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Price Volatility and Risk Management in Commodities Trading in India

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ABSTRACT:
This paper investigates price fluctuations on commodity exchanges in India. The investigation reviewed risk mitigation measures taken by the market participants using secondary data. Global demand, geopolitical developments, and supply chain issues resulted in market volatility. The scope for hedging was limited, thereby increasing the financial exposure of the traders. The effectiveness of government interventions intended to stabilize volatility in commodity markets was not uniform. The adoption of technology diversification resulted in improved transparency and risk mitigation within the market. This study particularly calls for enhanced financial education and policy changes. The major findings were the use of digital devices and sophisticated trading systems as the primary remedy.

Keywords: Commodity/Commodities, Price/Pricing, Market/Markets, Risk/Risks, Trading/Traders, Volatility, India/Indian Government, Supply, Technology

Research Background
The Indian marketplace for commodities exhibits severe volatility. The market's stability is uncontrollable, being influenced by the weather as well as supply and demand. Farmers are affected by external factors such as weather impacting their crops while global economic patterns influence crude oil and metals. The prices of gold, petroleum, and other commodities reliant on imports are impacted by currency movement. Commodities are the market's most economically sensitive instruments and geopolitical conflicts further add to the impact. Furthermore, commodities are highly susceptible to market speculation which promiscuously increases volatility. The price movement is mitigated through the introduction of futures contracts and speculations. Using strategies for hedging protects from loss to traders suffering the consequences of swift market moves. The evolving technology multi-commodity exchange MCX does significantly (Kathiravan et al. 2020). With the multi-commodity exchange, trade in different classes of commodities can be carried out via additional counterparties.
The regulatory figure Sovereign Order of India SEBI is in charge of regulating the commodities market in India (Vashisth and Malhotra, 2020). Price change can easily be protected from through the use of risk management strategies. Investments made into commodities are prone to great levels of risk which traders spread out through diversification.

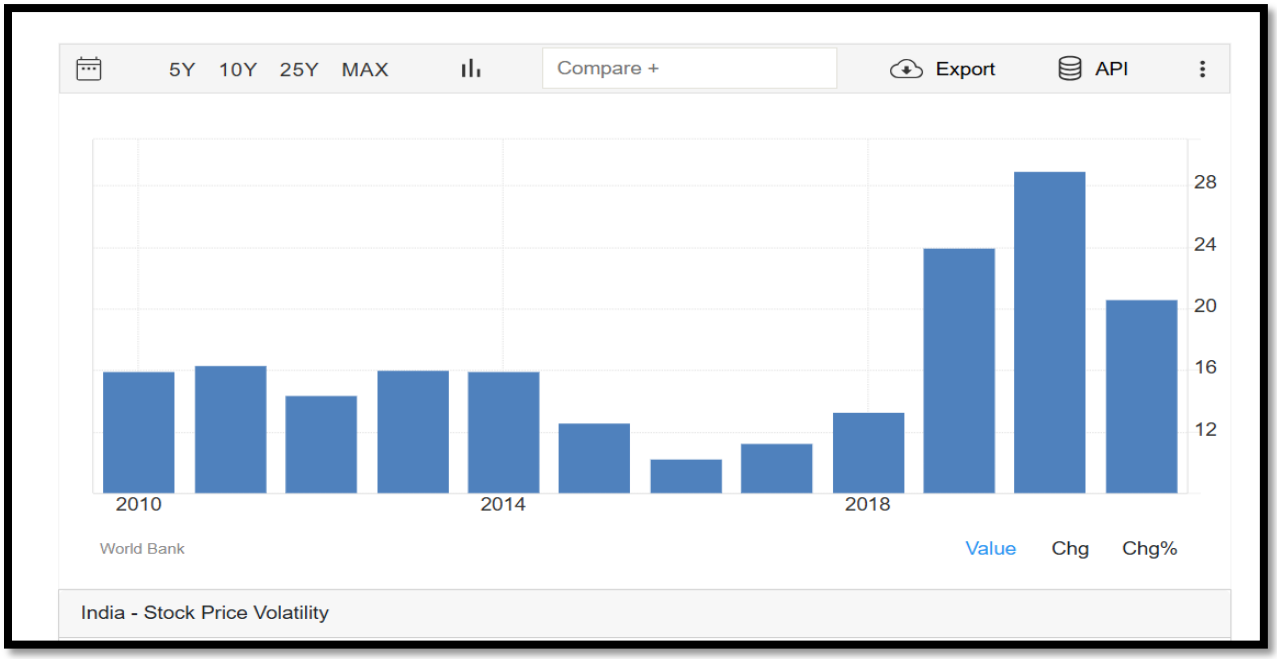

Figure 1: India - Stock Price Volatility
(Source: Tradingeconomics, 2025)

