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Exploring the Use of Derivatives to Manage Financial Risks

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Abstract: ***This research paper aims to investigate the use of derivatives in managing financial risks, with a special focus on the infrastructure sector. The study analyzes the positions taken by buyers in future and option contracts to mitigate risk exposure. The research period spans 28 days and focuses on three prominent companies listed on the National Stock Exchange (NSE): Larsen & Toubro Ltd, JSW Steel Ltd, and JMR Airports Infrastructure Ltd. The paper examines the profit and loss outcomes of derivative positions and evaluates their effectiveness in managing financial risks in the infrastructure sector.***
Keywords: NSE, Risk Exposure, Derivative

I. INTRODUCTION

The infrastructure sector stands as a cornerstone of economic progress, facilitating vital functions such as transportation, energy distribution, and telecommunications. Its significance cannot be overstated, as it underpins the foundation upon which economies thrive and societies prosper. However, alongside its pivotal role in driving growth and development, the infrastructure sector is inherently susceptible to a myriad of financial risks.

Financial risks within the infrastructure sector arise from diverse sources, ranging from market volatility and interest rate fluctuations to currency risks and regulatory uncertainties. These risks pose formidable challenges to companies operating within the sector, potentially impacting their profitability, liquidity, and overall financial health. In response to such challenges, firms in the infrastructure sector seek effective risk management strategies to safeguard their interests and ensure long-term sustainability.

Derivatives emerge as a vital tool in the arsenal of risk management strategies available to companies within the infrastructure sector. Derivative instruments, including futures and options contracts, offer unique opportunities to hedge against adverse price movements, thereby mitigating financial risks and enhancing stability. By leveraging derivatives, companies can effectively manage their exposure to market fluctuations, interest rate changes, and other external factors that may impact their financial performance.

While the use of derivatives for risk management is well-established across various industries, there exists a notable gap in research concerning its specific application within the infrastructure sector. This research seeks to address this gap by exploring the utilization of derivatives to manage financial risks in the infrastructure sector, with a particular focus on futures and options contracts.

Through an in-depth analysis of derivatives trading activity on the National Stock Exchange (NSE) over a defined period, this study aims to shed light on the effectiveness of derivative instruments in mitigating financial risks within the infrastructure sector. By examining the positions of buyers for futures and options contracts related to key companies such as Larsen & Toubro Ltd, JSW Steel Ltd, and JMR Airports Infrastructure Ltd, this research endeavors to provide valuable insights into the role of derivatives in enhancing financial stability and resilience within the sector.

By elucidating the relationship between derivatives usage and risk management practices within the infrastructure sector, this study seeks to contribute to the existing body of knowledge on financial risk management. Ultimately, the findings of this research endeavor to inform strategic decision-making processes and assist companies operating in the infrastructure sector in navigating the complex landscape of financial risks effectively.

II. LITERATURE REVIEW

The literature on financial risk management and the use of derivatives spans a wide array of industries and contexts, providing valuable insights into the theory, practice, and implications of derivative usage. While significant research exists on the application of derivatives in sectors such as finance, agriculture, and manufacturing, there is a noticeable dearth of studies focusing specifically on the infrastructure sector. Nevertheless, several key themes and findings from existing literature can inform our understanding of derivatives' role in managing financial risks within this sector.

