.

3.3.1 Raw Data Examination and Filtering the Data

As shown in Table 2, seven variables exhibit relatively large standard deviations: fintech, country competitiveness, cash, earnings, total assets (TA), interest expenditures, and money supply. To mitigate this volatility, outliers were systematically removed using a non-graphical approach, reducing the standard deviations to below one. Both graphical and non-graphical outlier detection methods were implemented in STATA. Following this data-cleaning process, the final dataset consists of 583 observations.

3.3.2 The Results of Diagnostic Check

The Fisher-type unit-root test, based on augmented Dickey-Fuller methodology (Islem, 2017), confirms that the data series is stationary, indicating no issues with non-stationarity. Additionally, variance inflation factor (VIF) tests were conducted to assess multicollinearity, revealing no significant correlation among the explanatory variables. The results of both normality and multicollinearity diagnostics are summarised in Table 3.

Regarding autocorrelation in Table 3, the model shows no evidence of serial autocorrelation, as the p-values in Models 1 and 2 are not statistically significant. However, the significant p-values indicate the presence of heteroskedasticity in both models. The Durbin-Watson test was applied to assess endogeneity under the assumption of exogenous variables, and the non-significant p-value confirms that Models 1 and 2 do not suffer from endogeneity issues. Furthermore, the fixed-effects model satisfies the Hausman test. To address heteroskedasticity, robust standard errors were estimated using the Stata program (Hoechle, 2007), which provides resilient standard errors for linear panel (fixed-effects) models.

4. Results and Discussion

The most appropriate model for this study is the panel data regression model, which aligns with methodologies

Table 2. Descriptive Statistics (on raw data)

Variable	Obs.	Mean	Std. Dev	Min	Max
FT	644	255.100	1093.590	0.000	10700.000
Com	644	27.300	15.370	1.000	58.000
Cash	644	22795.270	91592.040	20.980	930268.400
Ebit	644	2548.380	6693.710	-901.840	65221.920
Div	644	0.104	0.1822	0.000	1.100
Lev	644	0.270	1.800	0.000	26.640
TA	644	593285.200	3609076.00	676.100	3.450
Iexp	644	7433.470	47672.270	7.690	552931.100
GDPgrowth	644	0.029	0.038	-0.090	0.080
CPI	644	0.021	0.020	-0.025	0.081
IRate	644	0.052	0.025	0.008	0.110
MS	644	6.200	2.120	14447.000	1.360
Covid	644	0.284	0.451	0.000	1.000

Table 3. Diagnostic Check

	Unit-root test based on the ADF test	VIF for multicoll inearity	Breusch-Godfrey LM test for autocorrelati on	Breusch-Godfrey LM test for heteroskedasti city	Endogeneity	FE model selection using Hausman
Model 1	Results are normal since p<0.05	Range = 1.05-3.58	p-value = (0.275) Chi^2 = 1.188	p-value = (0.00) *** Chi^2 = 104.220	p-value = (0.300) Durbin = 0.298	p-value = (0.00) *** Chi^2 = 41.780
Model 2	Results are normal since p<0.05	Range = 1.05-3.58	p-value = 0.198 Chi^2 = 1.656	p-value = (0.00) *** Chi^2 = 109.770	p-value = (0.501) Durbin = 0.499	p-value = (0.00) *** Chi^2 = 76.53

employed in prior research (Carlini et al., 2022). As demonstrated in Table 4, the panel data model incorporates a demeaned approach for renormalisation, ensuring robustness in estimation. Following established practices in the literature (Balli & Sorensen, 2012), this study adopts a fixed-effects panel regression framework with a modified Capital Asset Pricing Model (CAPM) specification. The fixed-effects model is particularly suitable here, as it controls for unobserved heterogeneity and satisfies the Hausman test assumptions, thereby providing consistent and efficient estimates.

True model (interaction effect):

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \mu_{jt}$

Demeaned method:

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 (X_1 - \bar{x}_1) * (X_2 - \bar{x}_2) + \mu_{jt}$

4.1 Interaction Effect

The coefficient *b* represents the direct (unconditional) marginal effect of fintech (FT) funding, which remains constant across all countries. In contrast, *b Com* captures the conditional effect of FT on stock returns (SR), moderated by country competitiveness (*Com*). Since *Com* varies by country, this effect is heterogeneous across nations. To determine the threshold level of country competitiveness (*Com**), at which the total effect of FT becomes positive, we solve the inequality *b + b Com > 0*. This identifies the minimum level of *Com* required for FT to have a net enhancing effect on stock returns.

Thus, we have

$SR/FT = {}_2 + {}_3 Com = 3.84 + Com^* - 3.64 > 0 = 1.05 = \exp(1.05) = 2.85\%$

4.2 Discussion

According to Table 4, the bank stock returns will drop by 0.744 and 5.87 units in Models 1 and 2, respectively, if the coefficient values of each variable are set to zero (0). Based on the findings in Table 4, we can state each variable as follows:

Fintech (FT) exhibits a strongly positive effect on stock returns. Holding other independent variables constant, a 1% increase in FT investment leads to a rise in stock returns by 1.16 and 3.84 units in Models 1 and 2, respectively (coefficient *b*). This finding aligns with agency theory (Linder & Foss, 2015), which posits that banks possess the decision-making authority over FT funding to optimise stock prices, subsequently influencing investor evaluations.

Empirical support for this relationship exists across multiple studies. Grieco (2017) demonstrates that innovation investments positively affect bank stock returns, while Asmarani et al. (2020) confirm that both the frequency and value of FT funding enhance stock performance. Similarly, Carlini et al. (2022) show that R&D-driven innovation investment rounds yield favourable stock return outcomes. This study further contributes to the literature by revealing, through cross-country analysis, a statistically significant impact of FT financing value on stock market performance.

Country competitiveness (Com) exerts a positive and statistically significant influence on bank stock returns. If all

Table 4. Simulation of Models

Dependent Variable	Stock Return (CAPM)			
	Model 1 (FE)	Model 2a (FE) Individual Effect	Model 2b (FE) Interaction Effect	Model 2c (FE) Demeaned Method
logFT	1.169**	0.037	3.84**	-1.018**
	(0.333)	(0.218)	(0.855)	(0.228)
logCom		1.691**	1.47**	-0.025
		(0.452)	(0.170)	(0.409)
logFT*logCom			3.634**	
			(0.797)	
lnFT*lncom_demeaned				3.646**
				(0.796)
logCash	1.094	-1.050	-0.029	-0.019
	(1.204)	(1.241)	(0.503)	(0.502)
logEarnings	-2.636**	-1.032	-0.337	-0.340
	(0.693)	(0.078)	(0.208)	(0.207)
Div	-0.205	0.637	1.054	1.079
	(2.204)	(0.392)	(0.876)	(0.874)
logLev	-4.240	-0.163	-0.201	-0.200
	(1.693)	(2.402)	(0.085)	(0.084)
logIexp	2.967	3.755**	2.114**	2.113**
	(0.968)	(0.023)	(0.478)	(0.476)
GDPgrowth	-2.884	8.327	5.710	5.731
	(4.710)	(0.234)	(2.141)	(2.132)
CPI	-42.812	-2.285	-3.430	-3.439
	(14.10)	(0.867)	(2.825)	(2.815)
Covid	-3.206***	0.279	-0.339	-0.339
	(0.443)	(5.683)	(0.194)	(0.193)
Constant	-0.744	-5.735	-5.875	-0.339
	(1.745)	(7.755)	(0.981)	(1.058)
Observations	583	583	583	583
R-squared	5.08	1.62	1.89	1.95
F—Statistics	8.92	14.98	105.30	106.06
P-value	0.04	0.02	0.00	0.00

Notes: Standard errors are in parentheses and p-values in square brackets.
** p < 0.10; ** p < 0.05; *** p < 0.01 (two-tailed test).*

other independent variables in the model stay constant, a one per cent rise will result in a 1.47-unit increase in the bank stock return in model 2 (b). While Senarathne and Long (2019) found that industry-level competition demonstrates negligible effects on stock returns, our analysis reveals that country competitiveness maintains a robust positive association with bank stock performance when properly controlled. This distinction highlights the importance of examining competitiveness at the macroeconomic level rather than focusing solely on industry-specific factors.

The moderating effect is significant and favorable, while the interaction term has a negative impact. This suggests that country competitiveness (FT*Com) and fintech are important factors that together determine stock performance. The overall level of country competitiveness is 1.05, or 2.85%, meaning that a rise of 1 per cent in country competitiveness will stimulate a 2.85 per cent increase in the impact of fintech on bank stock returns. This data suggests that, under some conditions that need to be improved, such as country rankings, macroeconomic performance, government efficiency, including institutional framework and business legislation, and technological infrastructure in the country, the competitiveness of the country plays a significant role for the banking industry to benefit from the fintech effect. Similar to model 2(b), the additional result in

model 2(c) reveals a coefficient estimate of -3.646. Since the impact remains the same, the results are renormalised.

In models 1 and 2(b), cash positively affects stock returns (Faulkender & Wang, 2006), the effect is small. In models 1 and 2(b), earnings hurt stock returns; this research's result contradicts the findings of other studies (Faulkender & Wang, 2006). In model 1, dividend (Div) has a negligible negative impact on stock returns; in model 2 (b), however, it has a positive impact on stock returns (Faulkender & Wang, 2006). In both models, leverage has a negligible negative impact on stock returns. The results align with the previous investigation as well (Faulkender & Wang, 2006).

The results reveal distinct patterns across macroeconomic indicators. While the Consumer Price Index (CPI) demonstrates a consistently negative relationship with stock returns in both models, GDP exhibits mixed effects, showing negligible positive and negative impacts in Models 1 and 2(b), respectively (Huy et al., 2020). Regarding financial variables, interest expenses present an interesting contrast. In Model 1, they show an insignificant positive effect, while in Model 2(b), a 1% increase in interest expenses leads to a significant 2.11-unit increase in stock returns (holding other variables constant). These findings align with prior research by Faulkender and Wang (2006).

The COVID-19 pandemic's impact varies by model specification. Model 1 shows a significant negative association, where a one-year increase in COVID exposure corresponds to a 0.339-unit decrease in stock returns (ceteris paribus). Model 2, however, indicates a positive but statistically insignificant relationship. These results partially corroborate Fasanya et al. (2022), who found consistently adverse COVID-19 effects across global and country-specific contexts.

5. Conclusion

The study supports the effect of fintech on stock performance. According to the study, the association between fintech and stock returns is strengthened by country competitiveness, which has a significant moderating. Investor assessments are favourable when fintech expenditure is high and a country ranks higher; this increases demand for shares and raises the share price. The creation of fintech innovations has been greatly aided by fintech financing. However, there are still issues facing the Asian banking sector, particularly in areas where cash is still widely used. These issues result in increased operating expenses and restricted access to stock markets. When this happens, investors' negative attitudes regarding the banks discourage them from making investments in the riskier asset, which negatively impacts stock performance. Increasing profitability and improving investor perception of Asian banks are two benefits of converting them into fintech-based banking services.

Since fintech has emerged, investors have been able to increase their trust in banks, which has increased demand for fintech and made banks more competitive in the rapidly expanding fintech-based banking sector. This has increased profitability and improved stock performance for banks. Therefore, given some variables that need to be significantly improved, such as macroeconomic performance, government efficiency, company efficiency, and technical infrastructure, country competitiveness plays a crucial role in affecting the influence of fintech on stock performance. Consequently, banks can maintain their competitiveness in the market, raise additional capital for fintech companies, and boost investor sentiment in the stock market. The study contributes to the body of literature and offers insightful information on the advantages of fintech for investors, stakeholders in the banking sector, and policymakers. Because fintech was a novel technology in 2016, there was no data accessible on or before that year, which limits the research.

5.1 Future Research

With a primary focus on fintech proxy measures, this research study established the foundation for comprehending an underlying link through the use of secondary data, econometric models, and quantitative analysis. This should be expanded upon in future research by adding a variety of fintech metrics, growing the dataset, and examining the effects on the banking sector.

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Appendix

Table I. Appropriate model 1

Independent Variables	Breusch-Pagan LM test for RE	Hausman Test for FE
Model 1 (RE)	0.210 $Chi^2 = 0.65$	
Model 1 (FE)		0.000 $Chi^2 = 41.78$

Table II. The result for the Panel data regression model (OLS)on the relationship between stock returns and fintech, starting from the year 2017-2023, for Asia's banks.

Variables	***Model 1***
logFT	-0.114 (0.599)
logCash	-0.003 (0.937)
logEarnings	-0.021 (0.647)
logDiv	0.049 (0.742)
logLev	-0.067 (0.784)
logTA	0.056 (0.488)
logGDPgrowth	-4.202 (0.000) ***
logIRate	2.702 (0.012) **
logMS	0.031 (0.191)
COVID	-1.014 (0.000) ***
Constant	0.807 (0.002) ***
Observations	583
R-squared	0.3473
F-statistics	30.14
P-value	(0.000) ***

Notes: P-values in square brackets. * p < 0.10; ** p < 0.05; *** p < 0.01

Table III. The result for the Panel data regression model (RE) on the relationship between stock returns and fintech, starting from the year 2017-2023, for Asia's banks.

DV = Stock return and IV = Fintech (logFT)

Variables	***Model 1***
logFT	-0.009 (0.746)
logCash	-0.002 (0.967)
logEarnings	-0.007 (0.873)
logDiv	-0.048 (0.747)
logLev	-0.053 (0.831)
logTA	0.061 (0.449)
logGDPgrowth	-4.257 (0.000) ***
logIRate	2.458 (0.024)
logMS	0.032 (0.177)
COVID	-1.040 (0.000) ***
Constant	0.761 (0.003) ***
Observations	583
R-squared	0.5683
F-statistics	321.47
P-value	(0.000) ***

Table IV. Appropriate model 2

Independent Variables	Breusch-Pagan LM test for RE	Hausman Test for FE
Model 2 (RE)	0.241 $Chi^2 = 0.490$	
Model 2 (FE)		0.000 $Chi^2 = 76.53$

Table V. The result for the Panel data regression model (OLS) on the relationship between stock returns and fintech with the moderating effect of country competitiveness, starting from the year 2017-2023 for Asia's banks.

DV = Stock return, IV = Fintech and Mod. V = Country competitiveness

Variables	**Model 2a**	**Model 2b**	**Model 2c**
logFT	-0.003	0.062	-0.008
	(0.905)	(0.519)	(0.765)
logCom	0.196	0.220	0.198
	(0.014) **	(0.012) **	(0.014) **
*logFT*logCom*		-0.052	
		(0.480)	
*lnFT*lncom_demeaned*			-0.053
			(0.478)
logCash	0.056	0.059	0.059
	(0.303)	(0.280)	(0.280)
logEarnings	-0.052	-0.053	-0.053
	(0.250)	(0.237)	(0.237)
logDiv	0.109	0.107	0.107
	(0.475)	(0.484)	(0.484)
logLev	0.049	0.046	-0.046
	(0.240)	(0.265)	(0.266)
logGDPgrowth	-2.812	-2.811	-2.811
	(0.000) ***	(0.000) ***	(0.000) ***
logCPI	-4.753	-4.768	-4.768
	(0.000) ***	(0.001) ***	(0.001) ***
COVID	-0.996	-1.000	-1.000
	(0.000) ***	(0.000) ***	(0.000) ***
Constant	1.121	1.082	1.111
	(0.000) ***	(0.000) ***	(0.000) ***
Observations	583	583	583
R-squared	0.3565	0.3570	0.3570
F—Statistics	35.27	31.76	31.76
P-value	(0.000) ***	(0.000) ***	(0.000) ***

Note: P-values in square brackets. * p < 0.10; ** p < 0.05; *** p < 0.01

Table VI. The result for the Panel data regression model (RE) on the relationship between stock returns and fintech with the moderating effect of country competitiveness, starting from the year 2017-2023 for Asia's banks.

DV = Stock return, IV = Fintech and Mod. V = Country competitiveness

Variables	**Model 4a**	**Model 4b**	**Model 4c**
logFT	-0.003	0.109	0.001
	(0.905)	(0.270)	(0.958)
logCom	0.196	0.231	0.198
	(0.014) **	(0.005) ***	(0.010) **
*logFT*logCom*		-0.080	
		(0.294)	
*lnFT*lncom_demeaned*			-0.080
			(0.293)
logCash	0.056	0.056	0.056
	(0.302)	(0.306)	(0.306)
logEarnings	-0.052	-0.007	-0.007
	(0.249)	(0.876)	(0.876)
logDiv	0.109	-0.008	-0.008
	(0.474)	(0.958)	(0.956)
logLev	0.049	0.044	0.044
	(0.240)	(0.293)	(0.294)
logGDPgrowth	-2.812	-3.046	-3.047
	(0.000) ***	(0.000) ***	(0.000) ***
logCPI	-4.753	-3.165	-3.160
	(0.001) ***	(0.021) **	(0.021) **
COVID	-0.996	-1.039	-1.039
	(0.000) ***	(0.000) ***	(0.000) ***
Constant	1.121	0.940	0.984
	(0.000) ***	(0.000) ***	(0.000) ***
Observations	583	583	583
R-squared	0.4866	0.5697	0.5699
F—Statistics	317.41	350.54	350.65
P-value	(0.000) ***	(0.000) ***	(0.000) ***

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GST Announcement and Indian Multi Commodity Exchange Reaction: A GARCH-Based Approach

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Abstract

The study endeavours to examine the influence of Goods and Services Tax on the Indian Multi-Commodity Exchange. The Generalised Autoregressive Conditional Heteroscedasticity approach (GARCH1,1) has been modelled in the study to analyse the daily closing prices of MCXI(bullion) for the period 01-01-2015 to 31-12-2019; the sample period is divided into Pre and Post GST announcement. Based on empirical analysis, the study reveals that the market return volatility of the Indian MCX Index is relatively lower during the post-GST period. The new tax policy (GST) that was implemented in India was favorably received, and this is corroborated by the data that shows the variation in the MCXI return series has comparatively declined over time. The analysis further supports the idea that investors' fear, prejudice, and anxiety towards this new regime have witnessed a contrasting downward trend. This could be because commodity market participants were already aware of the announcement of GST and were not surprised when it was implemented. Consequently, they haven't shown negative reactions, even though the conditions remain active and resilient during the post-GST period. The study contributes substantially to theory by broadening the application of the Efficient. Market Hypothesis (EMH) to an underexplored domain, namely the impact of macroeconomic policy changes on commodities markets, particularly in a growing economy like India. This study provides new insights into the commodity market's reaction to significant economic policy changes, offers practical recommendations for policymakers concerning market preparedness, and presents innovative findings that contest traditional assumptions about market volatility after major policy changes. These contributions augment our comprehension of how macroeconomic reforms influence emerging markets, notably commodity exchanges, rendering this study a valuable addition to the existing body of literature.