Derivatives can insulate against price volatility in the markets. Options and futures strategies shield from adverse price movement in the market context. Weather derivatives act as a climate risk management tool for agriculture trade. Commodity swaps lower marked price volatility risk. Sophisticated analytics enable better decisions in commodity risk management. The consumption of metals and energy is economically boosted by industrial demand (Renner and Wellmer, 2020). Deregulated markets reduce the difficulty in trading commodities. Institutional investors hedge with structured commodity products. Retail purchases also participate in commodity markets to have a broader portfolio. High restrictions against them enable major producers to manage risks with hedging tactics. Investment through commodity-linked exchange-traded funds (ETFs) is considered safe (Yeniley, 2025).

Enhanced regulatory frameworks make it easier to monitor and manage risks. Public-private partnerships further enhance risk management strategies. There is government support for effective commodities market regulation aid. Reasonable changes in commodity prices keep the economy stable (Dutta et al. 2021). Indications from the future suggest that technology will play a bigger role in risk management. Controllable measures for prudent trading of commodities are enhanced by technology. Practices that allow sustaining the commodity markets over time are good for business. With effective risk management, India's trading sector will be more resilient.

Problem statement

The volatility in India's markets of commodities gives rise to economic unpredictability. The shifting demand and supply affect traders and investors on a large scale. Seasonal changes often cause disruptions in agricultural commodities. Changes in global economic conditions cause energy and metal prices to fluctuate. Changes in exchange rates affect gold and crude oil, which are import-dependent commodities. Geopolitical conflict gives rise to volatility in commodity prices. Speculative trading results in increased volatility in commodity prices (Staugaitis and Vaznonis, 2022). Poor risk management places traders in a position where they could suffer financial risks. Commodity markets in India have, for the most part, remained undiversified regarding hedging instruments. Proposed regulation changes have been unduly superficial in addressing sustained volatility. Sometimes, market distortions occur due to government interference. Restrictions on exports bring about changes in pricing and the domestic supply of commodities. Other factors have surfaced, such as inflation caused instability in commodity pricing. Traders are faced with the problem of inadequate tools to reduce exposure to these risks (Ghosh et al. 2024). There is almost no use of modern technologies in trading in India. Such factors as insufficient risk control hurt economic growth and market stability. More advanced regulatory frameworks and digital technologies are necessary. Investors can be assured that actively controlling risks leads to an acceptable state of affairs in trading commodities.

Aim and Objectives

Research Aim

To analyze price volatility in India's commodity markets and evaluate effective risk management strategies for mitigating financial uncertainties.

Research Objectives

- To examine the key factors influencing price volatility in Indian commodities trading.
- To assess the effectiveness of hedging and derivative instruments in managing price risks in India.
- To evaluate the role of government policies and regulations in stabilizing commodity markets in India.
- To explore technological advancements improving risk management in commodity trading in India.

Methodology

This study utilized secondary sources to examine the volatility of commodity prices. The data from government reports, market research, and relevant literature were crucial to the analysis. Historical pricing and policies provided context to risk management. Secondary data was very useful as it was time-saving and well-documented (Walliman, 2021). Patterns in price changes and their causal factors were established using thematic data analysis. It helped classify the primary drivers of risk and volatility of the commodity markets. This approach was useful as it enabled the study of regulations, economic policies, and market activities in a more focused way. Thematic analysis facilitated an understanding of the intricate dimensions of financial risks. It enabled a much more efficient assessment of risk management measures in the trading of commodities in India.

Results

Market Fluctuations Were Driven by Multiple Factors

As in most economies worldwide, price changes in India's commodity markets were caused by several factors which broke the supply and demand equilibrium. Multiple components were crucial in determining prices. Take, for example, the case of China, which increased steel imports during the year 2021. Steel firms in India, such as Tata Steel and JSW Steel, experienced price increases (Dash and Rath, 2021). The same example can be made in the case of crude oil when demand rose after COVID-19. Indian Oil Corporation and Reliance Industries had to increase their prices to match the new international prices.