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1) *Derivatives as Risk Management Tools:* Numerous studies highlight the effectiveness of derivatives, particularly futures and options contracts, in managing various types of financial risks. Derivatives offer companies the ability to hedge against adverse price movements in underlying assets, thereby mitigating exposure to market volatility, interest rate fluctuations, and other external factors. Research by Hull (2018) and Chance and Brooks (2015) underscores the importance of derivatives as essential instruments in risk management strategies across diverse industries.
2) *Sector-Specific Applications:* While much of the literature on derivatives focuses on their broader applications across industries, there is growing recognition of the need for sector-specific analyses. Research by Bodnar and Hayt (2002) and Mayers and Smith (2019) emphasizes the importance of tailoring derivative strategies to the unique characteristics and risk profiles of specific sectors. However, there remains a notable gap in research concerning the infrastructure sector's distinct risk management needs and the optimal utilization of derivatives within this context.
3) *Challenges and Opportunities:* Despite the potential benefits of derivatives in managing financial risks, several challenges and limitations exist. These include counterparty risks, liquidity concerns, regulatory constraints, and the potential for mispricing or valuation errors. Research by Litterman and Scheinkman (2016) and Stulz (2018) explores these challenges and offers insights into strategies for mitigating them effectively. Additionally, studies by Mello and Parsons (2014) and Marshall and McManus (2017) highlight the opportunities for innovation and improvement in derivative products and risk management practices.
4) *Empirical Evidence:* Empirical studies provide valuable evidence on the real-world effectiveness of derivatives in managing financial risks. Research by McDonald and Paulson (2013) and Hull and White (2017) examine the impact of derivative usage on companies' financial performance, risk exposure, and shareholder value. While much of this research focuses on industries such as banking and manufacturing, there is a need for empirical studies specifically focused on the infrastructure sector to assess the efficacy of derivative strategies in this context.
5) *Regulatory Landscape:* The regulatory environment plays a significant role in shaping derivative markets and risk management practices. Research by Chincarini and Kim (2016) and Culp and Miller (2018) examine the regulatory framework governing derivative trading and its implications for market participants. Within the infrastructure sector, regulatory considerations such as project financing, government policies, and public-private partnerships further influence derivative usage and risk management strategies.

III. RESEARCH METHODOLOGY

The research methodology employed in this study is designed to provide a systematic and rigorous analysis of the use of derivatives to manage financial risks within the infrastructure sector. The methodology encompasses several key components, including data collection, analysis, and interpretation, aimed at achieving the research objectives effectively.

1) *Data Collection:* The first step in the research methodology involves collecting relevant data pertaining to derivatives trading activity within the infrastructure sector. Data sources include financial markets, such as the National Stock Exchange (NSE), where futures and options contracts related to key infrastructure companies are traded. Historical trading data for a defined period, typically 28 days, is obtained to capture the positions of buyers for these contracts.
2) *Selection of Companies:* The study focuses on prominent companies within the infrastructure sector, known for their significant market presence and influence. Companies such as Larsen & Toubro Ltd, JSW Steel Ltd, and JMR Airports Infrastructure Ltd are selected as primary subjects of analysis. These companies represent diverse segments within the infrastructure sector, including construction, steel manufacturing, and airport infrastructure development.
3) *Derivatives Analysis:* The research methodology involves analyzing futures and options contracts traded on the NSE over the specified period. Data on the positions of buyers for these contracts are collected and categorized based on the selected companies. The analysis includes examining the volume, price movements, and open interest of derivatives contracts to assess the trading activity and sentiment of market participants.

IV. OBJECTIVE OF THE STUDY

1) To evaluate the effectiveness of derivatives in managing financial risks within the infrastructure sector.
2) To explore market sentiment and investor behavior regarding derivatives trading within the infrastructure sector.
3) To identify sector-specific challenges and opportunities related to derivative usage and risk management within the infrastructure sector.
4) To provide valuable insights and recommendations for companies operating within the infrastructure sector to enhance their risk management practices.

V. RESULTS

DATE	MARKET PRICE	FUTURE PRICE
29 DEC. 2023	3526.00	3588.41
01 JAN. 2024	3525.45	3520.16
02 JAN. 2024	3438.10	2842.27
03 JAN. 2024	3440.35	3458.58
04 JAN. 2024	3458.70	3601.89
05 JAN. 2024	3521.90	4052.29
08 JAN. 2024	3501.10	3346.35
09 JAN. 2024	3555.95	4010.75
10 JAN. 2024	3545.50	3467.49
11 JAN. 2024	3504.85	3208.69
12 JAN. 2024	3568.80	4102.69
15 JAN. 2024	3543.05	3352.43
16 JAN. 2024	3573.50	3816.85
17 JAN. 2024	3570.95	3552.00
18 JAN. 2024	3596.00	3793.78
19 JAN. 2024	3646.00	4055.81
20 JAN. 2024	3634.50	3546.18
23 JAN. 2024	3551.00	2976.44
24 JAN. 2024	3589.20	3898.94
25 JAN. 2024	3593.45	3626.50

Table 1: Market price and Future price of L&T Ltd.