Keywords: *Tax policy; GST; Commodity; Volatility; GARCH; MCXI; Market returns; India*

1. Introduction

Macro-news announcements have been a subject of great interest due to their substantial influence on stock market volatility (Haron & Ayojimi, 2019). Likewise, the Indian stock market is closely analysed concerning numerous economic changes, and to identify economic trends, the functioning of this sensitive market is closely monitored (Jyoti, 2014). To ascertain stock market efficiency, researchers have explored the Efficient Market Hypothesis in several studies (Kutchu, 2012; Patel et al., 2016). The market reacts to new information in two distinct ways. Firstly, it responds immediately after the announcement is made. Secondly, in certain circumstances, the market may react differently after the event occurs. (Rangel, 2011). Furthermore, it is evident that information-driven transactions account for the majority of price and volatility fluctuations, and the characteristics of these reactions can be connected to the characteristics of the information arrival process (Haron & Ayojimi, 2019). This indicates that new information substantially influences the market's behaviour. In this context, macroeconomic policy shifts such as GST serve as a critical event for evaluating market sensitivity and investor protection.

This study aims to empirically investigate the impact of GST announcement on Indian MCXI using the GARCH model to assess volatility in the pre- and post-GST period. By exploring this relationship, the present study also seeks to contribute to the broader understanding of how emerging markets react to policy-induced uncertainty. The rationale for this research is grounded in both theoretical and practical relevance. Macroeconomic announcements, particularly like GST reforms, represent a significant source of market information. It was anticipated that macro news announcements would capture newly acquired information, especially when new policies, such as the Goods and Services Tax (GST) in India, are first implemented (Lakshmi & Alex, 2018). It is a major tax reform that eliminates the cascading impact of taxes in India by consolidating all indirect taxes into a single tax system to establish "One Nation, One Market, and One Taxation" (Sehrawat & Dhanda, 2015).

Globally, constraints and advantages are inherent in all policies, which is no exception in the case of the GST implementation in India. Its implementation has been a contention since the then-Union Finance Minister, Mr. P Chidambaram, proposed it in his 2006-07 budget statement. The ramifications of this for the economy, both positively and negatively, have been the subject of numerous discussions. These implications are anticipated to manifest initially in the form of stock market return reactions. The introduction of GST is anticipated to boost India's economy by reforming the current taxing structure to allow for the unrestricted flow of goods and services (Khoja & Khan, 2020). By implementing the Goods & Services Tax, one could anticipate a tax structure devoid of numerous tax levies and cascading consequences (Roy, 2017). In addition to supplanting the existing VAT tax regime, the GST would encompass other indirect taxes, including service taxes & excise duties (Arora, 2016). However, because of its inflationary nature and adverse effects on specific sectors in other countries, the GST regime proposed for India's economy faced significant criticism prior to its implementation (Garg et al., 2023).

The relationship between macroeconomic news and market price volatility has been thoroughly studied in contemporary financial literature. Government announcements of macroeconomic news typically come as a shock and foster uncertainty in the economy since certain segments of society profit while others pay the consequences (Narayanan, 2014). Comparatively, in terms of novelty, implementing the GST is a new phenomenon for the Indian economy and may alter household spending patterns. The reason could be that it may foster an environment of anxiety, concerns, and uncertainty in the economy due to taxes on a variety of industries, which may, in turn, cause concerns, shocks, and uncertainties to numerous other sectors of the Indian economy (Garg et al., 2023). The direction of stock price movement will assist us in determining whether investors see GST rates and, ultimately, GST implementation as "good" or "bad" (Lakshmi & Alex, 2018). These consequences could be assessed based on the reaction of stock or commodities market returns; markets are frequently sentiment indicators that monitor market psychology in the form of investor or consumer behaviour (Beber and Brandt, 2016). Therefore, it would be fascinating to know how India's commodity market players greeted or welcomed the new policy (GST).

Given the importance, novelty, as well as potential lacuna this event could fill in the light of evolving markets such as India, the present study is, therefore, a humble endeavor by firstly assessing the impact of the GST announcement and implementation on the Indian Multi Commodity Stock Index by comparing the volatility of the Indian Commodity

Stock Market Index prior to and subsequent to the announcement and then analysing the degree of changes in investors 'returns following the implementation of the GST. Thus, the current work aims to capture the response of a commodities market, as reflected by the MCXI return volatility both before and after the GST was announced. The study also attempts to contextualise these reactions within the framework of EMH, therefore filling an important empirical gap in the literature on the fiscal policy shocks in emerging economies.

2. Related Literature and Theoretical Background

The volatility of the stock and commodity markets can be influenced by the Goods and Services Tax (GST). This inquisitiveness can be elucidated through the Efficient Market Hypothesis (EMH) lens, given that the Goods & Services Tax announcement is a novel and unprecedented piece of information within the Indian context. The theory posits that all studies examining the impact of newly acquired information on price fluctuations can apply the EMH. According to this approach, market prices reflect newly disclosed information instantaneously. Though some investigations (see, for example, Chalamandaris & Rompolis, 2012; Golosnoy et al., 2015) showed a violation of the Efficient Market Hypothesis, other studies (Westerlund & Narayan, 2014) support the EMH. In light of the literature, this study integrates the EMH to explain how GST announcements influence commodity market volatility.

The literature documents how these associated studies have developed and are segmented into the link between market volatility and macro-news announcements and the methodology employed to analyse the relationship. According to certain studies (Bernile et al., 2016; Chen & Gau, 2010; Jiang et al., 2012), macro-news announcements are classified as scheduled or unscheduled. Bernile et al. (2016) explore strategies for investors to receive the Federal Open Market Committee (FOMC) statement before it is officially released. They conclude that investors possessing exceptional skills may anticipate an impending FOMC announcement through insider information or news from the media, asserted that accessibility of such confidential information carries worldwide ramifications, exemplified by the 2007–2008 financial crises before the announcement of the National Consumer Price Index (CPI), Hashimoto and Ito (2010) demonstrated that the exchange rate instantly absorbs any earlier revelation of the CPI's information content in the Tokyo area. This starkly contrasts the GST policy, which created uncertainty in the regional market and delayed the market price's absorption of the information. In addition to being viewed as a tax strategy, compelling consumers to contribute towards the national debt imbalance, it was believed that the GST would increase the cost of living for households and reduce their standard of living (Narayanan, 2014). Additionally, a valid concern exists regarding the possibility that the government would readily increase the rate of the GST to satisfy its ever-growing expenditure demands once it is implemented (Keen et al., 2001). This reinforces the conclusion of Stein and Rühl (2015), who stated that the market's expectations play a significant role in forecasting the market's response to macroeconomic news announcements. Conversely, Hitzemann et al. (2015) note that the market was quiet before the release of production data and that there were no abnormal returns; nevertheless, on the day of the event, strange returns were recorded, which caused the market to become more volatile.

Recent studies have expanded the analysis of GST implementation beyond pure market volatility by examining its sectoral and systemic effects using advanced econometric methods. Upadhyay and Gupta (2024) assessed the impact of GST on Small-Scale Indian Businesses using PLS-SEM, finding a positive performance relation moderated by employee trust. Kavitha and Sree (2023) also highlighted cost efficiencies and reduced tax burden for SME-retailers post-GST. From a capital market perspective, Babu and Hariharan (2018) applied GARCH models to examine volatility shifts in FMCG and service indices, reporting increased fluctuation around GST implementation. Similarly, Haron and Ayojimi (2019) employed the GARCH (1,1) model to assess the influence of GST implementation on Malaysia's stock market. The findings showed the significant volatility during and after the GST announcement compared to the pre-announcement phase. The study further demonstrated the persistent long-run volatility and indicated that future markets offered a hedging advantage during the GST transition. These findings support the view that macroeconomic policy changes, particularly those perceived as burdensome, can induce both immediate and prolonged financial market reactions.

Moreover, the existing literature on policy uncertainty is replete with studies demonstrating how policy uncertainty in

an economy undermines GDP and investment. Bachmann et al. (2010) found that uncertainty is accompanied by adverse economic times, and both run concurrently. An adverse association between economic policy uncertainty and fixed investment exists in India, according to Bhagat et al. (2013)'s study. Similarly, Panga et al. (2018) investigated how changes to the GST policy affected S&P BSE indexes. They said that adopting GST will not significantly impact certain BSE industries. According to Joy et al. (2020), implementing the GST will make share market activities in India costlier. Economic activity can be influenced by changes in the structure of the tax system, according to Gale and Samwick (2014). However, not all tax reforms yield equivalent or favourable influence on long-term growth. The adoption of GST raises the costs of goods and services by 2.8% in Australia during the implementation stage, according to Valadkhani and Layton (2004). However, it has been noticed that the effects of inflation are temporary, lasting only for the duration of its implementation phase. Palil and Ibrahim (2011) assert that consumers are worried about a minimum 4% increase due to Malaysia's Goods and Services Tax implementation. Additionally, given how heavily their nation depends on household expenditure, it negatively impacts society and results in price hikes (Islam et al., 2017). Nevertheless, Kushalappa (2016) examined how the GST was implemented and its effects on the Indian stock market and discovered no appreciable distinction in the abnormal returns of Indian stocks before and after the GST was implemented. The pattern of return volatility from commodities futures in India was examined by Mukherjee and Goswami (2017), and the findings indicate the presence of a well-established, volatility-concentrated market for petroleum oil futures and gold, as well as the fact that the maturity impact is exclusively applicable to gold futures. Additionally, Nayaka and Panduranga (2021) revealed that while tax collections and the submission of GST returns are increasing rapidly in India, the government's persistent delay in compensating states is impeding state spending on various welfare initiatives.

On the opposite end of the spectrum of research that demonstrates positive relevance, like that of Gupta (2014), looked into the pre-GST taxation system's drawbacks and the GST concept to determine how the GST will operate in India, inferred that the adoption of the Goods and Services Tax (GST) would generate numerous commercial advantages that were unattainable under the Value Added Tax (VAT) system; thus would accelerate economic growth. Mujalde and Vani (2017) stated that a transition to GST would be helpful to the economy on multiple fronts, including removing economic distortions produced by the prior tax regimes and forming a unified national market in India. By implementing a single type of tax that attracts more investments, including foreign investors, Kumar (2017) concluded that implementing GST in India would make the nation more business-friendly. Renjith (2021) noted how Indian states handled sustainable debt during the GST era. Nayak et al. (2022) found a positive impact of indirect tax revenue on the Indian GDP.

3. Relevance of the Current Study

The aforementioned comprehensive body of literature indicates that numerous studies have been undertaken previously regarding the stock market's volatility as a result of national and international monetary policy changes, global crises, and taxation. This study, however, differs greatly from earlier research conducted in this field for India. To begin with, previous research has mostly focused on the effects of the global crisis and the GST on the stock market. However, there are hardly any empirical studies investigating the impact of GST on Multi Commodity Exchange India, particularly using the GARCH and ARCH approaches, which could be a part of an event study, especially when volatility is a key metric. To prevent erroneous findings, this study also includes a few external macroeconomic variables that have contributed to the volatility of the Indian market. In an emergent and developing commodity market such as India, the present study contributes to the existing corpus of knowledge by investigating the relationship between macroeconomic news uncertainty and its effects on diverse commodity sectors. Even though GST has been in place for 6.5 years, surprisingly, no empirical studies have been conducted on its influence on the Indian commodity market. Ultimately, this study enhances the comprehension of the impact of uncertainties surrounding macroeconomic news announcements on emerging markets, such as India, which have structures, organisations, and institutions distinct from those of developed markets. It is pertinent to mention that the data in this study only extends to 2019; nevertheless, its relevance is not diminished by more recent economic events. While the study captures the impact of the GST implementation, it also lays a foundation for future research aimed at examining how market behaviour evolved in the years following 2019. The analysis preceding 2019 provides

a critical reference point for comparative studies, enabling researchers to explore whether and how market volatility stabilised or changed as the GST regime became more established. Thus, the study's timeline (up to 2019) aligns with its purpose of examining the immediate impact of GST on the MCX. Its findings remain pertinent for understanding the initial market reaction and establishing a baseline for future studies on the longer-term effects of GST.

3.1 Research Hypotheses

Building upon the study's unique focus and supported by the literature reviewed, the following hypotheses have been formulated:

H_{01}: The GST Announcement has no significant effect on the return volatility of Indian MCXI

H_{02}: There is no significant difference in volatility persistence between the pre- and post-GST periods.

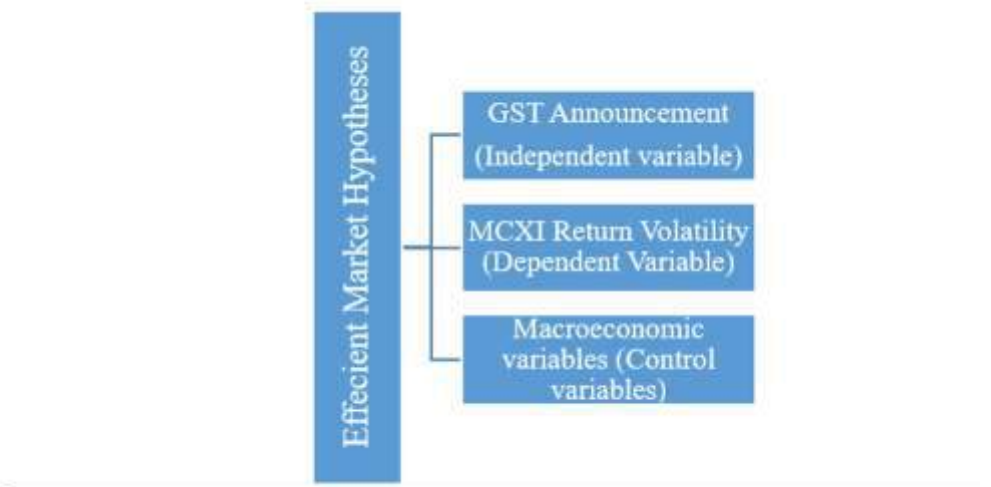
4. Data and Methodology

To examine the impact of pre- and post-GST announcements on the Indian Multi Commodity Exchange (MCX), daily closing prices of MCXI (Bullion) have been used in the study, and data have been obtained from the official website of MCX, while the data of macroeconomic variables, viz., Consumer Price Index (CPI), Unemployment rate (UNEMP) and Gross Domestic Product (GDP) were obtained from CMIE (Prowess). Moreover, all statistical and econometric analyses, including the GARCH (1, 1) modelling, were performed using the E-views 12 software. The study period ranges from 1st January 2015 to 31st December 2019, and the data has been bifurcated into two sets. The first set of data on MCXI, which ranges from 1st January 2015 to 30th June 2017, represents the effect of the Pre-GST announcement, and the second set of data, ranging from 1st July 2017 to 31st December 2019, reflects the impact of the Post-GST announcement. The interpolation technique has been used to convert monthly data of macroeconomic variables into daily data to match it with the returns of MCXI.

Since the emphasis is on investigating how the announcement of GST exerts an influence on the volatility of returns in the commodity market, the impact of various macro-economic variables has been controlled to increase the reliability of the findings and to avoid estimation bias, which could lead to spurious results.

The log returns of MCXI are ascertained as:

$$R_t = 100 * LOG (P_t/P_{t-1})$$



Source: Author's work
Note: Fig. 1 illustrates the relationship between the GST Announcement and Indian MCXI Volatility.

Figure 1. Conceptual Framework

Here, R_t represents a return of the MCXI at time t, P_t signifies the current price of MCXI, while P_{t-1} denotes a lagged price of MCXI. The data of controlled macroeconomic variables are transformed into logarithmic values.

The GARCH (1, 1) model is employed to capture the volatility of the returns of MCXI (Bullion) because the volatility nature of their returns is time-varying and based on pre-testing; this model is suitable for the study. The GARCH model resolves the problem of negative estimation and uses a few parameters to capture long-lagged effects. The equation of the GARCH model is symbolised as:

$Y_t = \alpha + \beta X_t + \epsilon_t$;

Here,

Y_t represents the conditional mean,

X_t represents **n** number of independent variables,

β signifies coefficients and

ϵ_t represents the error term.

It is to be noted that the error term should fulfil the assumption of $\epsilon_t \mid W_t \sim N(0, h_t)$. The term $\epsilon_t \mid W_t \sim N(0, h_t)$ indicates an information set.

Explicitly, the mean equation of market returns volatility of $MCXI_{bullion}$:

$R_t = \alpha + \beta_1 R_{t-1} + DCPI_t + DGDP_t + DUNEMP_t + \epsilon_t$

R_{t-1} is a lagged term of its own returns (RMCXI), and the DCPI, DGDP, and DUNEMP refer to the first difference value of the Consumer Price Index, GDP, and the Unemployment rate at time t, respectively.

The conditional variance equation of the GARCH model is:

$$h_t = \alpha + \sum_{i=1}^{p} \lambda_i h_{t-1} + \sum_{j=1}^{q} \gamma_j \mu^2_{t-1};$$

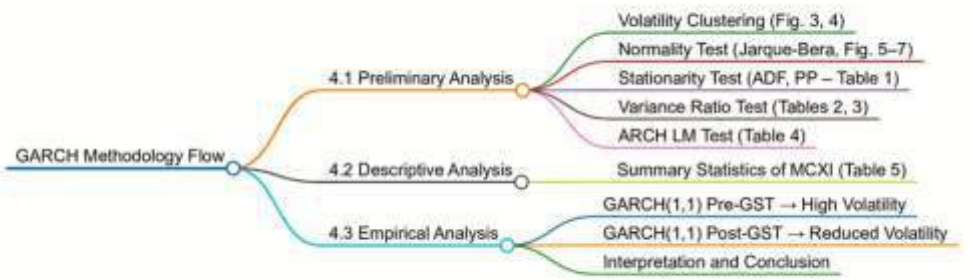
h_t here means the conditional variance that consists of its own lagged values and squared error terms. The ARCH and GARCH terms

$$\sum_{i=1}^{p} \lambda_i h_{t-1} \text{ and } \sum_{j=1}^{q} \gamma_j$$

respectively. p & q are non-negative numbers, ARCH captures short-run volatility, and the total value of ARCH and GARCH parameters defines the long-term volatility.