Month	Average Price (USD per Barrel)
April 2024	73.5
May 2024	74.1
June 2024	75
July 2024	76.2
August 2024	77
September 2024	78.3
October 2024	79.1
November 2024	80
December 2024	81.2

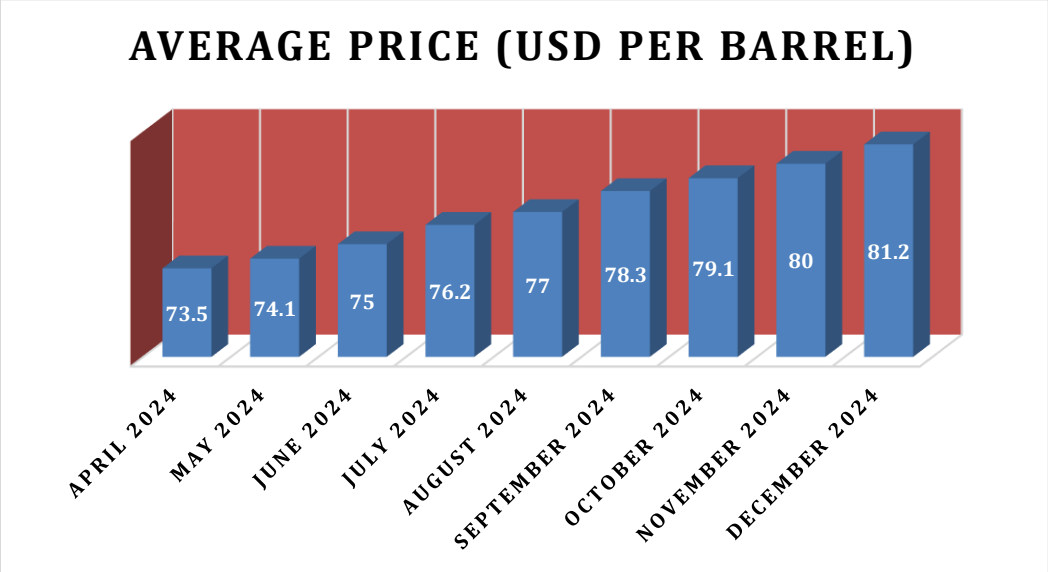

Table 1: Monthly Average Crude Oil Prices (Indian Basket) in 2024-2025

The supply chain problems caused covid time commodities to have price volatility. The 2020 COVID-19 lockdowns caused disruptions in trade and transport which led to Southeast Asia's agricultural suppliers like ITC and Adani Wilmar facing delays. The stoppage of coal imports from Australia and Indonesia meant that NTPC and Adani Power had to pay much higher prices for coal, increasing their electricity generation costs and when adding to inflation (Rao, 2021). Additional strains caused by inflation were also a contributor to volatility in the market. For example, Britain and India lost costs for businesses as fuel through Hindustan Unilever made logistics costs higher tipping the price the product.

Risk Management Using Value at Risk (VaR)

To manage financial risk, companies calculate Value at Risk (VaR):

$VaR=\mu-Z\cdot\sigma$

Where:

VaR= Maximum expected loss at confidence level

μ= Mean return

Z= Z-score (1.65 for 95% confidence, 2.33 for 99%)

σ= Standard deviation of price returns

Application:

If an oil firm's daily return is 0.5%, and price volatility is 2%, at 95% confidence:
VaR=0.5%−(1.65×2%)=−2.8%
The firm faces a 2.8% risk of loss in extreme scenarios.

Figure 2: Commodity prices in India
(Source: moneycontrol, 2025)

Firms such as Tata Motors and Maruti Suzuki had to manage production costs due to increases in metal pricing. This was worsened by the geopolitical events that were affecting Indian commodity markets. The warfare between Russia, and Ukraine severely impacted supply chains of wheat and sunflower oil. Adani Wilmar and Ruchi Soya witnessed edible oil import inflation. Indian Oil and Bharat Petroleum had supply issues during crude oil export restrictions from Russia because of sanctions (Vincent and James, 2020). In 2022, speculators selling oil contracts on the Multi Commodity Exchange (MCX) in future trading did so with no real supply-demand balance leading to higher prices (Arcot and Naidu, 2024). Companies and policymakers faced intense pressure to manage risk in these extremely volatile environments and find resourceful means to adapt to changes in circumstances.