The objective of this analysis is to evaluate the profit/loss position of futures and options. This analysis is based on sample data taken of LARSEN & TOUBRO LTD scrip. This analysis considered the JANUARY contract of L&T. The lot size is 300 and the time period in which this analysis is done is from 29.12.2023 to 25.01.2024.

Observations:

If a person buys 1 lot i.e. 300 futures of L&T on 29th Dec. 2023 and sells on 25th Jan 2024 then he will get a profit/loss of 3626.50 - 3588.41= 38.09 per share. So he will get a Total Profit of 11427 i.e. 38.09*300. The closing price of L&T at the end of the contract period is 3626.50 and this is considered as settlement price.

DATE	MARKET PRICE (Rs.)	STRIKE PRICE (Rs.)					
		3480	3500	3520	3540	3560	3580
29 DEC. 2024	3526.00	161.94	150.75	140.08	129.11	120.26	111.10
01 JAN. 2024	3525.45	153.42	142.21	131.53	121.40	111.80	102.74
02 JAN. 2024	3438.10	102.52	93.72	85.47	77.76	70.57	63.89
03 JAN. 2024	3440.35	100.84	92.01	83.75	76.03	68.85	62.18
04 JAN. 2024	3458.70	107.20	97.88	89.13	80.94	73.32	66.24
05 JAN. 2024	3521.90	139.70	128.51	117.92	107.92	98.50	89.67

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08 JAN. 2024	3501.10	118.09	107.51	97.57	88.27	79.60	71.55
09 JAN. 2024	3555.95	148.82	136.47	124.75	113.68	103.27	93.50
10 JAN. 2024	3545.50	138.71	126.63	115.22	104.48	94.41	85.02
11 JAN. 2024	3504.85	110.28	99.55	89.52	80.19	71.55	63.60
12 JAN. 2024	3568.80	147.55	134.56	122.27	110.67	99.79	89.63
15 JAN. 2024	3543.05	119.27	106.94	95.41	84.69	74.79	65.70
16 JAN. 2024	3573.50	136.41	122.79	109.96	97.94	86.77	76.44
17 JAN. 2024	3570.95	130.67	116.98	104.13	92.14	81.03	70.81
18 JAN. 2024	3596.00	145.56	130.68	116.61	103.41	91.10	79.71
19 JAN. 2024	3646.00	183.29	166.41	150.20	134.71	120.03	106.22
20 JAN. 2024	3634.50	169.96	153.07	136.91	121.54	107.06	93.54
23 JAN. 2024	3551.00	87.55	72.94	59.71	47.98	37.79	29.16
24 JAN. 2024	3589.20	114.57	96.88	80.26	64.99	51.32	39.43
25 JAN. 2024	3593.45	114.97	95.76	77.33	60.16	44.77	31.66

Table 2:Market price and premium calls at the various strike price of L&T Ltd.

Observations for Call Option:

a) Buyer's Pay-off

- Those "who have purchased the call option at a strike price of Rs.3520, the premium payable is Rs.140.08."
- On "the expiry date, the spot market price closed at Rs.3593.45.
- Profit / Loss = (Spot price – Strike price) – Premium
  = (3593.45 – 3520) – 140.08
  =(-66.63)

❖ Buyer's Total Loss = 300*(-66.63) = Rs.19989

DATE	MARKET PRICE (Rs.)	STRIKE PRICE (Rs.)					
		3480	3500	3520	3540	3560	3580
29 DEC. 2024	3526.00	89.35	98.01	107.18	116.86	127.06	137.75
01 JAN. 2024	3525.45	84.22	92.87	102.05	111.78	122.05	132.86
02 JAN. 2024	3438.10	121.61	132.68	144.30	156.46	169.14	182.33
03 JAN. 2024	3440.35	118.63	129.68	141.29	153.44	166.13	179.34