It is worth noting that the present study has not considered the other indices of MCX, i.e., Energy and Base metal, as the former is outside the purview of GST, while the latter does not capture conditional volatility in its return series, based on the ARCH LM test.

4.1 Preliminary Analysis



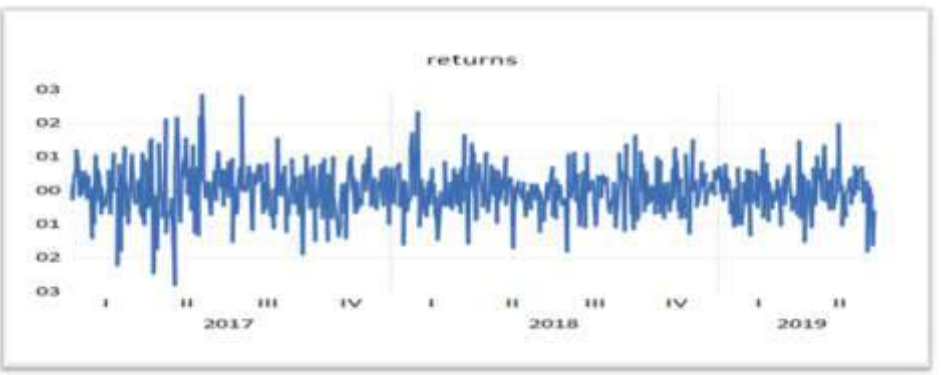
Source: Author's work using Markmap software.

Note: This figure presents a step-by-step process from initial diagnostics to final GARCH Model estimation, illustrating how each test supports the modelling of volatility in MCXI returns before and after the GST announcement

Figure 2. Methodological Flow of GARCH-Based Volatility Modelling

Source: Author's computation using E-views12

Figure 3. Return Series of MCXI $_{Bullion}$ – Pre-GST Announcement Period



Source: Author's computation using E-views 12

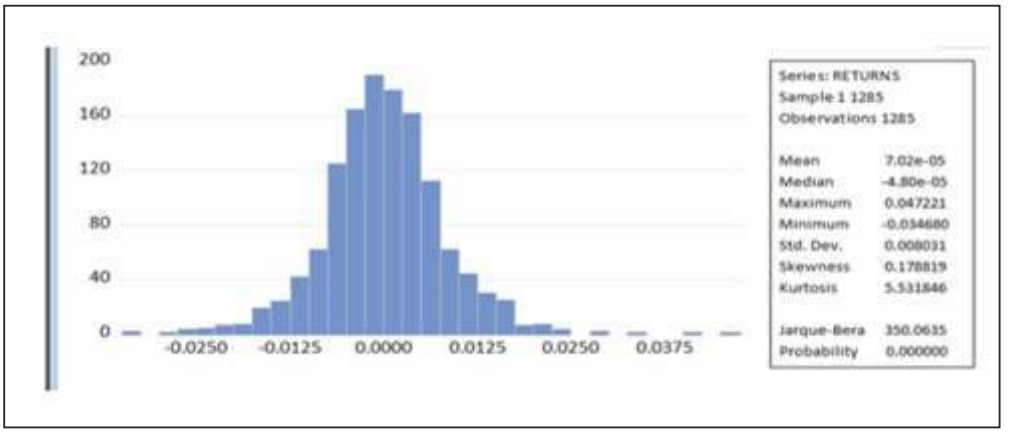
Figure 4. Return series of MCXI $_{bullion}$- Post GST Announcement Period

Before proceeding further, pre-diagnostic tests for modelling GARCH techniques are to be carried out to check and observe one of the stylised facts and properties of the GARCH model, ie, volatility clustering in the data series. If the returns reflect such a feature, the study may proceed further. The graphs of the return series of MCXI are shown below

It is apparent from the graphical representation of Fig. 3 and 4 that there is a volatility clustering in the return series, which implies that the large value of the returns of h_{t-1}(yesterday's value) has been followed by large values of h_t (today's value) and the small values of returns of h_{t-1} (past values) have been followed by small values of h_t (current values), further indicates, today's fluctuation is highly influenced by yesterday's volatility and the past values of returns significantly predict the current values.

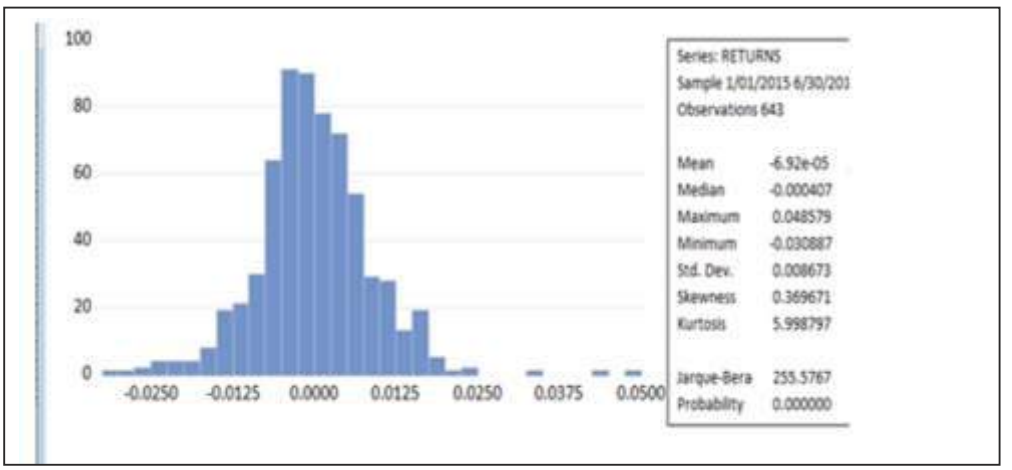
4.1.1 Normality test

The Jarque-Bera test is being conducted to ascertain that the return series exhibits normality, i.e., whether it has a normal distribution or not. As reflected in Figs. 5, 6, and 7, the statistical significance of the J-B test revealed that the returns' errors are considerably larger, hence not normally distributed, making it more suitable and fitted to employ GARCH techniques for this study.



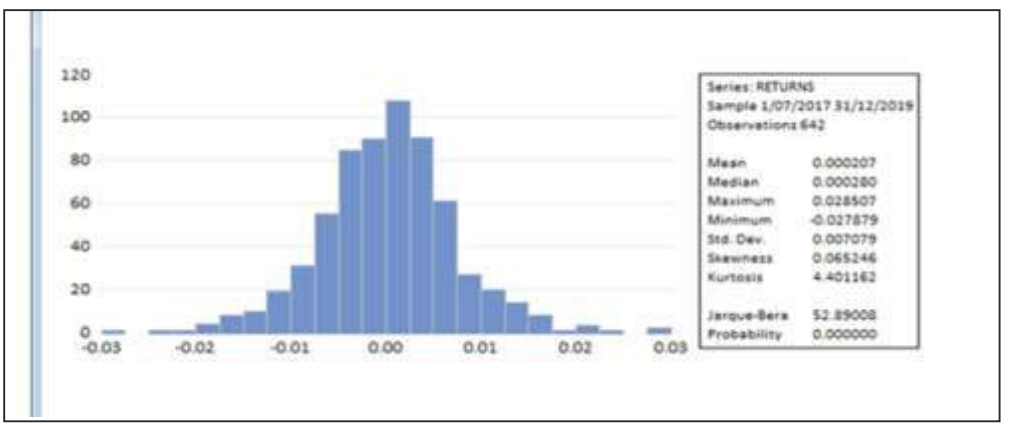
Source: Author's computation using E-views 12

Figure 5. Distribution of Returns (MCXI Bullion) – Full Period (Jan 2015 – Dec 2019)



Source: Author's computation using E-views 12

Figure 6. Histogram of MCXI Bullion Returns – Pre-GST Announcement (Jan 2015 – June 2017)



Source: Author's computation using E-views 12

Figure 7. Histogram of MCXI Bullion Returns – Post-GST Announcement (July 2017 – Dec 2019)

Table 1. Results of Augmented Dickey-Fuller and Phillips-Perron Unit Root Tests

Data	Test name	Equation	RMCXI (bullion)	DCPI	DGDP	DUNEMP
ALL DATA						
1-01-2015-31-12-2019	P. Peron Test	Trend &Intercept	-35.75844*	-35.11787*	-35.96666*	-35.10647*
	ADF Test	Trend &Intercept	-35.75842*	-34.78841*	-22.31835*	-34.75753*
Pre-announcement						
1-01-2015 to 30-06-2017	P.Peron Test	Trend &Intercept	-25.23932*	-25.15385*	-25.15909*	-25.13373*
	ADF Test	Trend &Intercept	-25.19110*	-25.15362	-25.15887*	-25.13341
Post-announcement						
1-07-2017 to 31-12-2019	P.Peron Test	Trend &Intercept	-25.28407*	-25.06257*	-25.11590*	-25.11524*
	ADF Test	Trend &Intercept	-25.28294*	-15.25012*	-25.11567*	-25.11501*

Source: Author's computation using E-views.

*Notes: RMCXI represents returns, DCPI represents the first difference in the Consumer Price Index, DGDP represents the first difference in GDP, and DUNEMP represents the first difference in the unemployment rate. The entire data is bifurcated and categorised according to the date of the event i.e., the official announcement of GST. *represents significant at 1% level.*

Table 2. Variance -ratio test (Pre-announcement)

Join tests	Value	df	Probability
Max |z| (at period 2)*	**7.856330**	**642**	**0.0000**
Individual tests			
Period	**var. ratio**	**Std. error**	**z-statistic**	**Probability**
2	0.514660	0.061777	-7.856330	0.0000
4	0.254869	0.106044	-7.026599	0.0000
6	0.150688	0.133588	-6.357696	0.0000

Source: Author(s) computation using E-views

4.1.2 Stationary test

Table 1 shows the equation values of trend and intercept of Augmented Dicky Fuller and Philip Perron unit root tests for the variables that are used in the study. The RMCXI series is stationary at level, integrated at order zero *I~ (0)*, while the other variables, i.e., CPI, UNEMP, and GDP, which are macroeconomic as well as controllable, are stationary at the first difference, integrated at order 1 *I~ (1)*. The series of returns is stationary at the level, indicating that the returns reflect the mean reversion feature, which is yet another property of GARCH modelling and satisfies the major condition of using such returns in the model.

4.1.3 Variance Ratio Test

Tables 2 and 3 provide the results of variance ratio tests that are carried out to estimate whether the returns have constant variance or not. The null hypothesis of the variance ratio test states that returns have constant variance, and the alternative hypothesis statement is that returns do not have constant variance. Based on the result, it is apparent that the returns series does not exhibit a constant variance since the P-value is less than 0.05, therefore rejecting the null hypothesis. The findings of the variance ratio test further enhance the validity and suitability of considering the GARCH model for the study.

Table 3. Variance-ratio test (Post-announcement)

Join tests	Value	df	Probability
Max |z| (at period 2)*	9.855595	640	0.0000
Individual tests			
Period	**var. ratio**	**Std. error**	**z-statistic**	**Probability**
2	0.480063	0.052756	-9.855595	0.0000
4	0.248344	0.092402	-8.134635	0.0000
6	0.197910	0.105776	-7.582881	0.0000

Source: Author(s) computation using E-views

Table 4. ARCH LM Test Results Pre-, Post-, and Full Sample Periods

Heteroskedasticity Test: ARCH LM Test (All data)	
F-statistic 11.35679	Prob. F (2, 1277) 0.0000
Obs*R-squared 33.28894	Prob. Chi -Square (2) 0.0000
Heteroskedasticity Test: ARCH LM Test (pre -announcement)	
F-statistic 7.107228	Prob. F (3,635) 0.0001
Obs*R-squared 20.75896	Prob. Chi-Square (3) 0.0001
Heteroskedasticity Test: ARCH LM Test (post -announcement)	
F-statistic 5.278062	Prob. F (2,635) 0.0005
Obs*R-squared 10.43257	Prob. Chi-Square (2) 0.0005

Source: Author's computation using E-views

4.1.4 ARCH LM Test

This conclusive and consequential preliminary assessment aims to predict the volatility of the Multi Commodity Exchange Index. The presence of autoregressive conditional heteroscedasticity effects is being studied before modelling ARCH/GARCH techniques in the study. Table 4 shows the statistics of the ARCH LM Test, which are stated above:

The statistical significance of the ARCH LM test reveals that the return series exhibits ARCH behaviour at lags 2 and 3, hence fulfilling the sufficient condition for using the ARCH/GARCH technique to forecast the influence of the GST announcement on the volatility of MCXI returns.

4.2 Descriptive analysis of the return series of MCXI $_{Bullion}$

Table 5 provides the descriptive summary statistics to analyse the log return series' characteristics. Based on the present findings, the study reveals that across the entire data and subsequent announcement periods, the mean of the return series is positive but negative for pre-announcement. The distribution of the return series is severely leptokurtic, as represented by the values of Kurtosis in all the groups (K>3). Moreover, returns in the context of standard deviation are positive for all groups and range from 0.007 to 0.008, less than 1. The values of skewness are positive, and tails exhibit a fatter than normal distribution. Furthermore, the return series in all the cases are not normally distributed; hence, normality is rejected according to Jarque-Bera statistics, which tests the hypotheses of skewness and kurtosis jointly.

Table 5. Descriptive Statistics of MCXI Bullion Returns (Full, Pre-GST, and Post-GST Periods)

All data

(1st Jan -2015 to 31 st Dec 2019)

Return mcx bullion

Mean	Minimum	Maximum	SD	Skewness	Kurtosis	Jarque –Bera	Observation
0.0702	- 0.034	0.047	0.008	0.178	5.531	350.0635*	1285

Pre-announcement

(1stJan- 2015 to 30thJune 2017)

Returnmcx bullion

Mean	Minimum	Maximum	SD	Skewness	Kurtosis	Jarque –Bera	Observation
-0.0692	- 0.030	0.048	0.008	0.369	5.99	255.5767*	643

Post- announcement

(1stJuly 2017 to 31st Dec 2019)

Returnmcx bullion

Mean	Minimum	Maximum	SD	Skewness	Kurtosis	Jarque –Bera	Observation
0.002	-0.027	0.028	0.007	0.065	4.40	52.89008*	642

*Note: *significant at 5 percent level and the total data are bifurcated according to the date of event (GST) and the results are furnished subsequently.*

Source: Author's computation using E -views

4.3 Empirical analysis and results:

Table 6 shows the GARCH (1, 1) pre- and post-GST announcement analysis. Prior to the announcement of GST, the conditional mean equation indicates that the mean of RMCXI $_{Bullion}$ is 0.0037 on average, and its lagged value significantly predicts the current return series by 0.8547 while maintaining the Consumer Price Index, GDP, and Unemployment rate variables constant. Based on the conditional variance equation, it could be deduced that the coefficients of the ARCH, GARCH parameters and the Constant Variance Term are positive and statistically significant at 5% and 10%, respectively. Moreover, it is to be noted that the time-varying volatility includes a constant, which is 0.0000000563, its past values (0.972675), and an element that depends on its past errors (0.018167). Based on these findings, it is evident that the returns of MCXIBULLION exhibit time-varying conditional volatility. Furthermore, the results indicate a strong persistence of volatility shocks, as demonstrated by the fact that the sum of the ARCH (b1) and GARCH ( ) coefficients is very close to 0.99, which is significantly closer to unity. It further denotes that the effect of today's shock will result in elevated future variance forecasts for a prolonged period.

Whereas, in the case of the post-GST announcement, the conditional mean of RMCXI is ascertained using the lag of its return while controlling the Consumer Price Index, GDP, and Unemployment rate variables to provide robustness in the study. The results of the conditional mean equation signify that the prior commodity market performance substantially impacts the current returns of the Indian Multi Commodity Exchange Index. The conditional variance of the Post-GST announcement reflects that the coefficients of

the ARCH & GARCH parameters are statistically significant but are comparatively lower than the Pre-GST announcement, as the sum of their coefficients is 0.94, which means there exists a considerable amount of persistence of market volatility, but it is lower than the volatility of prior announcement of GST period. This entails that, subsequent to the introduction of GST, both the short-term volatility as measured by ARCH and the long-term volatility as measured by GARCH reduced. Such a decrease in short- and long-run market volatility denotes that the unpredictability, ambiguity, and uncertainty in MCXI decreased comparatively after the official announcement of GST. It is pertinent to mention that in the announcement following the GST, the commodity market produces relatively low dispersion in returns of MCXI, which depicts that investors have welcomed and supported the implementation of the new policy, i.e., GST.

Table 6. GARCH (1,1) Model Estimation (Pre- and Post-GST Announcement Periods)

Equations Mean equation	Pre GST announcement GARCH statistics	Post GST announcement GARCH statistics
C	0.0037 (0.0299)	0.0002 (0.0025)
R_{T-1}	0.8547*(4.0632)	-0.0712 (-0.0523)
DLCPI	0.0955 (0.1150)	-0.1808 (-0.2953)
DLGDP	1.2532 (0.0261)	0.8886 (0.0243)
DLUNEMP	5.3324 (0.0347)	-5.6285 (-0.0048)
Variance equation		
C	0.0000000563** (0.733)	0.000000101** (1.1263)
b_1	0.018167* (2.0922)	0.015035* (1.8015)
	0.972675* (64.933)	0.930376* (34.9773)
(b_1+q)	0.99 (approx.)	0.94 (approx.)
AIC	-6.7210	-7.0979
SIC	6.6514	-7.0281
GED	1.2975*	1.41*
Durbin Watson	2.009	1.965
Post-diagnostic Test		
Heteroscedasticity test		
Prob. F	0.3852	0.9810
Prob. Chi-Square (1)	0.3844	0.9810
Autocorrelation		
Prob. Value Q (8)	0.38	0.88

Source: Author's computation using E-views.