Hedging and Derivatives Usage Was Limited

The operational risks posed by failure to hedge and utilize derivatives have been formidable for many Indian traders, leaving them exposed to higher financial risks. Hedging and adoption of options were predicted to mitigate the impact of price instability in markets, yet it was scant. Crops faced adversities because of unpredictable prices. Farmers cultivating wheat and rice during the year 2021 incurred losses due to a sudden slump in the market price. Agribusiness merchants such as ITC and Adani Wilmar were exposed to price risk without using any hedging tools (Dongre, 2022).

Month	Wheat Price (INR per Quintal)	Rice Price (INR per Quintal)
April 2024	2250	3150
May 2024	2275	3175
June 2024	2300	3200
July 2024	2325	3225
August 2024	2350	3250
September 2024	2375	3275
October 2024	2400	3300
November 2024	2425	3325
December 2024	2450	3350

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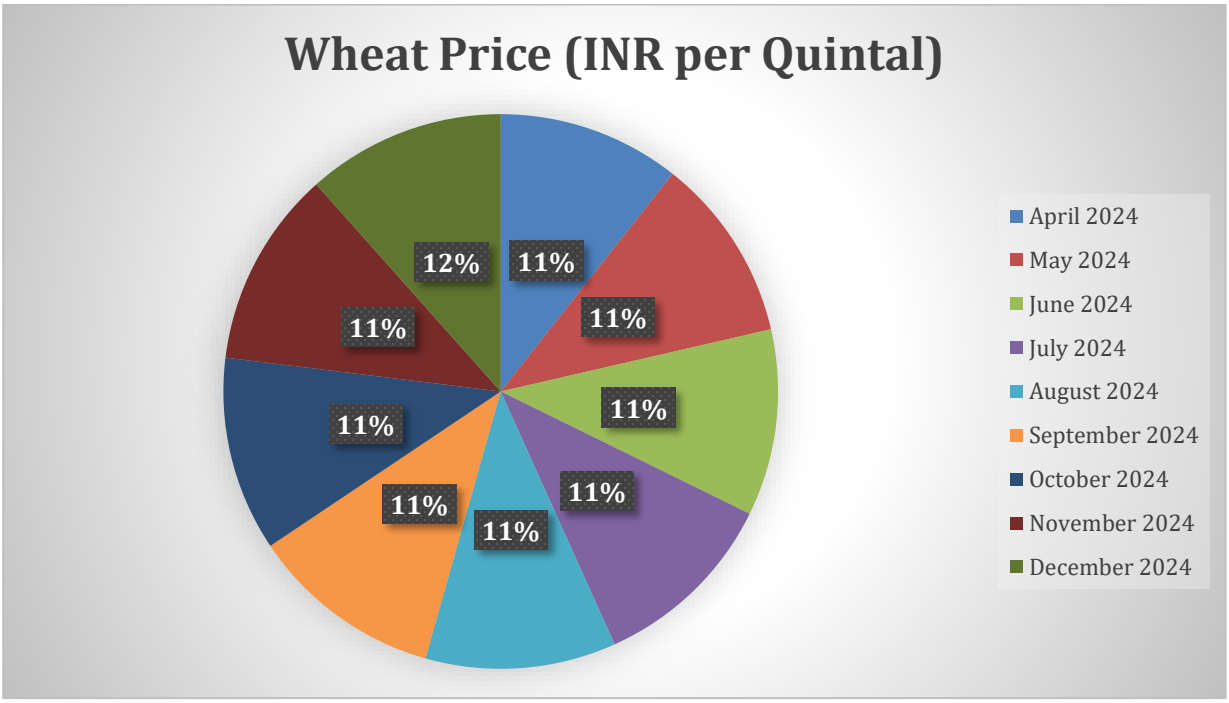

Table 2: Agri Commodity Prices

The industrial domain also suffered because of insufficiently allocated resources to deal with risks. In the steel sector, for instance, Tata Steel and JSW Steel experienced soaring prices for iron ore and were thus struck with high costs to produce steel. The government's participation was important in managing risks (Garg et al. 2023). SEBI conducts traders' education programs to train them about the derivatives market. The Reserve Bank of India did open up access to commodity derivatives for corporates, but it did not get much traction.