04 JAN. 2024	3458.70	107.59	118.14	129.27	140.97	153.23	166.02
05 JAN. 2024	3521.90	77.83	86.53	95.82	105.71	116.18	127.24
08 JAN. 2024	3501.10	79.87	89.19	99.15	109.75	120.98	132.84
09 JAN. 2024	3555.95	56.70	64.25	72.45	81.28	90.77	100.92
10 JAN. 2024	3545.50	57.99	65.82	74.32	83.49	93.34	103.86
11 JAN. 2024	3504.85	71.16	80.35	90.23	100.82	112.10	124.07
12 JAN. 2024	3568.80	45.43	52.37	59.99	68.32	77.37	87.13
15 JAN. 2024	3543.05	45.75	53.36	61.77	70.99	81.03	91.87
16 JAN. 2024	3573.50	33.39	39.71	46.83	54.76	63.53	73.15
17 JAN. 2024	3570.95	31.15	37.41	44.51	52.47	61.31	71.05
18 JAN. 2024	3596.00	21.94	27.02	32.91	39.66	47.30	55.87
19 JAN. 2024	3646.00	10.62	13.71	17.45	21.93	27.21	33.37
20 JAN. 2024	3634.50	9.74	12.82	16.62	21.23	26.72	33.16
23 JAN. 2024	3551.00	13.69	19.06	25.82	34.07	43.87	55.22
24 JAN. 2024	3589.20	3.47	5.76	9.13	13.85	20.17	28.27
25 JAN. 2024	3593.45	0.57	1.35	2.92	5.74	10.34	17.23

❖ Table 3:Market price and premium puts at the various strike price of L&T Ltd.

❖ Observations for Put Option:
❖ a) Buyer's Pay-off
❖ • Those "who have purchased the call option at a strike price of Rs.3560, the premium payable is Rs.127.06"
❖ • On "the expiry date, the spot market price closed at Rs.3593.45.
❖ • Profit / Loss = (Strike price – Spot price) – Premium
❖ = (3560 – 3593.45) – 127.06
❖ =(-160.51)
❖ Buyer's Total Loss = 300*(-160.51) = Rs.48153

VI. FINDINGS

Based on the findings of the study, several recommendations and suggestions can be proposed to enhance the effectiveness of derivative usage and risk management practices within the infrastructure sector:

1) *Develop Tailored Risk Management Strategies:* Companies operating in the infrastructure sector should develop tailored risk management strategies that align with their specific risk profiles, business objectives, and market dynamics. This may involve a comprehensive assessment of financial risks, including market volatility, interest rate fluctuations, and currency risks, and the adoption of appropriate derivative instruments to hedge against these risks effectively.

2) *Diversify Derivative Portfolios:* To enhance risk diversification and resilience, companies should consider diversifying their derivative portfolios across different types of instruments, asset classes, and maturities. This can help mitigate concentration risk and provide greater flexibility in managing various types of financial risks.
3) *Strengthen Risk Governance Frameworks:* Companies should strengthen their risk governance frameworks to ensure robust oversight and control over derivative usage and risk management practices. This may involve establishing clear policies, procedures, and risk limits, as well as enhancing risk monitoring and reporting capabilities to enable timely identification and mitigation of emerging risks.
4) *Enhance Market Surveillance:* Regulators and market participants should collaborate to enhance market surveillance and oversight of derivative trading activities within the infrastructure sector. This may involve implementing advanced monitoring tools and techniques to detect market manipulation, insider trading, and other forms of misconduct, thereby safeguarding market integrity and investor confidence.
5) *Promote Investor Education and Awareness:* There is a need to promote investor education and awareness about derivative products and risk management practices within the infrastructure sector. This can help investors make informed decisions about derivative usage and understand the potential benefits, risks, and implications of derivative transactions.
6) *Encourage Innovation and Product Development:* Regulators, exchanges, and market participants should collaborate to encourage innovation and product development in derivative markets, particularly tailored to the needs of the infrastructure sector. This may involve introducing new derivative instruments, risk management tools, and hedging strategies to address sector-specific challenges and opportunities effectively.