*Notes: R_{T-1} represents lagged returns of $MCXI_{BULLION}$, DLCPI, DLOGGDP, AND DLUNEMP representing first difference log value of controlled macroeconomic variables viz Consumer Price Index, GDP, and Unemployment rate, respectively. *, ** symbolize significant levels at 5% and 10% respectively. Z statistics are provided in brackets. GED refers to generalized error distribution, AIC and SIC are also provided. The prob. values of post-diagnostic analysis are also specified through Q stat and heteroscedasticity test. b_1 indicates the ARCH term and represents the GARCH term.*

5. Conclusion

The study aims to examine the impact of the GST announcement on the market return volatility of the Indian Multi Commodity Exchange Index while keeping certain macroeconomic variables constant, as these variables are known to cause market volatility. The GARCH (1,1) model, suitable through pre-testing, is utilised for this investigation. Comparing the pre-GST announcement era to the post-GST period, the empirical study shows that the market volatility was more persistent earlier, which suggests that the market reacted comparatively favorably in the post-GST period. It means that after implementing GST, the magnitude of the change in prices in an MCXI has shown relatively lower swings than before the GST announcement. It additionally suggests that market players have exhibited a favourable attitude toward the newly adopted indirect tax policy. In line with extant literature, it is found that the market reacts to macro news and prospective events before they occur; also, market participants' perceptions play an essential role in determining the Commodity Market's environment.

Considering the GARCH parameter of the Indian Multi Commodity Index before and after the GST announcement periods, the analysis found that investors accepted and enthusiastically endorsed this reform. The findings also reveal that the Indian MCXI has exhibited more persistence of market volatility in the pre-announcement phase than in the post-announcement era by comparing and contrasting the volatility levels of the Indian MCXI. Such a decline in conditional volatility after the announcement of GST signifies that GST exerted a relatively positive impact on MCXI.

Moreover, the corpus of studies unequivocally demonstrates that macroeconomic news causes a spike in market volatility. However, our study confirms that GST news can be considered a scheduled announcement resulting from the government's various educational initiatives, which can effectively reduce market volatility. The findings of our study are aligned with earlier studies done by Beber and Brandt (2006) and Vähämaa and Äijö (2011), which proposed that scheduled macro-news could reduce volatility in the market. This implies that market readiness for scheduled macro-news announcements could be one of the plausible reasons for reducing market volatility. Nevertheless, the results contradict the conclusions drawn by Chen and Gau (2010) and Bernile et al. (2016), who concluded that macro-news announcements significantly increase market volatility. The results we have obtained explicitly support the conclusions drawn by Rühl and Stein (2015) regarding the significant influence of expectation on the path of macro-news announcements, GST, in our case.

The study not only encompasses empirical analysis but also provides a substantial theoretical contribution. It extends the application of the Efficient Market Hypothesis (EMH), which has historically been extensively studied in stock markets. This unique contribution explores the impact of the Goods and Services Tax (GST) on the Indian Multi Commodity Exchange (MCX) Index, addressing a gap in existing research literature. The findings also have practical implications by emphasising that transparent and well-communicated policy changes, such as GST, help stabilise markets, providing useful insights for policymakers. While the data only extends to 2019, it forms a robust foundation for future research on long-term market trends following the GST implementation. Additionally, the study offers compelling insights into the immediate market response to the GST and serves as a crucial reference point for evaluating its broader economic implications.

In light of these limitations, future research would benefit from the incorporation of additional commodity indices. This approach would allow for an examination of whether similar volatility patterns emerge across a wide range of markets. This would enhance the generalizability of the findings beyond the MCXI and provide insights into how various sectors respond to major policy changes such as the implementation of GST.

Moreover, forthcoming studies should examine the degree to which the announcement of the GST has affected the volatility of commodity markets in other countries that have implemented this indirect tax reform system. Integrating this analysis with broader macroeconomic variables would offer a more comprehensive global perspective, informing both academic discourse and practical policymaking.

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Money Begets Money: Identifying Trading Strategies of Institutional Investors

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Abstract

The study examines the long-term trading strategies of both foreign and domestic institutional investors regarding the Nifty index in the Indian stock market, utilising vector autoregressive models. This model helps capture dynamic interactions over time. Specifically, the analysis includes variance decomposition, impulse response functions, and block exogeneity tests. The research utilises daily Nifty returns from January 2011 to December 2020, as well as daily investment data from foreign and domestic institutional investors in the Indian stock market. The findings suggest that domestic institutional investors frequently employ contrarian strategies, purchasing recent losers and selling recent winners.

In contrast, foreign institutional investors in the Indian stock market engage in momentum trading, which involves purchasing at high prices and selling at even higher prices. These results will help investors, policymakers, and firms make informed investment decisions. Additionally, scholars can analyse these findings and apply them in future academic research and theoretical development. To the best of our knowledge, this study is the first to explore the differing behaviours of foreign and domestic institutional investors regarding the Nifty index, which is significant for India due to its rapidly growing economy.

Keywords: *foreign institutional investors, domestic institutional investors, Indian stock market, Nifty index, vector autoregressive model, contrarian trading, momentum trading*

1. Introduction

One of the most notable developments in the Indian stock market is the increasing involvement of institutional investors, both foreign and domestic. These investors play a pivotal role in shaping the financial ecosystem by influencing corporate governance, stabilising capital flows, and enhancing market efficiency. Their large-scale investments help mitigate market volatility, thereby contributing to overall market stability (Sung et al., 2019; Sharma & Mittal, 2023; Patel et al., 2024).

In emerging markets like India, the presence of foreign institutional investors has expanded significantly. These investors bring not only capital but also international best practices, advanced investment strategies, and a broader market perspective (Rai & Bhanumurthy, 2004). Their primary motivations include diversifying portfolios, enhancing returns, and leveraging global investment opportunities (Panicker et al., 2019). In contrast, domestic institutional investors such as mutual funds, insurance companies, and pension funds play a crucial role in enhancing liquidity in the Indian money and capital markets. While DIIs tend to prefer companies with strong fundamentals and consistent profitability, FIIs often target relatively riskier firms with the potential for higher returns (Gopikumar et al., 2019; Kim & Yi, 2015).

Given the complexities of the stock market, many retail investors remain hesitant to participate directly, instead relying on the expertise of institutional portfolio managers and professional traders to guide their investment decisions (Chiang et al., 2012). However, the trading behaviour of institutional investors is not without concerns. Their substantial financial stakes and varying investment motives can significantly impact market dynamics, sometimes raising questions about transparency, fairness, and market manipulation (Lai & Wang, 2015; Varshney & Srivastava, 2022). These concerns become more pronounced during periods of economic uncertainty or crisis (Boubakri et al., 2011).

To better understand the behavioural patterns of institutional investors, prior studies have applied the feedback trading theory, which classifies trading behaviour as either momentum-based or contrarian. De Long et al. (1990) introduced this framework, noting that some investors engage in positive feedback trading, buying assets during price upswings, while others follow a contrarian approach, purchasing after price declines. This theoretical model has been extensively used in subsequent literature to examine institutional trading tendencies (Grinblatt et al., 1995; Wermers, 1999). For instance, Grinblatt et al. (1995) found that mutual funds frequently adopt momentum strategies, while Wermers (1999) highlighted that institutional herding behaviour is often momentum-driven.

Building on this theoretical foundation, the present study employs vector autoregressive models and impulse response functions to analyse whether institutional investors' trading behaviour in the Indian equity market aligns with momentum or contrarian strategies. This methodological approach enables a dynamic and time-sensitive examination of institutional responses to market fluctuations, offering deeper insights into their decision-making behaviour.

Furthermore, India is rapidly positioning itself as one of the world's fastest-growing economies. The Reserve Bank of India has recently revised its GDP growth forecast for FY24 upward to 7%, reflecting the country's economic resilience and development trajectory. As India becomes an attractive destination for multinational corporations, particularly in manufacturing and services, the role of institutional investors becomes even more critical. Nonetheless, their influence on market variables must be assessed with caution. Empirical evidence suggests that institutional participation may have a negative impact on short-term stock returns and reduce dividend payouts following private placements (Tao et al., 2018). Despite these concerns, institutional investors, both foreign and domestic, continue to support firms with higher expected profitability and risk-adjusted returns.

Against this backdrop, the present study seeks to investigate the long-term trading patterns of institutional investors in the Indian stock market, with a particular focus on identifying whether their behaviour aligns more closely with momentum or contrarian strategies. This research contributes to the growing literature on institutional trading behaviour in emerging markets and aims to offer policy-relevant insights into market stability and investor behaviour.

The research varies from earlier studies in the following ways: (1) using the VAR model, the authors ascertained the long-term investing behaviour of institutional investors, (2) the block exogeneity test describes the variables that are significantly contributing, (3) the impulse response function is utilised to document the changes in a model's variables following a shock to one or more of the variables, (4) to

specifically explain the relationships between the variables, variance decomposition is employed. The result of the study indicates that in the long term, domestic institutional investors engage in contrarian trading or profit-booking. In contrast, foreign institutional investors engage in momentum trading or trend-chasing.

Additionally, the research article is structured as follows: The significance of the research and the related study model are explained in the first section, along with the function of institutional investors in the Indian economy. The second section reviews the existing body of research on institutional investors. The third section outlines the research methodology, while the fourth section presents data analysis and interpretation, utilising the VAR model to examine the results. The research paper's conclusion, implications, limitations, and recommendations for further research are covered in the fifth and sixth sections.

2. Review of Existing Literature

Institutional investors encompass entities such as investment banks, insurance companies, sovereign wealth funds, mutual funds, and pension funds, which manage substantial volumes of capital on behalf of their clients or beneficiaries. Their participation has enhanced stock market liquidity and decreased information asymmetry by using various trading strategies that help stabilise individual stock prices (Lakonishok et al., 1992). It has been noted that institutional investors often act as net sellers during a bullish market and as net buyers during a bearish market, thereby influencing the behaviour of positive feedback traders (Sung et al., 2019).

The trading strategies employed by institutional investors vary significantly. For instance, Goodfellow et al. (2009) examined data from the Polish stock market between 1996 and 2000 to study the trading behaviours of institutional and individual investors. Their results indicated that during periods of market stress, investors' decisions regarding what to buy are influenced by their emotions. However, when the market is quiet, they make decisions independently. Institutional investors behave differently from individual investors. Supporting this, Han and Chung (2013) and Lin et al. (2007) in their studies of the Korean financial industry emphasised that individual investors lack the knowledge and training possessed by institutional investors. As a result, institutional investors, due to their large capital base, actively participate in both futures and spot markets, making it nearly impossible for individual investors to mimic their strategies for profit. In addition, Wang et al. (2023) found that the activities of foreign institutional investors in the Chinese market are positively correlated with the price movements of the underlying assets. Similarly, in the Dutch market, De Haan and Kakes (2011) demonstrated that all three categories of institutional investors, pension funds, life insurers, and non-life insurers, engaged in contrarian trading by purchasing past losers and selling past winners.

Syamala et al. (2014) asserted that institutional investors' participation has helped reduce information asymmetry and improve liquidity in developing markets, such as India. Building on this, Kadanda and Raj (2017) found that the share of foreign institutional investors in total stock market turnover has grown relative to that of domestic institutional investors. Furthermore, Chattopadhyay et al. (2018), using high-frequency FII trading data from January 1, 2003, to June 30, 2014, revealed that foreign institutional investors have engaged in herding activities, posing a serious threat to the transparent and orderly operation of the Indian stock market. In addition, 'Bose (2013) noted that mutual fund investments have played a crucial role in providing vital liquidity support to the Indian stock market. Supporting this view, Chauhan (2020) stated that domestic mutual fund investors, being more familiar with their market conditions, tend to engage in negative feedback trading strategies.

India is among the world's fastest-growing economies, offering substantial investment opportunities. While existing studies have examined the interactions between foreign and domestic institutional investors and their influence on stock market returns, the role of domestic institutional investors in channelling household savings into the equity market remains critical. Moreover, foreign institutional investments (FIIs) constitute a significant component of capital flows into the Indian economy. Several studies have observed herding behaviour among FIIs, which may contribute to market volatility and hinder the smooth functioning of the stock market. Despite this, a notable gap remains in the literature regarding the prediction of long-term investment patterns of both foreign and domestic institutional investors in India. To address this gap, the present study investigates the investment behaviour of institutional investors in the context of an emerging market like India, where retail investors often remain hesitant to participate directly in equity markets. This study specifically analyses the long-term relationship between institutional investor activity and Indian stock market indices.

Moreover, as shown in Table 1, the majority of research on institutional investors has been conducted in developed countries (Wang et al., 2023; Yang, 2021; Ke & Sieracki, 2019; Hudson et al., 2020; Chung et al., 2016; Ahmed, 2014; Han et al., 2013; Phansatan et al., 2012; De Haan & Kakes, 2011). These studies highlight that significant differences exist in institutional trading outcomes across countries. For instance, Lai and Wang (2015) and Ahmed (2014) found that in the futures market, domestic institutional investors tend to engage in positive feedback trading. In contrast, foreign institutional investors (FINIs) follow a negative feedback strategy. In contrast, De Haan and Kakes (2011) and Yang (2021) reported that institutional investor trading behaviour is positively associated with changes in futures prices, often adopting a contrarian approach. Despite the growing relevance of emerging markets, there remains a paucity of research focusing on developing economies like India, particularly regarding the behaviour of institutional investors and its impact on the Nifty index. Within the Indian context, Madaan and Shrivastava (2022) and Tayde and Rao (2011) explored the herding behaviour of foreign institutional investors, while Gopal and S. (2018) examined industry-level herding among institutional investors. This indicates a critical gap in the literature, underscoring the need for further empirical investigation into the behaviour of institutional investors in emerging markets, such as India, with a particular focus on their influence on stock index dynamics, such as the Nifty 50.

Table 1. Glimpse of relevant work related to the investment behaviour of institutional investors

Authors and Year	The main objective of the study	Geographical region in the study	Findings/conclusion
Wang et al., (2023)	To look into the trading and profits made by foreign investors on the Chinese stock exchange.	China	International investors prefer premium Chinese equities, and there is a favourable correlation between return and net inflow of foreign capital.
Madaan & Shrivastava (2022)	To examine herding behaviour and its durability among foreign institutional investors (FIIs) in the individual stocks of the Indian stock exchange's energy sector.	India	Foreign institutional investors persistently herd into the majority of the enterprises.
Yang (2021)	To investigate how investor attitude affects futures price fluctuations and how it influences price changes in the Korean futures market.	Korea	The behaviour of institutional foreign investors is positively correlated with changes in the future price.
Hudson et al., (2020)	To determine the institutional investor's herding behaviour	UK	Institutional investors congregate in market portfolio, size, and value characteristics, including open- and closed-end funds.
Ke & Sieracki (2019)	To look into the trading patterns of the four categories of investors: foreign investors, listed real estate businesses, private investors, and institutional investors in the UK.	UK	Institutional investors usually take a contrarian stance, while UK private investors generally follow the sentiment of UK-listed real estate businesses with lag.
Ganesh et al. (2018)	To examine industry herding among institutional investors and to find whether it is	India	Institutional investors have a herding tendency towards most of the industries, in the overall period.

	intentional or unintentional.		
Chung et al., (2016)	To study institutional investors' weekly trading actions.	Korea	The net trades of institutional investors are strongly correlated with the net trades of the next week, which is consistent with persistent trading and/or herding behaviour.
Lai and Wang (2015)	To evaluate the correlation between the trading behaviours of three institutional investors and the Taiwan stock index futures returns.	China	Investment trusts are positive feedback traders in the futures market, whereas foreign institutional investors are negative feedback traders.
Ahmed (2014)	To analyse the trading behaviours of retail and institutional investors.	Qatar Exchange (QE)	Compared to individual investors, institutional investors favour positive feedback trading tactics. It appears that both investor categories are acting in a herding manner.
Han and Chung (2013)	To look into how individual and institutional investors traded during mergers and acquisitions.	Korea	Individual investors have less experience and/or intelligence than institutional investors. Before the disastrous merger was announced, institutional investors sold their shares to a bidding business, and individual investors bought the shares. In addition, we find that even after the news of a disastrous merger breaks, institutional investors continue to sell their shares to a bidding business, while ordinary investors continue to buy them.
Phansatan et al. (2012)	To analyse international, individual, and institutional investors' trading conduct and decompose their trading performance.	Thailand	Foreign investors have a macro but not a micro informational advantage over domestic investors. They employ momentum and positive feedback strategies, and they are skilled at reading the short-term market. Still, they find it difficult to select companies in sluggish markets.
De Haan and Kakes, 2011	To examine the investment strategies of the three distinct institutional investor groups: non-life insurers, life insurers, and pension funds.	Dutch	All three institutional investors tend to be contrarian traders, meaning they purchase recent losers and sell recent winners.
Tayde & Rao (2011)	FIIs investing in Indian stock markets: to determine if they engage in herding and positive feedback trading	India	During various stages of the stock market, FIIs are found to engage in positive feedback and herding trading. As large-cap companies have greater liquidity, this behaviour is more prevalent in them.

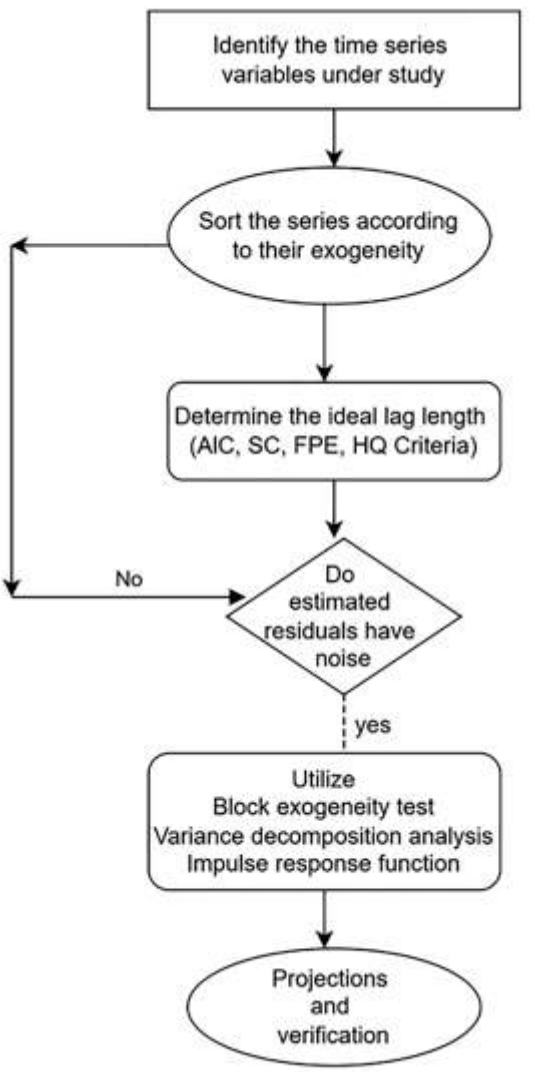
Notes: The primary studies in each model, along with details on their objectives, the country in which they were conducted, and their conclusions, are explained in the table.