INSTRUMENT TYPE	SYMBOL	UNIT	EXPIRY DATE	OPTION TYPE	STRIKE	LTP	CHNG	%CHNG	OPEN	HIGH	LOW	VOLUME (Contracts)	VALUE (₹ Crores)	OPEN INTEREST (Contracts)	SPOT
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Call	7,000.00	**13.60**	-3.10	-18.56	15.40	15.60	12.60	9,832	1.41	131	6,284.00
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Call	6,950.00	**16.10**	-3.40	-17.44	16.10	18.20	15.80	7,658	1.26	-	6,284.00
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Call	7,500.00	**5.00**	-15.90	-76.08	5.40	5.90	5.00	7,036	0.39	-	6,284.00
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Call	6,850.00	**24.00**	1.00	4.35	24.00	24.70	23.80	5,540	1.34	-	6,284.00
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Put	5,550.00	**15.50**	-1.50	-8.82	14.70	15.50	14.50	4,568	0.68	-	6,284.00
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Put	6,200.00	**198.00**	80.60	68.65	127.00	207.40	122.60	4,403	6.92	126	6,284.00
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Put	5,000.00	**6.80**	1.10	19.30	5.90	8.00	5.00	4,310	0.27	2	6,284.00
Options on Futures	CRUDEOIL	100 Barrel	17-Mar-2025	Call	6,300.00	**104.70**	-72.60	-40.95	159.80	165.00	100.00	4,262	5.57	518	6,284.00

Figure 3: Crude oil Pricing trends
(Source: nseindia, 2025)

The above figure shows the recent pricing trend of crude oil as per NSE. Both exporters and importers faced difficulties concerning currency risks. Tata Motors and Maruti Suzuki, for example, had to incur additional costs because of a depreciating Rupee. The loss could have been mitigated through the use of currency financial instruments on the Bombay Stock Exchange BSE. Small traders were reluctant to employ these hedging options because of the complexities posed by the market (Mahadevan, 2021). This absence of adequate knowledge restricted them from locking in prices. The uncertainty associated with India's commodity markets can greatly benefit from proper derivatives trading. A successful increase in the use of options and futures can help companies control some of their business risks.

Regulatory Policies Had Mixed Effectiveness

Intervention by the government had a significant impact on the commodity markets of India. The MSP (minimum support prices) paid to farmers guaranteed their income but led to market inefficiencies (Das, 2020). Those restrictions benefited local consumers but came at the cost of lower export revenues for agribusinesses (Ramaul et al. 2024). Price ceilings for the most important commodities affected the market differently. To mitigate inflation, the government put a price cap on sugar which impacted the sugar mills like Bajaj Hindusthan and Balrampur Chini by reducing their profits. Conversely, consumers gained from low inflation as sugar prices became constant. Price controls on energy and fertilizers aided industries but hurt the fiscal position of the government. Farmers were able to utilize subsidized fertilizers to lower production costs which positively affected companies like Rashtriya Chemicals and Fertilizers.

Month	Steel Price (INR per Metric Ton)
April 2024	63500
May 2024	64000
June 2024	64550
July 2024	65000
August 2024	65500
September 2024	66000
October 2024	66550
November 2024	67000
December 2024	67500

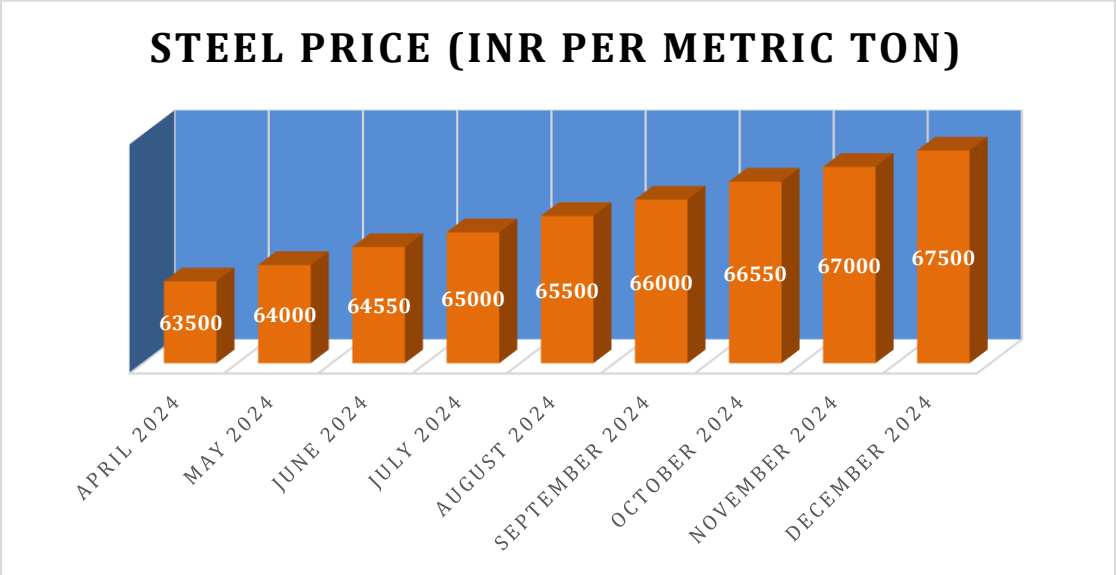

Table 3: Annual Inflation Rate in India (2024-2025)

