Library Progress International
Vol.44 No. 3, Jul-Dec 2024: P.9274-9280

Print version ISSN 0970 1052
Online version ISSN 2320 317X

Original Article

Available online at www.bpasjournals.com

Unveiling the Lead-Lag Relationship Among Metal Derivatives in the Multi Commodity Exchange (MCX) of India: A Comprehensive Analysis

Mr. Purna Prasad Arcot[1], Dr. B.Diwakar Naidu[2]

1Research Scholar, Reva Business School,Reva University,Bengaluru., India.
R20PMS01@som.reva.edu.in
[2]Professor, Reva Business School,Reva University, Bengaluru.,India
divakar.naidu@reva.edu.in

How to cite this article: Purna Prasad Arcot, B.Diwakar Naidu (2024) Unveiling the Lead-Lag Relationship Among Metal Derivatives in the Multi Commodity Exchange (MCX) of India: A Comprehensive Analysis. *Library Progress International,* 44(3), 9274-9280.

Abstract
This research paper delves into the substantial impact of commodity exchanges in India on the economy, specifically focusing on the areas of improved price discovery and the facilitation of systematic derivatives trading. Market participants, including hedgers and traders, effectively utilize futures contracts as strategic tools to control prices and capitalize on market volatility. Both agricultural and non-agricultural products are actively traded in the spot and futures markets, with metals emerging as the dominant category on the Multi Commodity Exchange (MCX). The process of price discovery within financial markets is a pivotal factor that ensures sustainable trading practices. Through an extensive study analyzing the relationship between spot and futures prices of seven metal derivatives traded on the MCX over a decade-long period, significant correlations have been identified across all cases.
Keywords: Lead-lag relationship, metal derivatives, Multi Commodity Exchange, MCX, futures prices, spot prices, ADF test, Johansen cointegration test, Granger causality test, stationarity, commodity markets.
Lead-lag relationship, Granger causality test:
JEL Code: C32 - Time-Series Models; Dynamic Quantile Regressions; Dynamic Treatment Effect Models; Diffusion Processes; State Space Models
Metal derivatives, Multi Commodity Exchange (MCX), Commodity markets:

JEL Code: G13 - Contingent Pricing; Futures Pricing; option pricing
Futures prices, Spot prices, ADF test, Stationarity:
JEL Code: C58 - Financial Econometrics
Johansen co-integration test:
JEL Code: C32 - Time-Series Models; Dynamic Quantile Regressions; Dynamic Treatment Effect Models; Diffusion Processes; State Space Models

Introduction:

The emergence of Commodity Futures trading in India in 2002 has witnessed exceptional growth, attracting considerable research attention aimed at comprehending the efficacy of these markets. Commodity markets encompass a diverse range of participants, including hedgers seeking protection against price fluctuations and speculators aiming to profit from market dynamics without physical deliveries. This study aims to explore the evolution of commodity trading since its inception, while also addressing the initial challenges encountered due to inadequate standard operating procedures. Notably, the Indian commodity market is characterized by physical markets known as the "Spot Market" or "Cash Market," which function through contractual agreements between buyers and sellers for the exchange of products with cash settlements. The market primarily encompasses agricultural commodities, energy, gas, and metals, with metal derivatives standing as a distinct niche market primarily driven by hedgers. The two prominent exchanges, namely the National Commodity and Derivatives

Exchange (NCDEX) and the Multi Commodity Exchange (MCX), play pivotal roles in facilitating high trading volumes. While the NCDEX focuses on agricultural commodities, the MCX specializes in non-agricultural products such as metals, energy, and gas. Over the past two decades, the commodity derivatives sector has witnessed significant transformations, including endeavors to improve market education, adopt advanced technologies, and enhance operational efficiency.

Introduction to MCX

The Multi Commodity Exchange of India Limited (MCX) is India's first listed exchange, providing a state-of-the-art platform for online trading of commodity derivatives transactions. Established in November 2003, the MCX operates under the regulatory framework of the Securities and Exchange Board of India (SEBI) to ensure compliance and market integrity. The exchange plays a crucial role in facilitating efficient price discovery and effective risk management in the commodity derivatives market. It offers a diverse range of metals for trading, categorized into bullion metals and base metals. Bullion metals include highly valued precious metals like gold, silver, and platinum, while base metals encompass essential industrial metals such as aluminum, iron, Brassphy, tin, copper, lead, nickel, steel, and zinc. The MCX's comprehensive offerings in metal derivatives contribute significantly to the development and growth of the Indian commodity market. This study is the first of its kind in the Indian metal derivatives segment which included all the metals for the last 10 years. This paper covers the niche segment of Indian commodity markets.