Source: Compiled by the authors

Consequently, Table 1 highlights that institutional investors engage in trading for multiple reasons, and their activity contributes to a reduction in market volatility (Chhimwal & Bapat, 2020). While foreign portfolio investments commonly target emerging markets, mutual funds have emerged as the fastest-growing segment in India since 2004 (Patro & Kanagaraj, 2012). Accordingly, the present study focuses on analysing the trading behaviour of institutional investors within the Indian economy.

3. Research Methodology of the Study

The research methodology outlines the framework and systematic approach adopted for conducting the study effectively. It specifies the research design, data sources, and sampling techniques employed to achieve the study's objectives and draw logical conclusions. This study relies on secondary data obtained from reputable financial databases, including the Centre for Monitoring Indian Economy



Note: This flowchart-style illustration presents the sequential process followed by the vector autoregressive models. The components are arranged from top to bottom to enhance clarity and ease of understanding.

Source: The authors

Figure 1. Steps involved in VAR forecasting

(CMIE) and Bloomberg. The dataset comprises daily observations on mutual fund flows, foreign institutional investor activity, and the daily Nifty returns. A purposive/convenience sampling technique is applied to ensure the relevance of selected data. The research spans a substantial time frame, from January 2011 to December 2020, to capture recent market dynamics and provide robust empirical insights. Analytical techniques such as the Block Exogeneity Test (Wald Test), Variance Decomposition, and Impulse Response Function are conducted using EViews 12 software.

4. Data Analysis and Interpretations

The study employs a vector autoregressive (VAR) model to identify the trading strategies of institutional investors. This model is a system of matrices where each variable is an endogenous variable. For multivariate time series, VAR models are employed. Every variable in the model can be expressed as a linear function of its historical lags and those of the other variables. The VAR model is outlined as follows:

4.1 Identifying the time series variables

The first step in using the VAR model to determine the long-term causal relationship between institutional investors and the Nifty Index is to determine that all of the time series variables, whether exogenous or endogenous, must be stationary, have the same order of integration, and have all been transformed, not at the level. There must be a logical cause-and-effect relationship between the variables, which may be explained as follows:

(The dependent variable is a function of its lagged value and the lagged value of another variable).

One way to convert a time series with a unit root problem into one with stationarity is to apply a sequence of sequential differences, d. If d is the integration order, then the differences are represented by I(d). These transformations are known as the series integrated of order k for non-stationary time series. The integration order is often either I (0) or I (1).

$$\mathrm{I}_{\mathrm{t}}\mathcal{F}ii_{\mathrm{t}}=\alpha+\sum_{\mathrm{i}=1}^{\mathrm{K}}\beta\imath\,\mathrm{In}\mathcal{F}ii_{\tau-\mathrm{i}}+\sum_{j=1}^{k}\phi j\mathrm{I}ndi\,i\tau-j+\sum_{m=1}^{k}\varphi\mathrm{m}\,\mathrm{I}ncnx\tau-m+\mathcal{U}_{1t}$$

$$\mathrm{I}_{\mathrm{t}}dii_{\mathrm{t}}=\sigma+\sum_{\mathrm{i}=1}^{\mathrm{K}}\beta\imath\,\mathrm{In}\mathcal{F}ii_{\tau-\mathrm{i}}+\sum_{j=1}^{k}\phi j\mathrm{I}ndi\,i\tau-j+\sum_{m=1}^{k}\varphi\mathrm{m}\,\mathrm{I}ncnx\tau-m+u_{2t}$$

$$\mathrm{I}_{\mathrm{t}}cnx_{\mathrm{t}}=\vartheta+\sum_{\mathrm{i}=1}^{\mathrm{K}}\beta\imath\,\mathrm{In}\mathcal{F}ii_{\tau-\mathrm{i}}+\sum_{j=1}^{k}\phi j\mathrm{I}ndi\,i\tau-j+\sum_{m=1}^{k}\varphi\mathrm{m}\,\mathrm{I}ncnx\tau-m+u_{2t}$$

Table 2. Augmented Dickey-Fuller test statistic

Time Series Under Consideration		Daily FII equity investment	Daily Dll equity investment	Daily CNX Nifty index
T-statistics	At level	-14.02	-11.64	0.74
	1st difference	-72.69	-25.15	-68.87
Probability value	At level	0.00	0.00	0.99
	1st difference	0.00	0.00	0.00
Augmented Dickey-Fuller test statistic	1st difference	-28.28 (0.00)	-27.96 (0.00)	-68.87 (0.00)

Note: The weighted average of the 50 largest Indian companies listed on the National Stock Exchange serves as the foundation for the Nifty 50, a benchmark index for the Indian stock market.

Source: Authors' computations

It is evident from Table 2 that both foreign and domestic institutional investors are integrated at level I (0), while the Nifty index is integrated at level I (1). So, the ratio of equity purchase to equity sales is undertaken to make them in the same order of integration and it is also proved with the help of Augmented Dickey-Fuller test statistics, all the financial time series (foreign institutional equity investments, domestic institutional equity investments, Nifty log returns) are stationary at first difference (don't have unit root problem), though can apply VAR model.

4.2 Arranging the series in the order of exogeneity

Step two is to put the series in the exogeneity order. Variance decompositions and impulse responses are impacted by the order in which the variables are sequenced in a VAR system.

It is beneficial if all the sequences are kept in the order of decreasing exogeneity. The most exogenous variable should come first. The exogeneity of the variable is decided based on its x^2 value and R^2 value. The least is the value of the most exogenous variable. If the variable has the highest R^2, that means the variable is endogenous because it can be explained by other variables. From Table 3, it is clear that R^2 for Nifty is 1%, foreign institutional investors are 5% and domestic institutional investors are 9%. So Nifty is the most exogenous variable, that's why Nifty comes first. R^2 of each variable is more than the previous one.

4.3 Identify the optimum lag length

The next step is to figure out how long the lag should be. Model selection criteria can be applied to determine the VAR(p) model's lag duration. The conventional approach is to fit VAR(p) models with orders p = 0, p max. Next, a value of p minimises a specific model selection criterion. For VAR(p) models, the model selection criteria take the following form:

$$IC(p) = \ln |\Sigma\tilde{}(p)| + cT \cdot \phi(n, p)$$

$\Sigma\tilde{}(p)$ = T-1, PT t=1 ˆεtˆε0 t is the residual covariance matrix from a VAR(p) model without a degree of freedom correction. A penalty function called ϕ (n, p) is used to penalise large VAR(p) models, and cT, a sequence, represents the sample size T. The most commonly used information criteria are the Akaike information criterion (AIC), the Bayesian information criterion (BIC), and the Hannan-Quinn (HQ) criteria, which include Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Log-Likelihood (LIK).

$$AIC(p) = \ln |\Sigma\tilde{}(p)| + 2\,T\,pn2$$
$$BIC(p) = \ln |\Sigma\tilde{}(p)| + \ln T\,T\,pn2$$
$$HQ(p) = \ln |\Sigma\tilde{}(p)| + 2 \ln \ln T\,T\,pn2$$

If the true order p is smaller than or equal to p(max), the Hannan-Quinn criteria and the Bayesian information criterion consistently estimate the order under fairly general conditions, whereas the Akaike information criterion asymptotically overestimates the order with positive probability. In daily data, most of the criteria give different results; the Akaike information criterion gives the maximum no of lags, and the Schwarz info criterion delivers the shortest number of lags. So, in daily data, it is not possible to go beyond 6 or 7. Beyond 5, it is just impossible to take the legs because the daily data that happened 5 days back may not influence today, it is absorbed in 5 days. Moreover, one of the purposes of choosing an optimal lag is to remove the problem of residual or autocorrelation. When autocorrelation is found in a model's residuals, it indicates that a few important variables are absent. There's a chance the model is not properly stated. Autocorrelation suggests that the standard errors and, by extension, the p-values are not reliable. The autocorrelation function, or ACF plot, will be used to examine the autocorrelation issue. In an ACF plot,

Table 3. Testing the exogeneity of the variables

R^2	d (log_ nifty)	FII	DII
	0.01	0.05	0.09

Note: A statistical measure called R-squared shows the amount of variance for a dependent variable in a regression model that one or more independent variables can explain.

Source: Authors' computations

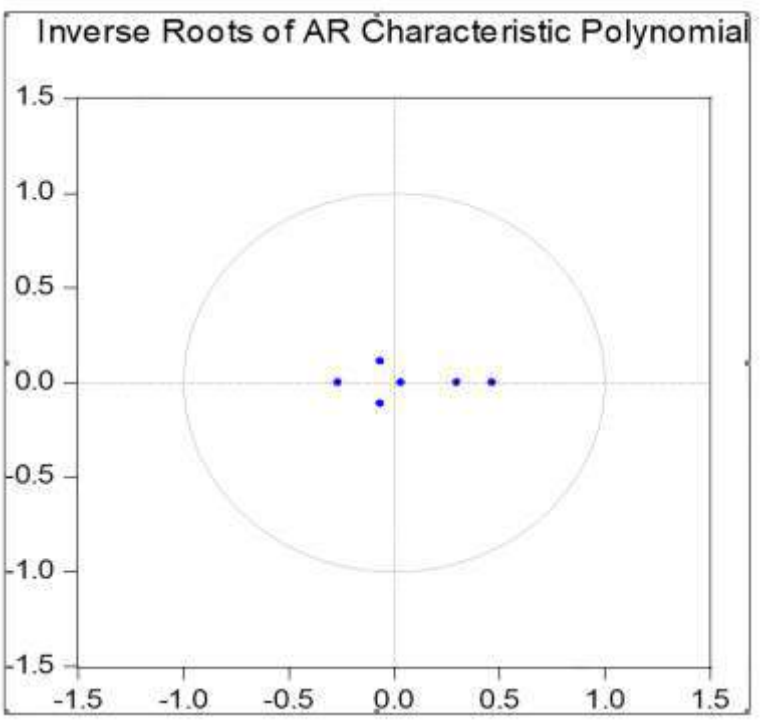
the values of correlation between the lags are presented alongside the confidence band. Put simply, it indicates the degree to which the series' current value is consistent with its historical values. From Table 4, it is clear that the minimum lags are suggested by the Schwarz info criterion, which is three lags. This value of lag also eliminates the serial autocorrelation problem, as shown in Figure 2. In the graph below, all the dots are within the circle, which shows there is no autocorrelation problem, so it is assumed that lag 3 is the appropriate lag for further study.

Table 4. VAR Lag Order Selection Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	3999.37	NA	4.38	-1.52	-1.51	-1.52
1	4314.26	629.29	3.90	-1.63	-1.62	-1.63
2	4405.62	182.46	3.78	-1.67	-1.64	-1.66
3	4461.56	111.67	3.71	-1.68	**1.65***	-1.67
4	4492.99	62.69	3.68	-1.69	-1.64	-1.67
5	4512.65	39.21	3.66*	-1.70*	-1.64	-1.67*

*Note: * indicates lag order selected by the criterion. Bold value represents the selected lags.*

Source: Authors' computations



Note: The correlation between the error components that show up in time series data is known as autocorrelation or serial correlation for short. In certain cases, the error terms at t+1, t+2, t-1, t-2, and so on are related to the error term at time t

Figure 2. Testing the problem of autocorrelation by the Auto-Correlation Function, or ACF plot

4.4 Block Exogeneity Test (Wald Test)

The Wald test can be used to identify the variables that are significantly influencing something. Finding out if explanatory variables in a model are significant can be done using the Wald test, commonly known as the Wald Chi-Squared Test. If the Wald test for a variable is significant, include that variable in the model; else, remove it. The outcome shows that both foreign and domestic institutional investors have a major impact on the Nifty in three days. Foreign institutional investors are caused by both Nifty and domestic institutional investors. Domestic institutional investors are also affected by both foreign institutional investors and the Nifty. So, it is concluded that there is a bidirectional causality between the institutional investment flows and Nifty returns. Both foreign and domestic institutional investors respond to each other's behaviour and Nifty movements.

4.5 Impulse response function

An essential phase in econometric analysis, which uses vector autoregressive models, is impulse response analysis. Their main objective is to explain how changes in one or more of the variables of a model affect the other variables. Their significant usefulness in evaluating economic strategies arises from their ability to track the transmission of a single shock within an otherwise complex system of equations. The system's response to a shock can only be partially understood from individual coefficient estimates in a VAR model because every variable in the model depends on every other variable. To give a better picture of the dynamic behaviour of the model, impulse responses (IR) are used. All impulse response functions begin with the moving average (MA) representation of a linear VAR model, which is also the forecast error impulse response (FEIR) function. Mathematically speaking, the FEIR ∅_i during the Ith interval after the shock is obtained as

$$\Phi_i = \sum_{j=1}^{i} \Phi_{i-j} A_j, \qquad i=1, 2, \ldots$$

Table 5. VAR Granger Causality/Block Exogeneity Wald Tests

Variable that depends	Excluded	Chi-sq	df	P value
D(LOG_NIFTY)	Dll	10.64	3	0.00
	Fll	12.20	3	0.00
	All	20.66	6	0.00
Domestic institutional investors	D(LOG_NIFTY)	90.67	3	0.00
	FII	12.91	3	0.00
	All	132.18	6	0.00
Foreign Institutional investors	D(LOG_NIFTY)	76.31	3	0.00
	Dll	12.87	3	0.00
	All	83.90	6	0.00

Note: The probability that variations from the expected are the result of random chance is represented by the chi-square, where p is the probability value.

Source: Authors' computations

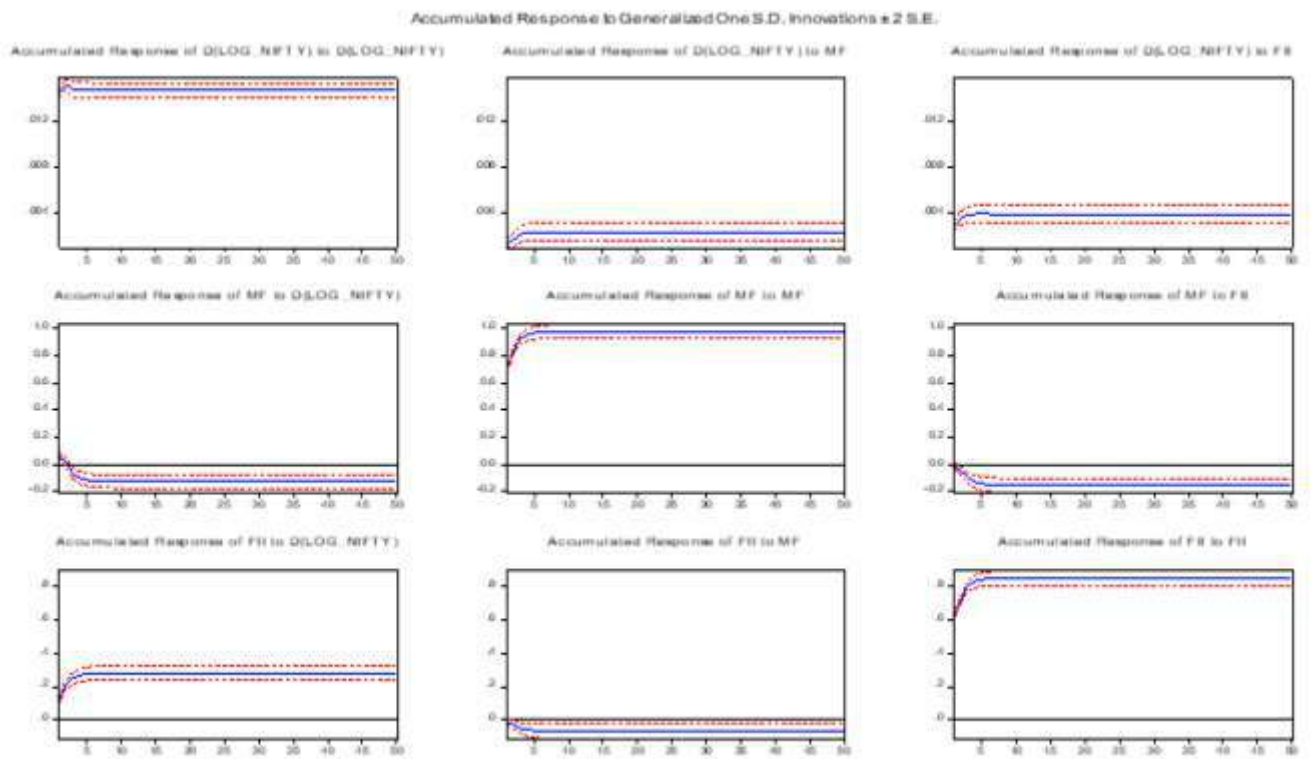
where K is the number of endogenous variables, p is the VAR model's lag order, and F _o = l_k and A_j = 0 for j>p.

The determination of the estimated structural parameters or the proper ordering of variables limits both orthogonal and structural impulse responses. Koop et al. (1996) and Koop et al. (1998) consider generalised impulse responses (GIR), an alternative type of impulse response function. Since they incorporate the impacts of other shocks outside of the response, they are independent of the variable order. This is accomplished mathematically in the following manner:

$$\Theta_i^g = \Phi_i \, \sigma_{jj}^{-1/2} \, \Sigma,$$

where the variance of the jth variable is denoted by σ_jj.