The government's controls over fuel prices had a direct impact on oil marketers, particularly, Indian Oil and Bharat Petroleum. These companies incurred losses when prices of crude oil escalated because they had to sell at a regulated and controlled lower price. Import restrictions had repercussions on the industrial sector. The government raised the import tariff for steel for the sake of protecting local manufacturers. Domestic firms such as Tata Steel and JSW Steel gained from reduced competition from imports (Lakhina and Didwania, 2022). On the other hand, automobile producers like Maruti Suzuki were adversely affected on account of higher expenses due to costly materials. These policies managed to foster regulatory stability and economic growth simultaneously, however, they stayed out of the balance under benign intervention which severely distorted the market. It is a widely held belief that proper institutional reforms will improve the efficiency of the commodity market in the long run.

Technology Improved Risk Management Efficiency

Risk management in India's commodity markets underwent revolutionary changes with the advent of technology. Digital trading platforms increased the clarity of prices and safeguarded against trading risks. The National Commodity and Derivatives Exchange (NCDEX) and Multi Commodity Exchange (MCX) made it possible for traders to monitor the prices of commodities in real-time. Farmers and traders now had access to market data without having to rely on middlemen (Kumarathunga et al. 2022).

Risk Reduction Efficiency Formula

$$R_{new}=R_{old}\times(1-E_t)$$

Where,
$R_{new=}$ Risk after implementing technology
$R_{old=}$ Initial risk exposure before technology adoption
$E_{t=}$ Efficiency improvement due to technology (as a decimal)
If a commodity trading firm has an **initial risk exposure** of **₹10 million**, and **AI-based predictive analytics** improve risk efficiency by **30%** (E_t=0.30E_t = 0.30):

$$R_{new}=10{,}000{,}000\times(1-0.30)=7{,}000{,}000$$

Consequently, this shows that the new exposure to risk is improved to ₹7 million.
Thus, portraying efficient management of risk. This formula shows how risk is reduced due to the use of technology in financial markets, more so in commodity markets.

The Agricultural Market Information System (AGMARKNET) made it possible for farmers to access prices at any given moment (Joshi, 2023). The Electronic National Agriculture Market (e-NAM) facilitated a single market for reasonable pricing of products. Algorithmic trading reduced the existing market risks. With MCX and NCDEX now offering high-frequency trading (HFT) platforms, data-driven trades can be executed instantly. This greatly reduced the chances of human errors or volatility. The efficiency of the supply chain is felt through improved IoT-enabled monitoring. Companies such as Mahindra Agri were able to decrease post-harvest losses through the usage of IoT sensors in crops to monitor conditions.

Name	Month	Last	High	Low	Chg.	Chg. %	Time
NCDEX Coriander	Apr 25	8,242.00	8,300.00	8,214.00	-40.00	-0.48%	21/02
NCDEX Guar Gum	Mar 25	10,099.00	10,110.00	10,030.00	+67.00	+0.67%	21/02
Gold	Apr 25	2,953.20	2,964.70	2,930.10	-2.90	-0.10%	22/02
Silver	Mar 25	33.012	33.540	32.810	-0.474	-1.40%	22/02
Copper	Mar 25	4.5600	4.6150	4.5330	-0.0520	-1.08%	22/02
Platinum	Apr 25	987.70	1,003.80	982.50	-9.50	-0.95%	22/02
Palladium	Mar 25	990.90	1,008.00	981.00	-17.30	-1.72%	22/02
Crude Oil WTI	Apr 25	70.22	72.55	70.00	-2.26	-3.12%	22/02
Brent Oil	Apr 25	74.43	76.75	74.21	-2.05	-2.68%	22/02
Natural Gas	Mar 25	4.234	4.444	4.148	+0.082	+1.93%	22/02
Heating Oil	Mar 25	2.4323	2.5068	2.4308	-0.0711	-2.80%	22/02
Gasoline RBOB	Mar 25	2.0300	2.0800	2.0200	-0.0600	-2.88%	22/02
London Gas Oil	Mar 25	717.00	733.50	711.50	-17.75	-2.42%	22/02

Figure 4: Real Time Streaming of commodity prices
(Source: in.investing, 2025)

Storage incompetence was reduced through digital tracking within warehouses. The financial safety of commodities trading was improved by cybersecurity. HDFC and ICICI banks adopted the issuance of letters of credit through blockchain

technology to increase safe transactions (Ramu et al. 2024). This lowered the chances of fraud in the import and export of commodities. Market players needed to use data analysis to identify risks. Companies, traders, and policymakers successfully managed the impacts of price volatility using AI, blockchain, and automation tools. With increased digital adoption, India's commodity markets became more secure and operationally efficient.