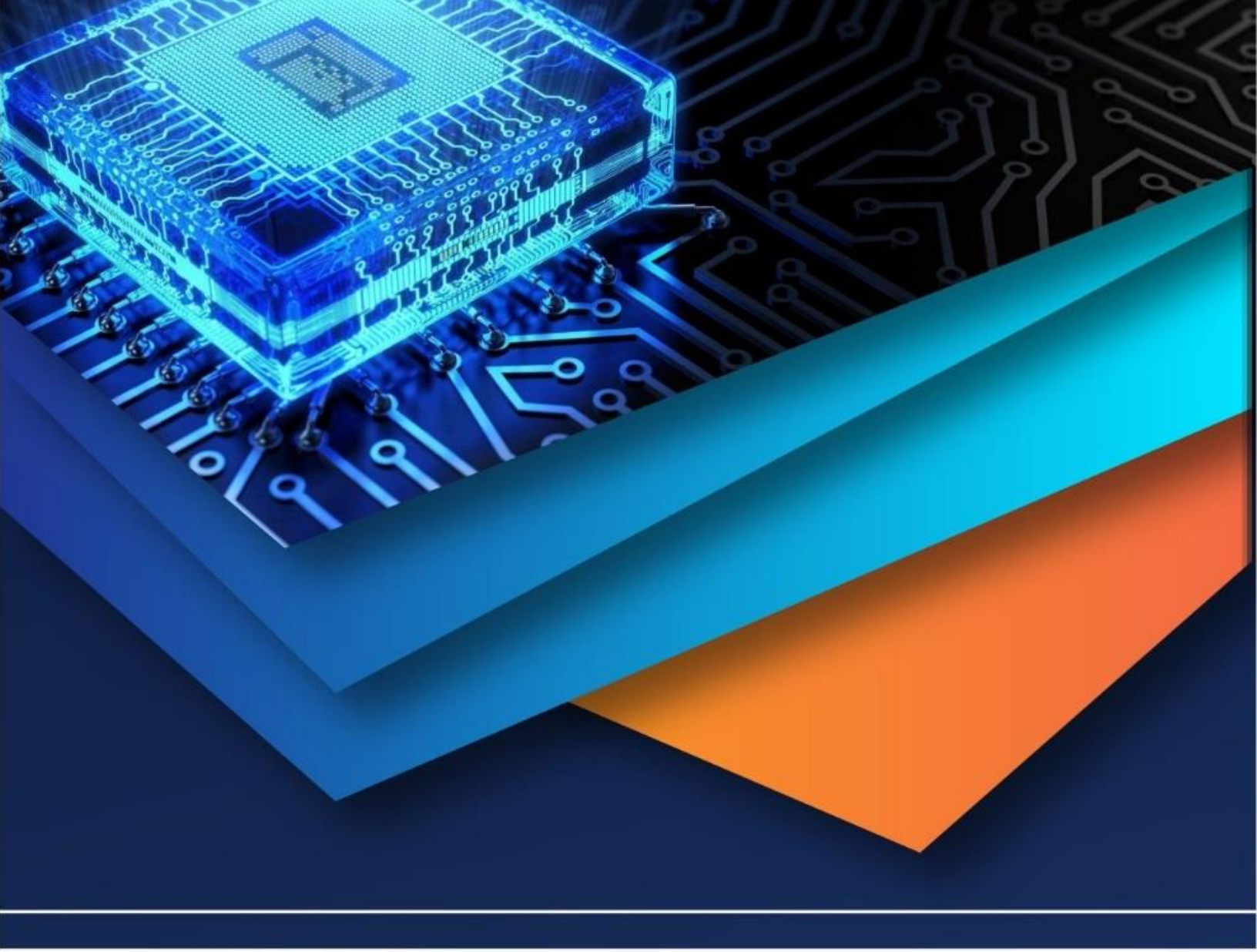
VII. CONCLUSION

In conclusion, the research contributes to a deeper understanding of the role of derivatives in managing financial risks within the infrastructure sector. By providing empirical evidence, insights, and recommendations, the study offers valuable guidance for companies, investors, regulators, and other stakeholders seeking to navigate the complex landscape of financial risks effectively. Moving forward, further research and collaboration are warranted to advance our understanding of derivative usage and risk management practices within the infrastructure sector and promote financial stability and resilience in this critical domain of economic activity.

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