The result of the impulse response function shows that the response of foreign institutional investors to Nifty is positive, and the response of domestic institutional investors to Nifty is negative. It means when Nifty is going up, foreign institutional investors are buying, and while Nifty goes down, they start selling, which means a positive response (response is coming in the same direction). This kind of trading is known as momentum trading behaviour or trend-chasing behaviour. If the trend is positive, they buy, and if the trend is negative, they sell. But in the case of domestic institutional investors, when the market is going down, on the same day, they sell; if the market is still going down, they start buying. As the market starts moving up, they start selling. They immediately change their position according to the market. This is called profit booking or value trading, which means when the market is overvalued, they sell, and when it is undervalued, they buy. So, the result of the study from this dataset is that foreign institutional investors are involved in momentum trading, or domestic institutional investors in contrarian trading. Therefore, the impulse response shows the direction of response to another market. The response is very high in the first 5 days, which is known as the response period. After that, it starts declining, and within 10 days or around 11 days, the effect dies. The result shows how many days the response of one market to unexpected movement in another market will last.



Note: For a better view, go online

Figure 3. Generalised impulse responses

Table 6. Variance Decomposition analysis

period	VD of NIFTY				VD of Dll				VD of Fll			
	SE	Nifty	Dll	Fll	SE	Nifty	Dll	Fll	SE	Nifty	Dll	Fll
1	0.01	100.00	0.00	0.00	0.68	0.82	99.17	0.00	0.62	3.79	0.14	96.06
2	0.01	99.82	0.01	0.16	0.70	1.10	98.82	0.06	0.63	5.65	0.26	94.08
3	0.01	99.60	0.16	0.23	0.72	2.63	97.07	0.28	0.64	5.95	0.43	93.60
4	0.01	99.59	0.17	0.23	0.72	2.81	96.83	0.35	0.64	6.00	0.45	93.53
5	0.01	99.59	0.17	0.23	0.72	2.84	96.76	0.38	0.64	6.02	0.46	93.51
6	0.01	99.59	0.17	0.23	0.72	2.85	96.74	0.39	0.64	6.02	0.46	93.51
7	0.01	99.59	0.17	0.23	0.72	2.85	96.74	0.39	0.64	6.02	0.46	93.50
8	0.01	99.59	0.17	0.23	0.72	2.85	96.74	0.39	0.64	6.02	0.46	93.50
9	0.01	99.59	0.17	0.23	0.72	2.86	96.74	0.39	0.64	6.02	0.46	93.50
10	0.01	**99.59**	**0.27**	**0.23**	0.72	**2.86**	**96.74**	**0.39**	0.62	**6.02**	**0.46**	**93.50**

Note: The EViews software displays a unique variance decomposition for each endogenous variable. Column S.E. displays the forecast error of the variable for each forecast horizon. Domestic and foreign institutional investors, the Nifty index, all behave differently toward one another, as the bold figure in the table shows.

Source: Authors' computations

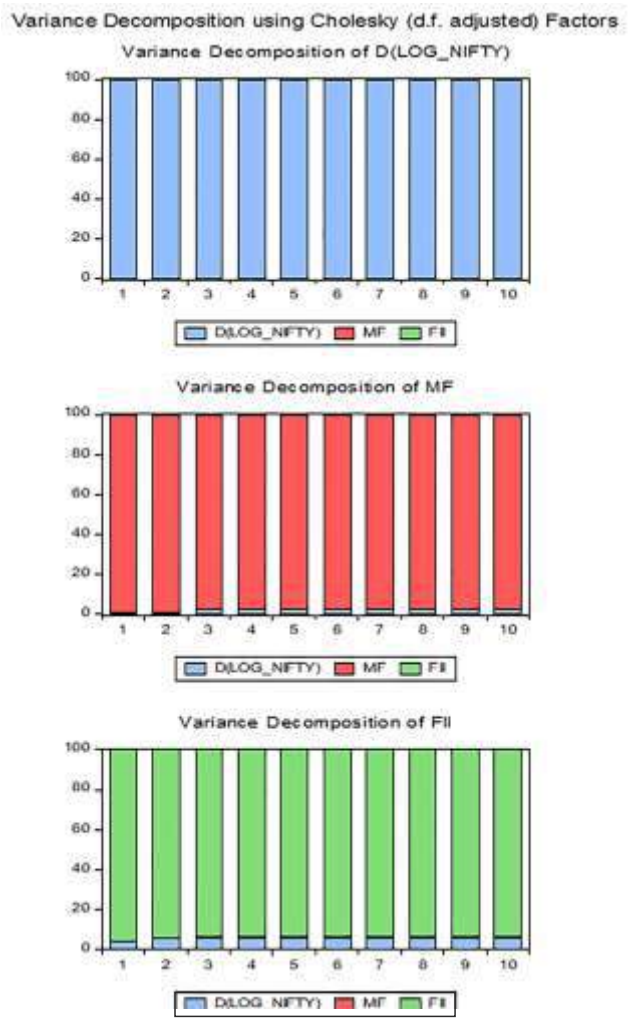
4.6 Variance decomposition

In macroeconomic analysis, the term "variance decomposition," or more precisely, "error variance decomposition," refers to a specific method for examining the relationships between the variables that vector autoregressive (VAR) models reflect. The information that each variable in the autoregression contributes to the other variables is shown by the variance decomposition. It indicates the extent to which exogenous shocks to the other variables can account for the forecast error variation of each variable. It is also helpful to ascertain the amount that each independent variable contributes to the explanation of the dependent variable's variation, as well as the degree to which the dependent variable's variance lags its variability.

The results of the 10-day variance decomposition investigation are displayed in Table 6. It has been observed that in the initial stage, Nifty forecast variance is 100% explained by its shocks, but over time, this decreases slightly (99.5%). The contribution of institutional investors, both foreign (0.23%) and domestic (0.27%), is minimal. So, it is concluded that Nifty is largely self-driven, with minimal influence from institutional investors. The study also finds that in the case of domestic institutional investors, 2.86% of investment behaviour is explained by Nifty, .39% by foreign institutional investors, and 96% by their behaviour. It means domestic institutional investors are mostly influenced by its past behaviour, and Nifty starts playing a small but growing role. Similarly, Nifty explains the 6% investment behaviour of foreign institutional investors. Due to foreign investors' momentum trading in investments, the lagged Nifty index return has a greater influence on foreign institutional investors. The influence of domestic institutional investors is minimal, just 0.4%. Figure 4 also clearly shows how much another variable explains one variable. Since both domestic and foreign institutional investors' investment behaviour is largely explained by their shocks, over time, the influence of Nifty has increased. The investment behaviour of d(log_nifty) is not as much explained by either group of investors.

5. Discussion and Conclusion of the Study

This study investigates the trading behaviour of institutional investors in the Indian stock market using daily data spanning from 2011 to 2020. The vector autoregression (VAR) model is employed to effectively capture the dynamic



Note: d (log_ nifty) is represented by the Sky-blue colour lines, Mutual funds by red lines, and foreign institutional investors by green lines.

Figure 4. Variance decomposition using Cholesky factors

interactions between institutional investor activity and movements in the Nifty index. Emerging markets like India, characterised by market imperfections, lower liquidity, and a high concentration of retail investors, offer profit-making opportunities for informed and strategically driven institutional investors (Badhani et al., 2023). India's robust macroeconomic fundamentals, overall stability, and potential for accelerated economic growth make it an attractive destination for global investors (World Bank, 2024). Consequently, foreign institutional investors (FIIs) are often willing to pay a premium to access Indian markets, sometimes overlooking traditional valuation metrics in pursuit of higher returns (Gopikumar et al., 2019).

Empirical studies have demonstrated that institutional investors, such as FIIs and mutual funds, possess superior market knowledge compared to individual investors, enabling them to make more informed investment decisions in the Indian context (Aren et al., 2016). Furthermore, Funaoka and Nishimura (2019) emphasise that institutional investors rely more on private information than on market sentiment, allowing them to enhance their investment performance. This research aims to identify the long-term trading patterns of institutional investors in India, considering their distinctive role and behaviour in the market.

Comparative studies across various countries, including China, South Korea, the United Kingdom, Taiwan, Thailand, and the Netherlands, have highlighted the diversity of institutional investor behaviour influenced by local regulatory frameworks and market environments (Wang et al., 2023; Yang, 2021; Hudson et al., 2020; Ke & Sieracki, 2019; Chung et al., 2016; De Haan & Kakes, 2011). Prior literature also notes a tendency for individual investors to engage in contrarian or negative feedback trading, while institutional investors often exhibit herding behaviour (Chang et al., 2000). Moreover, FIIs possess a macro-level informational advantage over domestic investors, although they may lack micro-level insights (Tayde & Rao, 2011). These investors frequently employ momentum and positive feedback trading strategies, particularly in the short term, but may face challenges in stock selection during weaker market phases. In sum, the present study applies a VAR model to explore the temporal relationships between institutional investor trading and stock market performance, providing a comprehensive analysis of institutional behaviour in the Indian equity market.

The result of the study reveals that foreign institutional investors are involved in momentum trading behaviour, leading traders to favour stocks with rising prices instead of those that have experienced declines. But in the case of domestic institutional investors, when the market is going down, on the same day, they sell; if the market is still going down, they start buying. As the market starts moving up, they start selling. They immediately change their position according to the market. This is called profit booking or value trading, which means that when the market is overvalued, they sell, and when undervalued, they buy. They help to stabilise the Nifty return when the market is volatile. They also help to correct the underreaction and overreaction of the market, which is caused by unexpected pandemics

like COVID-19. Additionally, it has been noted that the Nifty impacts foreign institutional investors more than domestic institutional investors because foreign investors tend to trade in momentum. During a crisis, they increase stock market volatility; domestic institutional investors are essential to maintain stock market stability.

6. Research Implications, Limitations, and Future Research Direction

India, a rising country, has seen an increase in international investments; despite that, not all businesses have equal access to this capital. Oil and gas and fast-moving consumer goods (FMCG) make up just 9.94% and 7.28% of foreign investment holdings, respectively, while 50% of holdings are in IT, auto components, and financial services (Mishra, 2023). Consequently, this study will help all the firms by gaining insight into the long-term investment patterns of foreign investors, which will open up new funding streams for corporate expansion. In light of the report of Financial Express (2023), the strong greenback in international markets has caused the value of the rupee to fall against the US dollar. The withdrawal of foreign institutional investors depresses domestic equities and could pull the rupee downward. In comparison to equity financing, debt financing is more affordable, quicker to obtain, and offers equity investors a higher return on their investment. However, in addition to lower capital costs and analyst accuracy, institutional investors support high-level sustainability assurance services (García et al., 2022). Thus, policymakers will find the study's conclusion useful in developing and enforcing regulations that require corrective action to be taken beforehand to safeguard investor interests and market stability.

The results of the study have significant contributions and implications for retail investors as well. After the information is disclosed to the public, individual investors still make unfavourable trading decisions (Han & Chung, 2013). To gain insight into the historical performance of stock market dynamics, investors need to do a post-analysis of every investment. They ought to keep a close eye on institutional investors' actions and investing patterns, particularly during times of crisis when outflows exceed inflows. Before creating the portfolio, it is also crucial for the fund managers to understand the institutional investors' worldwide investment patterns as well as any potential behavioural biases. They can earn a profit from the stock market by imitating institutional investors' long-term trading techniques. The study's findings will also contribute to the advancement of knowledge in this field worldwide.

This study looks at how foreign and domestic institutional investors have been making investments in the Nifty index in a typical market. Furthermore, the measurement of institutional investors' investment behaviour may take into account the impact of black swan events like the COVID-19 pandemic and some significant systematic risk variables (Nieto & Rubio, 2022). Future research can be undertaken to assess the behaviour of institutional investors during uncertain calamities like war, earthquakes, mergers and acquisitions, and geopolitical risks among nations. The suggested conceptual paradigm for further examination and understanding is as follows.

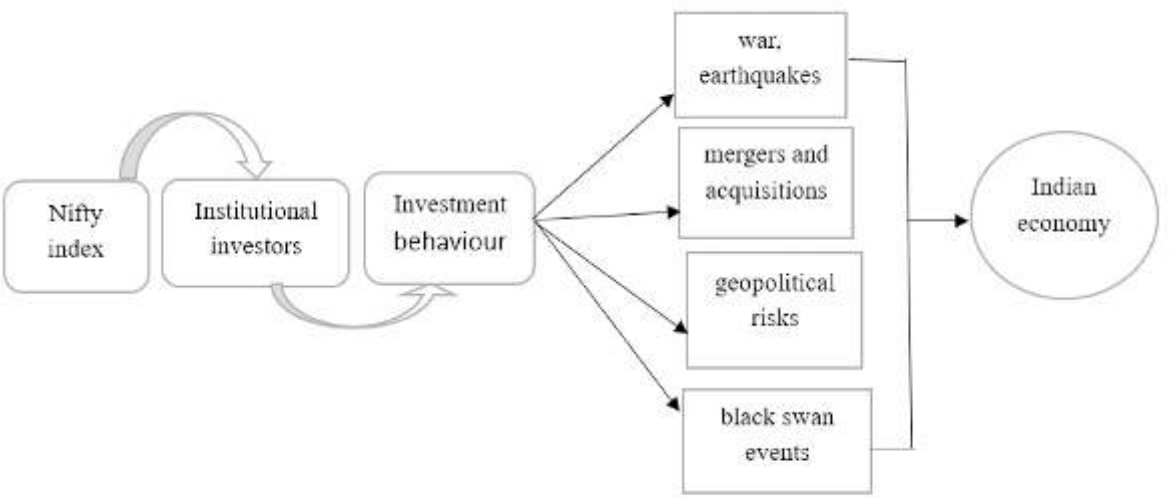


Figure 5. Proposed conceptual model

India is on track to become the third-largest economic superpower in the future as a result of its economy's rapid expansion. The nation has made drastic changes in the previous several years that have created enormous prospects in the domestic market and established the nation as a hub for manufacturing. India's demand forecast is extremely positive for the upcoming years. The market opportunity is huge as far as premiumisation goes. This would only be feasible with large institutional investments. Since the study covers a broader aspect, which has both practical and theoretical implications, there are certain limitations associated with it. The timeframe selected for the study is significant and provides valuable insights into the trading behaviour of institutional investors. However, extending the period of analysis could yield more comprehensive and robust results, especially in capturing long-term trends and shifts in market dynamics. Additionally, the study focuses on one of the leading stock market indices, which ensures relevance and depth. Yet, incorporating other major indices could offer a comparative perspective and enrich the understanding of institutional investors' behaviour across different market segments. This study is based solely on secondary data, which, while valuable for understanding broad trends and patterns, may limit the depth of analysis. Incorporating primary data could provide richer insights and strengthen the robustness of the findings. The Nifty 50 index comprises 50 companies, which may limit the generalizability of the findings. Conducting sector-specific studies could provide more nuanced and robust insights. Despite these limitations, the findings provide a valuable foundation for understanding long-term trading patterns in emerging markets like India.

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Impact of Financial Statement Fraud on Firm Value: Evidence from the Pharmaceutical Sector Using the Beneish M-Score Model

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Abstract

Financial statement fraud poses a significant threat to corporate credibility, stakeholder trust, and market stability. This study examines the impact of financial statement fraud on firm value in the Indian pharmaceutical sector, using the Beneish M-Score model to detect manipulation among 66 companies listed on the Bombay Stock Exchange from 2019 to 2023. Drawing on an integrated theoretical framework combining the Fraud Triangle with Legitimacy, Signalling, and Stakeholder theories, the study explores both the antecedents and consequences of fraudulent reporting. A total of 330 firm-year observations were analysed using multiple linear regression with firm value as the dependent variable, and profitability and firm size as control variables. Pooled OLS estimation was selected after panel diagnostics, and all classical regression assumptions were validated. The results indicate that 36.67% of companies exhibited signs of financial statement fraud, and a statistically significant negative relationship was found between the Beneish M-Score and firm value. These findings empirically validate the theoretical assertion that financial misconduct undermines legitimacy, damages reputation, erodes stakeholder trust, and ultimately diminishes firm value. The study advocates for enhanced fraud detection mechanisms and improved financial transparency to protect investor confidence and maintain market integrity.

Keywords: *Financial fraud, Fraudulent Financial Statements, fraud detection, Firm Value, Beneish M-Score*

1. Introduction

A financial statement is a formal record of documents that provides a summary of financial activities and presents the financial position of an organisation, individual, or business. These statements are typically prepared in compliance with accepted accounting standards and principles to ensure accuracy, consistency, and comparability (Mautz & Angell, 2006). The primary purpose of financial statements is to assist investors and creditors in assessing a company's financial history- covering aspects such as revenues, expenses, profits or losses, assets, liabilities, and equity- and using that information to forecast future cash flows, such as interest, principal payments, and dividends, in terms of quantity, timing, and uncertainty (Olayinka, A. A., 2022).

Financial statements provide a thorough understanding of the state and direction of an entity's financial health and progress, making them an essential tool for stakeholders to use when making decisions. However, there are instances where financial statements may be falsified or misrepresented, leading to significant negative consequences for stakeholders (Shahana, Lavanya, & Bhat, 2023). As noted by Rezaee (2005), financial statement fraud (FSF) has garnered substantial attention from the media, investors, regulators, and the broader financial community, particularly in the wake of high-profile fraud cases at large corporations.

Global capital markets are nevertheless confronted with the continuous problem of financial fraud. According to Desai (2020), corporate fraud occurs when management breaches the trust placed in them by acting selfishly or prioritising the interests of a small group of people over those of all stakeholders. Similarly, deliberate manipulation or distortion of financial data to misrepresent a company's financial health is known as financial statement fraud (Khamainy et al., 2022). This could entail hiding obligations, overstating assets, reducing expenses, or inflating revenues. Such false financial reporting can have serious and long-lasting consequences.

When financial statements are misrepresented, creditors and investors run the risk of incurring severe financial losses, as reliance on false or misleading information can result in substantial losses (Soltani et al., 2023). In addition to having monetary repercussions, false financial reporting erodes investor confidence. The accuracy and transparency of financial disclosures serve as the foundation for investor expectations, choices, and resource allocation plans. The market gets erratic, and investor mood shifts to risk aversion once this confidence is damaged.