Speculation Increased Short-Term Price Volatility

Month	Exchange Rate (INR/USD)
April 2024	82.5
May 2024	82.7
June 2024	82.9
July 2024	83
August 2024	83.2
September 2024	83.5
October 2024	83.7
November 2024	83.9
December 2024	84

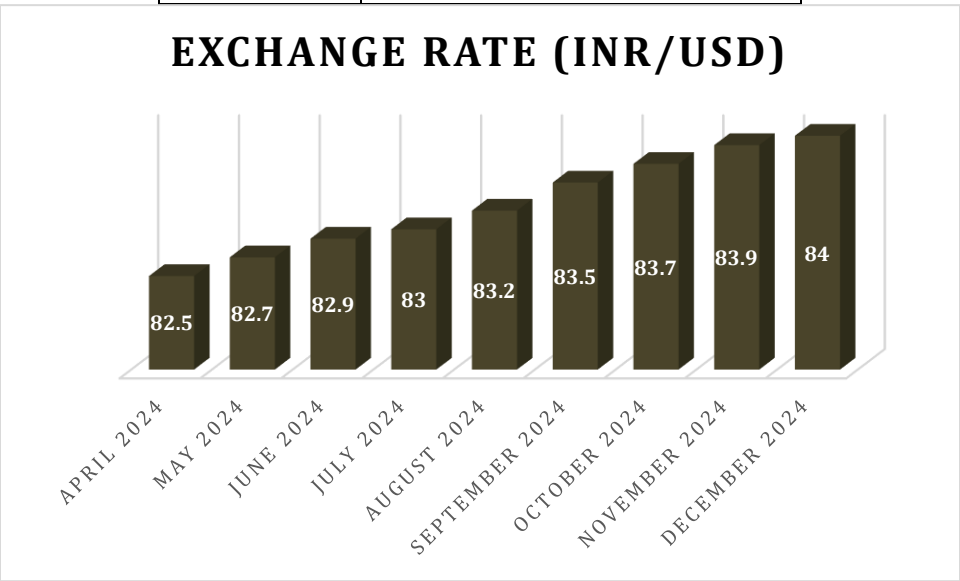

Table 4: Exchange Rates Increase

The sharp volatility in the commodity MSX and NCDEX index in India was due to excessive speculative trading. As crude oil prices rose due to speculation, Indian Oil and Reliance Industries saw their stock prices vastly impact in earnings. Agricultural goods got excessively volatile from excessive speculative trading. Soybean and wheat futures kept rising alongside ITC and Adani Wilmar.

Speculative Impact on Commodity Prices (Supply-Demand Distortion)

Speculation often inflates commodity prices beyond actual demand:

$P_{new}=P_{old}\times(1+\alpha S)$

Where:

P_{new} = Speculative price

P_{old}=Market-driven price

α= Speculation factor

S= % speculative trading

Application:

If crude oil price is ₹6,000 per barrel, and speculation is 20%:

P_{new}=6,000×(1+0.2)=7,200
Speculation inflates oil prices by ₹1,200 per barrel.

The government tried to restrict excessive speculative practices while setting up the needed still controllable environment. Position limits were enacted on traders by SEBI, suspending trading to try to smooth out disruptions. As is the reality, artificial speculation changed the true demand-supply proportion that used to exist. Risk controls that are presently necessary should minimize the volatility created.