This decline in confidence among investors invariably harms a company's image. Fraudulent companies are subject to legal and regulatory scrutiny, as well as long-term damage to their credibility, stakeholder relationships, and brand equity (Gupta & Gupta, 2015). The harm to one's reputation is frequently irreparable and goes beyond the immediate financial consequences. Potential alliances, future business prospects, and access to financing can all be hindered by a damaged reputation.

Together, the erosion of investor trust and the deterioration of corporate reputation exert downward pressure on the firm's market valuation (Naz & Khan, 2025). Fraud-related disclosures often trigger sharp declines in stock prices, increased cost of capital, and heightened scrutiny from regulators and market analysts. These combined effects ultimately result in a significant loss of firm value, underscoring the broader economic impact of financial misrepresentation.

Instances of fraudulent financial statements have occurred both within India and internationally, affecting companies and economies alike. The noteworthy international cases include WorldCom, Xerox, and Enron Corporation. Enron, a once-respected energy giant, filed for bankruptcy in 2001 due to widespread accounting fraud. It employed dishonest financial tactics to conceal debt and inflate profits, ultimately leading to its collapse and broader regulatory reforms. Beyond legal reform, the Enron scandal raised deeper concerns about core beliefs and ideals (Gore & Murthy, 2011). In India, major financial scandals include the Satyam Computer Services case, the Punjab National Bank (PNB) Scam, and the Kingfisher Airlines case. The Satyam Computers fraud in 2009 involved significant financial statement manipulation, resulting in a substantial loss of investor confidence and potential legal consequences (Madaan, Mehta, & Sharma, 2022). This manipulation included exaggerated revenues and fabricated assets. The incident led to stricter corporate governance reforms in India (Bhasin, 2013), and the auditor PwC India was fined $7.5 million by US regulators- the largest penalty ever imposed on a foreign accounting firm (Norris, 2011). These cases underscore the necessity of reliable tools for early fraud detection.

Given the need for effective detection models, the Beneish M-Score offers a compelling framework. Beneish (1999)

incorporates eight financial ratios derived from publicly available financial statements and allocates weights to assess the probability of manipulation. Unlike other models that rely on complex machine learning algorithms or require non-public data, the Beneish M-Score is accessible, cost-effective, and interpretable (Durana, Blazek, Machova, & Krasnan, 2022). Its ability to identify red flags using standard financial data makes it especially useful for researchers, auditors, and regulators (Kaur, Sood, and Grima, 2023). The model has been widely applied in academic and professional settings, further reinforcing its credibility. These strengths justify its selection for this study as the primary tool for detecting potential financial statement fraud.

Research findings from Beneish's implementation of the M-Score model in India are varied. Kaur et l. al. (2014) concluded that 32.14% of companies in the telecom sector engaged in financial statement fraud, according to the Beneish M-Score. Roy and Debnath (2015) discovered widespread financial statement fraud in Indian public sector enterprises, with the service industry showing the highest frequency at 48%, followed by the petroleum sector at 30%, power generation at 20%, and the mining sector at 2%. Azam and Begum (2023) found that the Indian telecom sector generally maintained a low likelihood of financial statement manipulation, with consistently low M-Scores. Similarly, Agrawal, Manikandan, and Sakthivel (2023) identified a slight likelihood of financial statement manipulation from 2016 to 2020, with no evidence in 2022. Koshti (2023), in her study, using the Beneish M-Score and Discriminant Analysis, finds that Bajaj Auto Ltd. and TVS Motor Ltd. show signs of potential fraud. However, overall, the selected Indian automobile companies are likely non-fraudulent. Ranjan et al. (2024) observed a low risk of financial statement manipulation in firms like JSW, TATA STEEL, SAIL, JINDAL STEEL, SHYAM METALICS, and LLOYDS, but a higher risk in APL APOLLO and JINDAL STAIN, with KIOCL and USHA MARTIN showing fluctuating M-Scores. Marvadi and Savani (2020) identified consistent indications of fraudulence in their research on pharmaceutical companies using the Beneish M-Score model. In contrast, Nandini et al. (2019) analysed financial statement manipulation across pharmaceutical firms over a decade and revealed a low incidence of manipulated accounts among the studied companies.

While numerous studies have applied the Beneish M-Score to detect potential financial statement fraud across various Indian sectors- including telecom (Kaur, Sharma, & Khanna, 2014), public enterprises (Roy & Debnath, 2015), automotive (Koshti, 2023), steel (Ranjan et al., 2024), and pharmaceuticals (Marvadi & Savani, 2020; Nandini et al., 2019)- the focus of most of this literature has remained largely diagnostic, concerned primarily with identifying firms exhibiting red flags or signs of manipulation. However, a significant research gap persists in understanding the **consequences** of such fraudulent activities- particularly in terms of how they affect firm value, market performance, and stakeholder trust.

This gap is particularly significant in the **Indian pharmaceutical sector**, which plays a crucial role in both the domestic and global economies. India is one of the world's largest producers of generic drugs and vaccines, supplying medicines to over 200 countries and accounting for a substantial share of global pharmaceutical exports. The sector is characterised by high public scrutiny, complex regulatory compliance (both national and international), and considerable R&D investment, making it particularly sensitive to financial transparency and corporate governance. Furthermore, pharmaceutical firms often operate in a high-stakes environment where financial reporting influences licensing, investor sentiment, merger potential, and global competitiveness. These features, combined with growing investor interest and government incentives, make the sector especially vulnerable to financial fraud and reputational risks stemming from financial misrepresentation.

Despite this, limited academic work has explored the **broader impact** of financial statement fraud in this sector, especially how such fraud affects firm valuation in the Indian context. Addressing this critical gap, the present study extends beyond fraud identification and examines the impact of financial statement fraud, as measured by the Beneish M-Score, on firm value, specifically in the context of Indian pharmaceutical companies listed on the Bombay Stock Exchange.

The paper is organised as follows: the review of literature covers prominent theories and prior research; the methodology section describes the research design, sampling, and analytical methods; followed by the results and discussion; and concluding with the study's limitations and future research directions.

2. Review of Literature and Hypothesis Formulation

2.1 Fraud

Fraud is a complex and multifaceted issue that defies a universal definition due to its elements of surprise, deception, cunning, and unethical tactics aimed at misleading others (Akers & Gissel, 2006). It is a global problem that erodes the profitability, reputation, and legitimacy of organisations, causing significant and far-reaching consequences (Rossouw et al., 2000). At its core, fraud involves individuals or groups within an organisation exploiting their positions to gain an unfair advantage, often through manipulation, misrepresentation, or abuse of power, ultimately undermining the organisation's integrity and stakeholder trust (Rashid et al., 2022).

2.2 Financial Statements Fraud

According to Sharma and Panigrahi (2013), financial statement fraud involves the deliberate alteration of financial reports to mislead investors and creditors and generate illicit profits. The Companies Act (2013) defines corporate fraud more broadly as any deceptive act or omission, including abuse of power, meant to unfairly benefit or harm stakeholders. Both definitions emphasise the importance of intent in financial fraud. In particular, financial statement fraud involves the manipulation of financial data to deceive consumers, often resulting in poor credit or investment decisions (Xiuguo & Shengyong, 2022). Robust detection and preventive mechanisms are crucial for preventing this type of fraud, thereby protecting stakeholders and maintaining financial transparency (Shonhadji & Maulidi, 2021).

2.3 Beneish M-Score Model

Beneish M-Score is a statistical tool, developed by Messod D. Beneish, a professor at Indiana University, that identifies financial statement fraud by evaluating a set of financial ratios. According to Beneish (1999), eight key ratios can be utilised to assess the likelihood of financial statement fraud within an organisation. These ratios include: i) Days' Sales in Receivables Index, ii) Gross Margin Index, iii) Assets Quality Index, iv) Sales Growth Index, v) Depreciation Index, vi) Sales, General and Administrative Expenses Index, vii) Leverage Index, and viii) Total Accruals to Total Assets Index.

The Beneish M-Score is calculated using a formula that combines all eight financial ratios to evaluate the likelihood of financial statement fraud. According to Akra and Chaya (2020), the Beneish M-Score is a probability model that estimates potential tampering of the financial statements with approximately 76% accuracy, identifying cases that require further investigation rather than assuring 100% manipulation with absolute certainty. By calculating an M-Score, investors and auditors can identify potential red flags in an organisation's financial records. The Beneish M-Score's ability to forecast aids decision-making for stakeholders, boosting integrity by assuring that financial statements accurately depict a company's state of finances and encouraging trust in the financial system (Durana et al., 2022).

2.4 Firm Value (Value of the Company)

Susanti and Restiana (2018) state that investors' perceptions of a company, which are often reflected in stock prices, have a significant influence on firm value. Haryono and Iskandar (2015) further clarify that this value encompasses the company's total assets, including the market value of shares and liabilities. Murni, Sabijono, and Tulung (2019) add that the company's value results from investor assessments and expectations of its stock movement in the capital market. Ahmed et al. (2022) highlighted in their study that increasing the value of the company is one of an organisation's main goals since it makes the business more attractive to investors and could improve stock prices. Management wants to increase shareholder wealth and strengthen the company's place in the market by increasing firm value.

2.5 Hypothesis

The Fraud Triangle concept, proposed by Donald Cressey in 1950, bears a strong correlation to financial statement fraud in publicly traded companies. This theory identifies three key components necessary for fraud: pressure, opportunity, and rationalisation. Pressure is the term used to describe the financial stress that leads people to commit fraud, frequently as a result of concealed personal financial difficulties (Wells, 2014). Opportunity arises from weaknesses in internal controls that allow fraud to occur with minimal risk of detection (Sánchez-Aguayo et al., 2021). Rationalisation involves justifying fraudulent actions as necessary rather than criminal (Free, 2015). For fraud to take place, all three components must be present; their combined existence raises the possibility of fraudulent activity. In practice, managers facing intense pressure to meet financial targets may exploit these internal weaknesses and rationalise their

fraudulent conduct as advantageous for the company, thus misleading investors and undermining trust in the financial statements (Herbenita et al., 2022).

While the Fraud Triangle explains why fraud occurs, the broader implications of such fraud on firm value are better captured through the lenses of legitimacy theory, signalling theory, and stakeholder theory. Financial statement fraud is against the social contract between businesses and society, in addition to breaking the law. According to legitimacy theory, companies make an effort to conduct themselves in a way that conforms to social norms and values (Kusumawati & Sulistiana, 2025). The credibility of the company is jeopardised when fraud is revealed, which results in public outrage and regulatory scrutiny. Research indicates that businesses involved in financial fraud frequently lose their credibility, particularly when their disclosure policies deviate from accepted norms (Rahman, Arefin, & Shakil, 2024).

According to signalling theory, financial fraud sends erroneous signals about a company's performance to external stakeholders (Shahid et al., 2024). The firm's reputation is harmed by the discovery of such manipulation, which undermines investor trust and signals a lack of integrity in management. According to research, stock price drops and unfavourable media attention are two signs of the substantial reputational harm caused by post-fraud disclosures (Steigenberger, 2025).

Stakeholder theory highlights that businesses have obligations to all parties involved, including consumers, creditors, and employees, in addition to shareholders (Hassan et al., 2024). Stakeholder trust is damaged, relationships are strained, and long-term sustainability is jeopardised by financial fraud. When trust is lost, stakeholders can stop supporting the company, which would impact its value and performance (Valentinov & Roth, 2024).

Empirical findings reinforce this theoretical link. Tarjo et al. (2022) reveal that firms involved in financial fraud experience an inevitable decline in value as investors withdraw their investments. This behaviour indicates that fraud negatively impacts firm value, causing a growing reluctance among prospective investors to invest in such companies. Similarly, D'Amato and Falivena (2020) demonstrate that financial fraud is detrimental to firm performance, showing a negative association with firm value; the firm's value decreases as the level of financial statement fraud increases. Therefore, by integrating the Fraud Triangle's explanation of fraud occurrence with the legitimacy, signalling, and stakeholder theories' insights on its consequences, the present study proposes the following hypothesis:

H1: Financial statement fraud negatively affects firm value.

2.6 Research Model

Three main variables- the dependent, independent, and control variables are the focus of this study. Firm value serves as the dependent variable, while financial statement fraud is the independent variable. Profitability and company size are included as control variables. The research model is outlined as follows:

$$\textbf{Value} = \beta_0 + \beta_1 \textbf{FSF} + \beta_2 \textbf{ Profit} + \beta_3 \textbf{ Size} + \mathcal{E}$$

Where, value = Firm Value

$\beta 0$ = Constant or Intercept

$\beta 1, \beta 2, \beta 3$ = Slopes of Independent Variables

FSF = Financial Statement Fraud

Profit = Profitability

Size = Company Size

$\mathcal{E}$ = the error term

3. Theoretical Framework

Understanding the relationship between financial statement fraud and firm value requires a multi-theoretical approach that captures both the motivations for fraudulent behaviour and its broader consequences. While the **Fraud Triangle Theory** (Cressey, 1950) provides a foundational understanding of why individuals commit fraud, it does not explain the downstream impact of such fraud on market-based outcomes like firm value. Therefore, this study extends the fraud triangle by incorporating insights from **Legitimacy Theory**, **Signalling Theory**, and **Stakeholder Theory** to build a comprehensive framework.

3.1 The Fraud Triangle: Antecedents of Financial Fraud

The Fraud Triangle, introduced by Cressey (1950) and elaborated by Kassem and Higson (2012), identifies three interrelated factors that must be present for fraud to occur: **pressure**, **opportunity**, and **rationalisation**.

- **Pressure** refers to financial or personal stressors that compel individuals to manipulate financial statements (Wells, 2014). These include unmet performance expectations, excessive debt, or personal financial hardship.
- **Opportunity** arises when internal controls are weak or oversight is insufficient, creating an environment in which fraud can occur with minimal risk of detection (Sánchez-Aguayo et al., 2021).
- **Rationalisation** is the cognitive process by which individuals justify their unethical behaviour. Perpetrators often convince themselves that the fraud is temporary, harmless, or necessary for organisational survival (Free, 2015).

3.2 Organisational Theories Explaining the Impact of Financial Fraud on Firm Value

While these three factors explain the **likelihood of fraud**, they do not, on their own, clarify the **impacts of fraud** on organisational outcomes. Hence, additional theoretical lenses are required.

3.2.1 Legitimacy Theory: Erosion of Social Acceptance

According to Legitimacy Theory, organisations depend on societal approval to sustain operations. Financial statement fraud, once uncovered, signals a breach of societal expectations and results in the **loss of organisational legitimacy** (Rizwan & Chughtai, 2023). Such a loss can lead to regulatory sanctions, negative media coverage, and increased scrutiny from investors and the public. When legitimacy is compromised, it diminishes the firm's ability to operate effectively in the market, contributing to a decline in firm value (Mandal, 2024).

3.2.2 Signalling Theory: Reputational Consequences

Signalling Theory focuses on how companies communicate their quality and performance to the market (Ren et al., 2022). Financial statements are a key signal used by investors to assess a firm's viability. Fraudulent reporting distorts this signal. When fraud is discovered, the correction of prior misinformation can damage the firm's **credibility and reputation**, leading to abrupt market re-evaluations, often reflected in falling stock prices and increased cost of capital (Hemrit & Belgacem, 2024).

3.2.3 Stakeholder Theory: Trust and Confidence Erosion

Stakeholder Theory emphasises the interconnectedness between firms and their stakeholders, including shareholders, creditors, regulators, customers, and employees (Wang et al., 2024). Trust is the foundation of these relationships. Financial fraud disrupts this trust, leading to **withdrawal of stakeholder support**, legal repercussions, and reputational harm. The erosion of stakeholder confidence directly affects the firm's valuation and long-term sustainability (Chimonaki et al., 2023).

3.3 Integrated Framework: From Fraud to Firm Value

By connecting the **antecedents of fraud** (Fraud Triangle) to the **consequences of fraud** (through Legitimacy, Signalling, and Stakeholder theories), the study establishes a pathway linking internal motivations to external outcomes. The proposed framework suggests that:

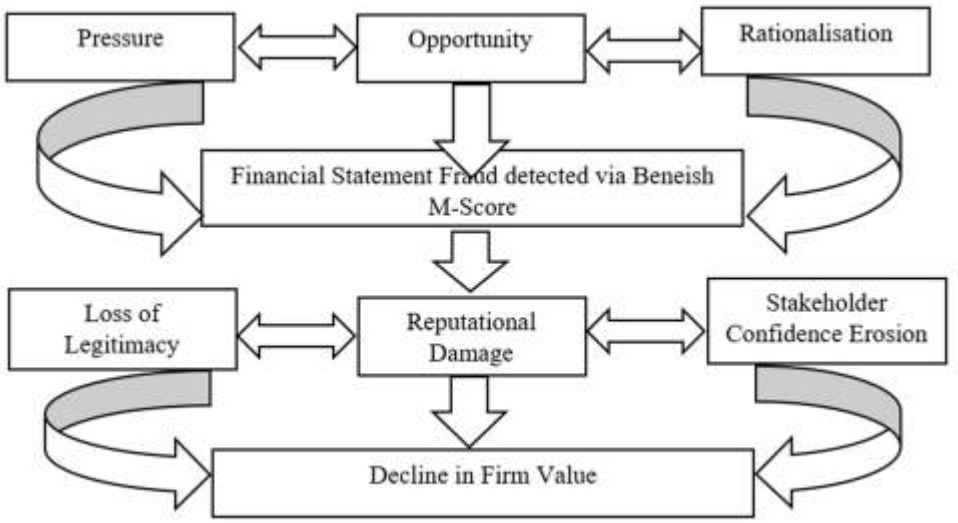
- **Pressure**, **opportunity**, and **rationalisation** increase the likelihood of financial statement fraud.
- Once fraud is committed and detected, it triggers:
  - **Loss of legitimacy** (Legitimacy Theory)
  - **Reputational damage** (Signalling Theory)
  - **Stakeholder confidence erosion** (Stakeholder Theory)
- These, in turn, negatively affect **firm value**, particularly in capital markets where trust and transparency are fundamental.

The conceptual model derived from this framework is illustrated in Figure 1.

4. Research Methodology

4.1 Sample

This study focuses on pharmaceutical companies listed on the Bombay Stock Exchange (BSE) during the period from 2019 to 2023, with data collected from the **Prowess database** maintained by the Centre for Monitoring Indian Economy (CMIE). The pharmaceutical sector was selected due to its strategic importance in India's economy, particularly in the context of public health, generic drug exports, and regulatory oversight, which makes it a suitable candidate for analysing the effects of financial statement fraud on firm value.



Sources: Self-Compiled

Figure 1. Integrated Theoretical Framework Linking Financial Statement Fraud to Firm Value

The period from 2019 to 2023 has been selected as it covers years that include the pre-pandemic, pandemic, and post-pandemic phases, a time of significant financial stress and regulatory scrutiny, which increases the potential relevance of financial reporting practices and firm valuation.

The following criteria were used to identify companies for inclusion in the sample:

a) The company must have maintained a continuous listing on the BSE between 2019 and 2023.

b) The company should not have been delisted during the study period.

c) The company must have reported profits in each year of the study period.

d) Complete data on the required variables (firm value, financial indicators, and control variables) must be available in the CMIE Prowess database.

4.2 Research Variables and its Measurement

Firm value serves as the dependent variable of this study. The company's description of value is called firm value. Nenkov, D. (2019) mentioned in his study the Price to Sales ratio and the Enterprise Value to Sales Ratio as the key indicators of the value of a company. This proxy is preferred over alternatives such as Tobin's Q, Price-to-Earnings, or Market-to-Book ratios, as EV/Sales provides a more comprehensive valuation by incorporating both equity and debt, ensuring comparability across firms with different capital structures. Moreover, it relies on observable accounting figures and avoids the estimation issues associated with Tobin's Q, while being less prone to earnings manipulation than ratios like P/E or ROE. Based on the above observation, firm value is formulated as follows:

EV/ Sales Ratio = Enterprise Value (EV) / Sales (Revenue)

Financial statement fraud serves as the independent variable in this study, and is measured using the Beneish M-Score, which is derived from eight financial ratio indexes:

Table 1. Financial Ratios to Calculate Beneish M- Score

Financial Ratio	Formula
DSRI (Days Sales in Receivables Index)	(Net Receivables$_{(t)}$ / Sales$_{(t)}$) / (Net Receivables$_{(t-1)}$ / Sales$_{(t-1)}$)
GMI (Gross Margin Index)	[(Sales$_{(t-1)}$ – COGS$_{(t-1)}$) / Sales$_{(t-1)}$] / [(Sales$_{(t)}$ – COGS$_{(t)}$) / Sales$_{(t)}$]
AQI (Asset Quality Index)	[1 - (Current Assets$_{(t)}$ + Fixed Assets$_{(t)}$) / Total Assets $_{(t)}$] / [1 - ((Current Assets$_{(t-1)}$ + Fixed Assets$_{(t-1)}$) / Total Assets $_{(t-1)}$)]
SGI (Sales Growth Index)	Sales$_{(t)}$ / Sales$_{(t-1)}$
DEPI (Depreciation Index)	(Depreciation$_{(t-1)}$ / (Fixed Assets$_{(t-1)}$ + Depreciation$_{(t-1)}$)) / (Depreciation$_{(t)}$ / (Fixed Assets$_{(t)}$ + Depreciation$_{(t)}$))
SGAI (Sales General and Administrative Expenses Index)	(Sales General and Administrative Expense$_{(t)}$ / Sales$_{(t)}$) / (Sales General and Administrative Expense$_{(t-1)}$ / Sales$_{(t-1)}$)
LVGI (Leverage Index)	[(Current Liabilities$_{(t)}$ + Total Long-Term Debt$_{(t)}$) / Total Assets $_{(t)}$] / [(Current Liabilities$_{(t-1)}$ + Total Long-Term Debt$_{(t-1)}$) / Total Assets $_{(t-1)}$]
TATA (Total Accruals to Total Assets)	(Income from Continuing Operations$_{(t)}$ - Cash Flows from Operations$_{(t)}$) / Total Assets $_{(t)}$

Sources: *Corporate Finance Institute*

In addition, the Beneish M-Score value is calculated by entering the results of the eight-ratio index computation into a mathematical model:

MSCORE = − 4.84 + 0.920*DSRI + 0.528*GMI + 0.404*AQI + 0.892*SGI + 0.115*DEPI −0.172 *SGAI − 0.327*LVGI + 4.697*TATA

In order to interpret the MSCORE value, if the company's-

a) M-Score < −2.22 is considered to be detected as not engaging in financial statement fraud.

b) M-Score ≥ −2.22 suggests a higher likelihood of financial statement fraud.

There are two control variables used in this study: Profitability & Company Size. Profitability is the return relative to its revenue, assets, equity, or other financial metrics. In this study, the Profitability is formulated as follows:

Return on Sales = Net Income/ Sales

The study uses Return on Sales as the proxy for profitability, as it directly reflects a firm's efficiency in generating profit from revenue, aligning well with the EV/Sales firm value metric. Unlike ROA or ROE, ROS avoids overlap with asset or equity-based variables, reducing multicollinearity. Additionally, it captures bottom-line performance more comprehensively than operating or gross profit margins, which exclude interest and taxes.

Conversely, the second control variable used is company size, which serves as a measure of the size of the company. The study presents a depiction of company size as follows:

Size = Ln (Total Assets)

4.3 Data Analysis Technique

The study makes use of secondary data obtained from the financial statements of pharmaceutical companies that were listed between 2019 and 2023 on the Bombay Stock Exchange, sourced from the CMIE Prowess Database. Before selecting the appropriate model, classical assumptions such as **normality, multicollinearity, autocorrelation,** and **heteroscedasticity** are tested to ensure the validity of the regression analysis.

To determine whether **Pooled OLS, Fixed Effects, or Random Effects** is the most suitable estimation method, the study conducts relevant panel diagnostics, including the **Breusch-Pagan LM test** and the **Hausman test**. These tests help assess the presence of individual-specific effects and potential systematic differences across entities, and if

needed, **robust standard errors** are applied, and potential issues such as **endogeneity** are addressed to ensure reliable estimation. The data analysis process involved initial examination using descriptive statistics, and hypothesis testing was subsequently conducted using multiple linear regression analysis in order to determine the correlations between the variables.

5. Results And Discussion

5.1 Research Sample

This study analyses a sample of **66 pharmaceutical companies** listed on the **Bombay Stock Exchange (BSE)** over the five-year period from **2019 to 2023**, resulting in a total of **330 firm-year observations** (66 companies × 5 years). The selection was based on predefined criteria related to continuous listing, availability of complete financial data, and consistent profitability. These criteria ensured data consistency and robustness for panel data analysis.

5.2 Descriptive Statistical Analysis

Table 2 presents the descriptive statistics for the factors that were examined in the research. The descriptive statistics indicate moderate variation in **firm value** (mean = 3.06), with some extreme values suggesting differing performance across firms. The **MSCORE** mean of -2.07 and a wide range reflect significant variation in potential financial statement fraud indicators. **Profitability** and **firm size** show relatively normal dispersion, supporting the assumptions required for regression analysis.

5.3 Classical Assumption Test

To ensure the robustness and reliability of the regression model, a series of classical assumption tests were conducted. The normality of residuals was verified using the Kolmogorov-Smirnov test, which yielded a Z-value of 0.850 In terms of autocorrelation, the Durbin-Watson statistic was calculated to be 2.010, which lies comfortably within the acceptable range of 1.78 to 2.21, suggesting that there is no first-order autocorrelation in the residuals. To check for heteroscedasticity, the Spearman Rank correlation test was used, which returned a significance value of 0.183 (greater than 0.05), indicating the presence of homoscedastic residuals. Collectively, the results of these diagnostic tests confirm that the data satisfy the key assumptions required for the application of Ordinary Least Squares (OLS) regression, thereby validating the use of this technique in the study.

5.4 Panel Data Specification and Model Selection

The dataset's panel structure, which included 66 pharmaceutical businesses monitored over a five-year period (2019–2023), made it crucial to identify the best estimation method. We used the Breusch-Pagan Lagrange Multiplier (LM) test to determine if unobserved individual effects were present. With a p-value of 0.171 and a Chi-square value of 1.87, the test revealed no statistically significant cross-sectional effects. This result supports the use of the **Pooled Ordinary Least Squares (OLS)** model over the Random Effects model. Additionally, the **Hausman test**, conducted to compare the efficiency and consistency of fixed versus random effects estimators, produced a **Chi-square value of 3.12** and a **p-value of 0.209**. These results indicated that there were no systematic differences between the two and confirmed that Pooled OLS was appropriate for this analysis.

Furthermore, theoretical explanations and correlation diagnostics were used to assess possible endogeneity problems, such as simultaneity bias or reverse causality. There were no significant issues found; therefore, advanced estimate methods like Instrumental Variables (IV) or Two-Stage Least Squares (2SLS) were not required. Robust standard errors were used in the Pooled OLS estimation to guarantee the robustness of the regression results and take

Table 2. Descriptive Statistical Analysis Results

Variables	N	Mean	Median	S.D.	Min	Max
Value	330	3.06	1.87	2.92	-0.200	16.1
MSCORE	330	-2.07	-2.01	2.02	-22.8	8.25
Profit	330	0.127	0.110	0.114	0.00618	1.45
Size	330	1.46	1.36	0.712	0.244	6.68
Valid N (listwise)	330					

Sources: Self-Compiled

into consideration any small deviations from the classical assumptions. Overall, the combination of diagnostic tests and econometric reasoning validates **Pooled OLS** as the most appropriate and statistically sound approach for analysing the panel data in this study.

5.5 Multiple Linear Regression Analysis

Table 3. Multiple Linear Regression Analysis Results

Model	Std. Error	Coefficients	t-ratio	Sig.
Const	0.220	0.537	2.441	0.0152
MSCORE	0.089	-0.252	-2.830	0.0049
Profit	0.586	4.286	7.313	0.000
Size	0.120	0.698	5.789	0.000

An analysis of multiple linear regression is performed to determine the impact of independent variables on a dependent variable. Based on Table 3 above, the regression equation is expressed as follows:

Value = 0.537 – 0.252 MSCORE + 4.286 PROFIT + 0.698 SIZE + Ɛ

5.6 Coefficient of Determination Test (R^2)

In a regression model, the percentage of the dependent variable's variation that can be predicted from the independent variables is known as the coefficient of determination, or R2. According to the test results, 31.72% of the variation in firm value can be explained by financial statement fraud, profitability, and company size, with an Adjusted R Square Value of 0.317.

5.7 Test of Model Feasibility

The F-test is employed to assess the regression model's viability. The significance result of 0.000 for the F-test was less than the 0.05 level of significance, meaning that 0.000 < 0.05. As a result, it is considered that the regression model used in this investigation is suitable and feasible.

5.8 Hypothesis Testing

Table 4. Financial Statement Fraud Detection Results

MSCORE	Frequency	Percentage
Not detected as fraud	209	63.33
Detected as fraud	121	36.67
Total	330	100

Sources: Self-Compiled

The results presented in Table 4 highlight the effectiveness of the MSCORE model in detecting financial statement fraud from 2019 to 2024. Out of the 330 observations analysed during this period, 209 observations, i.e., 63.33%, were not detected as committing financial statement fraud, suggesting that these companies maintained financial integrity with no evident signs of manipulation according to the MSCORE criteria. On the other hand, 121 observations (36.67%) were found to have the ability to commit financial statement fraud, indicating that a significant proportion of companies were involved in financial statement fraud during the study period. These findings align with prior research, such as Marvadi and Savani (2020), who identified consistent fraud signals in companies, and Roy and Debnath (2015), who reported widespread fraud in Indian industries, reinforcing the ongoing challenges in financial reporting integrity. This substantial rate of fraud detection in the pharmaceutical companies emphasises the prevalence of financial statement manipulation from 2019 to 2023, underscoring the need for robust detection mechanisms and enhanced oversight to safeguard investors and uphold the credibility of financial disclosures.

Table 5. Hypothesis Testing Results

Variable	Coefficient	Sig.
MSCORE	-0.252 **(negative)**	0.0049 (0.0049 < 0.05)

Sources: Self-Compiled

Table 5 presents the hypothesis testing results for the MSCORE variable. The regression coefficient of MSCORE is -0.252, with a significance value of 0.0049, which is lower than the 0.05 level of significance (0.0049 < 0.05). These findings show that financial statement fraud significantly and negatively affects firm value in the pharmaceutical industry, supporting hypothesis (H1).

5.9 Analysis and Discussion

The results of this study indicate a significant negative relationship between financial statement fraud (measured using the Beneish M-Score) and firm value among Indian pharmaceutical companies. Specifically, the regression coefficient of -0.252 (p= 0.0049) suggests that as indicators of financial manipulation increase, the firm's market valuation declines. This finding **supports the hypothesis (H1)** and reinforces the theoretical understanding that fraudulent financial reporting undermines market confidence and damages firm performance.

Theoretically, this finding aligns strongly with the **Fraud Triangle Theory,** which posits that financial fraud is likely to occur when pressure, opportunity, and rationalisation coexist (Cressey, 1950; Wells, 2014). In the pharmaceutical sector, intense competition and high stakeholder expectations may create pressures that incentivise manipulation. When combined with insufficient internal controls or weak regulatory enforcement, the opportunity to commit fraud increases, often justified by management through short-term survival rationalisations. The observed negative impact of such behaviour on firm value confirms the long-term consequences anticipated by the theory.

According to Rizwan and Chughtai (2023), the findings also support the Legitimacy Theory, which contends that a company's ability to survive is correlated with its level of social acceptance. Companies lose public acceptance, face reputational harm, regulatory penalties, and possibly a drop in market trust when financial fraud is exposed; these factors can all directly lower a company's worth (Mandal, 2024). In a similar vein, this validates the Signalling Theory since investors receive false indications about a company's performance and dependability due to fraudulent reporting. As the study's findings make clear, once these false signals are discovered, they cause reputational damage, an increase in the cost of capital, and a decline in stock price (Hemrit & Belgacem, 2024).

The **Stakeholder Theory** further supports the interpretation of these results. Financial statement fraud damages the trust of not only investors but also creditors, employees, and regulators (Wang et al., 2024). This erosion of stakeholder confidence adversely affects business sustainability and valuation. As stakeholder withdrawal and scrutiny intensify following fraudulent disclosures, a firm's future prospects and earnings potential decline, which ultimately depresses its market value.

Empirically, the study's findings **support** the work of **Marvadi and Savani (2020),** who identified widespread indications of fraud in the pharmaceutical sector using the Beneish M-Score. Similarly, **Roy and Debnath (2015)** highlighted a high frequency of manipulation in Indian public sector enterprises. Although **Nandini et al. (2019)** reported a relatively low level of manipulation in pharmaceutical firms, this study suggests that even isolated or subtle manipulation can have disproportionate effects on firm valuation, possibly due to the sector's sensitivity to investor trust and regulatory oversight.

Moreover, the results also **reinforce** findings by **D'Amato and Falivena (2020)** and **Tarjo et al. (2022),** who showed that fraudulent practices have a detrimental effect on firm performance and investor sentiment, causing declining stock prices and reduced firm value. This confirms that the economic consequences of fraud are not confined to legal repercussions but extend to **market-based penalties**, highlighting the importance of proactive fraud detection.

6. Conclusion

The study looked at the effects of financial statement fraud on company value among pharmaceutical companies listed on the Bombay Stock Exchange between 2019 and 2023, as determined by the Beneish M-Score model. According to the data study, 36.67% of organisations were flagged by the M-Score as possibly fraudulent. Moreover, 330 observations were analysed, and the results showed that financial statement fraud significantly reduces firm value. The findings highlight that companies with higher M-Scores, indicating a greater likelihood of financial statement fraud, experience a substantial decline in their market valuation. The results revealed a significant and negative association between financial statement fraud and firm value, confirming the hypothesis that companies exhibiting red flags of manipulation are likely to suffer a decline in market valuation. The findings contribute to the theoretical literature by integrating the Fraud Triangle Theory with Legitimacy, Signalling, and Stakeholder theories. This multi-theoretical approach enabled a deeper understanding of both the motivations behind fraudulent financial behaviour and its broader market consequences. While the Beneish M-Score does not confirm the existence of fraud, its statistically significant relationship with firm value highlights its relevance as a predictive indicator of financial risk. In sum, the study reinforces the importance of financial transparency and corporate integrity in sustaining firm value, especially in sectors such as pharmaceuticals that operate in highly regulated environments and under intense investor scrutiny. The research also highlights the broader economic costs of financial statement fraud, including reputational damage, investor withdrawal, and long-term performance decline.

7. Implications And Future Research

The study's findings have significant implications for multiple stakeholders. The findings highlight the long-term risks of financial statement manipulation for company management, even when such actions are justified as tactical or short-term. In addition to being required by law,

maintaining financial integrity is also strategically necessary to maintain investor confidence and corporate valuation. The Beneish M-Score's ability to identify possible fraud indicates to regulators and policymakers the necessity of integrating such instruments into standard financial monitoring systems. Establishing early warning systems can assist in preventing financial malfeasance before it worsens, as the pharmaceutical industry deals with public health, international exports, and regulatory compliance. This study can also help auditors and forensic analysts understand the predictive power of financial ratio-based models, such as the M-Score. The legitimacy and dependability of financial disclosures can be improved by including fraud risk indicators in routine audit processes. The study emphasises to investors the value of doing due diligence that extends beyond reported profitability ratios and earnings. One way to reduce exposure to value losses resulting from post-fraud disclosures is to incorporate fraud risk into the investment decision-making process.

Finally, some limitations of this study present opportunities for future exploration. Even though this study offers compelling proof of a negative correlation between financial statement fraud and firm value, there are still a number of research directions that could be pursued. First, future studies may explore the causal directionality of this relationship using advanced econometric techniques such as instrumental variables or longitudinal structural equation modelling. Secondly, the research was limited to the pharmaceutical industry in India. Analysing other high-risk sectors like banking, real estate, or infrastructure could yield comparative insights on the vulnerabilities and detection effectiveness of those sectors. Third, future studies might look into how corporate governance, board independence, or the efficacy of audit committees can moderate the link between fraud and firm value. Adding institutional safeguards to the relationship between fraud and value would enhance the theoretical model. Last but not least, because the Beneish M-Score mostly uses quantitative data, qualitative research such as case studies of fraud aftermath, procedures for whistle-blowers, or management ethics could offer more profound understandings of the organisational and human aspects of financial misconduct.

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