Supply Chain Disruptions Affected Commodity Pricing

Month	Urea (INR per 50 kg bag)	DAP (INR per 50 kg bag)
April 2024	266	1350
May 2024	270	1360
June 2024	273	1375
July 2024	275	1385
August 2024	278	1400
September 2024	280	1415
October 2024	283	1430
November 2024	285	1445
December 2024	288	1460

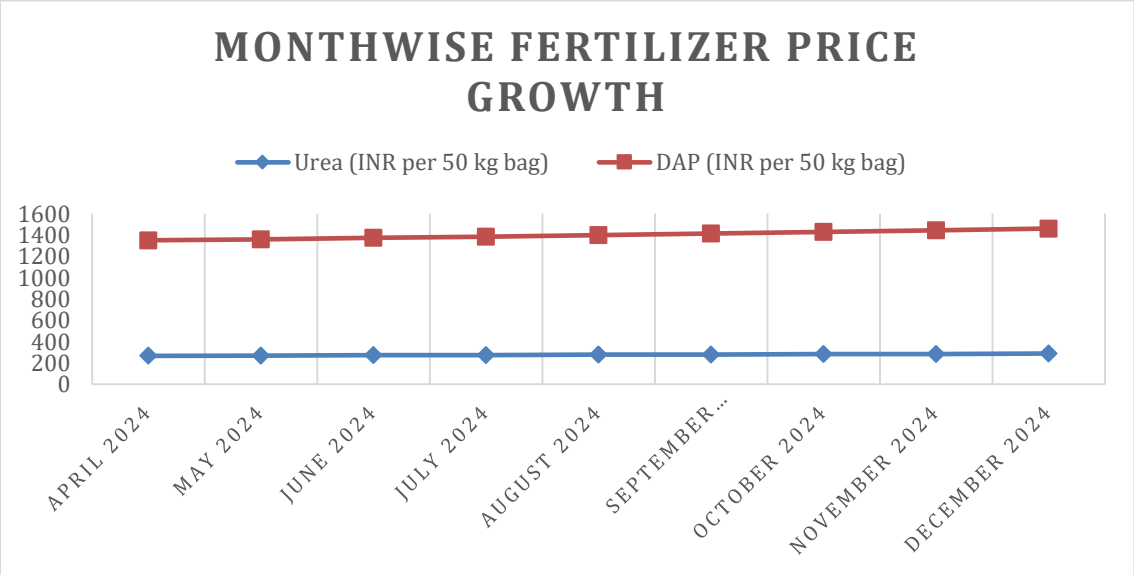

Table 5: Month wise fertilizer price growth

Disruptions in the supply chain due to COVID and other logistical restraints deviated from the prices that were commonly accepted in India's commodity markets. Bottlenecks led to extended delays in the delivery of goods. Truck movement for agriculture commodities ceased due to the lockdown inflicted at the height of COVID-19 in 2020 (Ghosh et al. 2020).

Discussion

The research evaluated the derivatives market's price fluctuation and threat handling in the commodity markets of India. There were several external and internal factors which affected the market. Commodity pricing were moderated by shifts in global demand, geopolitical events, and inflation. Tata Steel and Indian Oil experienced significant changes to their prices and costs and were unable to accommodate these changes. Traders' limited use of derivatives and hedging increased their financial exposure (Selvaraj, 2021). A majority of the companies were unable to manage their risks effectively with the

utilization of futures and options. Price fluctuations were major problems for Adani Wilmar and Bharat Petroleum. The policy environment had stabilizing and distortionary effects. Interventions from the government using minimum support prices and limit exports-controlled inflation but these measures increased market inefficiency. ITC and JSW Steel faced irregular and inconsistent policy exposure from the government. Advancements in technology positively impacted the efficiency of risk management. AI-powered analytics, blockchain, and digitalization improved market responsiveness. Better price mitigation ensured hands-off. NCDEX and MCX greatly helped traders by providing better options for price tracking (Bhaskar Krishnappa, 2022). Market mechanisms, on the other hand, would help promote long-term sustainability in India's commodity market (Pal and Garg, 2019). There was a lack of alignment between government policies, corporate practices, and technology development. More sophisticated trade policies, along with greater awareness and adoption of digital tools, could alleviate the price volatility. New infrastructure in the market could help attain this goal.

Conclusion

The analysis of risk mitigation and price volatility in the commodity markets in India was the focus of this research. global demand changes, speculation, and supply chain issues were some of the reasons that caused price changes. Low usage of financial derivatives and other hedging methods drew attention to the considerable risks traders faced. As a result of these policies, some degree of pricing stability was achieved, but prices were still subject to distortion. More advanced technologies led to greater transparency, but the rest of the market did not embrace it. The research was successful in meeting its goals, namely understanding the complexity of risk management. The results underscored the lack of financial knowledge and inefficient policies as problems which could be dealt with through stronger digitization. To increase the efficiency and stability of the market, these changes are necessary.

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