Review of Literature:

The Indian commodities market has witnessed significant growth, but price volatility in agricultural commodities remains a concern due to factors like demand-supply dynamics and weather conditions. Further liberalization of the sector is necessary to sustain this growth (Hariharan & Reddy, 2018). Raising awareness among farmers and traders about commodity futures is crucial for hedging and financial gains, and there is untapped potential for commodity exchanges to expand their market coverage. A study on spot and futures prices of agricultural commodities found co-integration with crude oil, foreign exchange rates, and the Sensex index during most break periods. The futures market played a leading role in price discovery and information processing. Breaks in commodity prices were attributed to demand-supply fundamentals and the 2007 global financial turmoil. The influence of exchange rates, Sensex, and crude oil on agriculture prices varied in different sub-periods (Bodhanwala, Purohit, & Choudhary, 2018).Volatility exists in commodity markets, but no specific trend pattern has been identified. However, the volatility in spot and futures markets generally exhibits a similar pattern, indicating an association between the two markets in India. This association positively affects market efficiency (Chakraborty & Das, 2015).The suitability of the GARCH formulation for Indian commodity markets has been questioned, suggesting the need for more sophisticated models. Trading volume significantly impacts volatility, while inflation exclusively affects crude oil price volatility (Dash, 2019).Investors have obtained reasonable returns from commodity investments in recent years. To make informed investment decisions, careful monitoring of market prices, economic conditions, returns, and associated risks is essential (Periasamy & Satish, 2014).Price discovery intensity varies across different agricultural products, emphasizing the need for in-depth exploration and appropriate assumptions (Ali & Gupta, 2011).Outdated laws governing agricultural marketing and price discovery hinder the agricultural sector, leading to low price realization for farmers. Farmer participation in national-level commodity exchanges offering derivative contracts has been limited. Initiatives like e-Choupal by ITC-Agri Business Division assist farmers in price discovery and hedging on exchange platforms (Rajib, 2014).The organized commodity derivative market in India has experienced significant growth since its inception in 2000. However, the total trade value declined in later years. Analyzing trends and progress in national commodity exchanges and comparing trade values for selected agricultural commodities is necessary. The commodity futures market exhibited a Compound Annual Growth Rate (CAGR) of 73.18% over eight years (2004–2011), but declined to 37.99% (2004–2015) (Bansal & Kaur, 2017).Efficiency in futures markets implies that futures prices incorporate all available information, reflecting the expected future spot price along with a risk premium (Kumar & Pandey, 2013). Studies have shown a cointegrating relationship between futures prices and spot prices for all commodities, indicating market efficiency (Sahoo & Kumar, 2009). Equilibrium adjustment is observed to be quicker when futures prices exceed spot prices for non-ferrous metals, suggesting investor preference for commodities due to perceived consumption value (McMillan, 2006). Despite efforts to attract investors, the trading volume in the Indian commodities market remains low, highlighting the need for awareness, education, and regulatory guidelines (Vikas, Sarma, & Srinivas, 2018). Research focuses on analyzing the impact of commodity futures markets on reducing volatility in the Indian spot market for rice, potato, wheat, and masoor grain, employing a GARCH model (Chakrabarty & Sarkar, 2010). Derivative pricing is closely linked to social costs, emphasizing the importance of effective management frameworks (Gevorkyan & Gevorkyan, 2012). Non-energy metal and agricultural commodities exhibit spillover effects (Shruthi & Ramani, 2020). While some domestic markets, such as gram, edible oils, and oilcake, demonstrate integration, rice markets remain regulated and disconnected from international markets. Persistence profile analysis assesses the degree of integration (Shekar, 2011). Herding behavior is observed in commodity markets of China, Indonesia, and the USA, while anti-herding behavior is evident in the markets of India, Malaysia, Taiwan, and the UK. The Japanese market exhibits higher information efficiency without herding or anti-herding (Kumar, Badhani, Bouri, & Saeed, 2020). The growth in commodities trading can be attributed to perceived risks in stock and debt markets, as well as the use of commodities as hedging tools. Banks and over-the-counter trading initially dominated, followed by the establishment of exchange-based trading (Basu & Gavin, 2011). Volatility increases in stock and derivatives markets as expiration dates approach, placing greater pressure on cash markets (Meyer, Estrin, Bhaumik, & Peng, 2009). Understanding behavioral finance can enhance rational investment decision-making (Agnew, 2006).The Indian commodity markets have been praised by economists for their role in price discovery and risk transfer through futures exchanges. However, policy makers express concerns about the impact of futures trading on the prices of essential food staples. A research article revisited the issue of price discovery in Indian commodity markets and evaluated the contribution of spot and futures markets in the price stabilization process, as well as the convergence of spot and futures prices for six major commodities (Iyer & Pillai, 2010).Transparent and fair price discovery is crucial for participants in the commodity market value chain to gain a competitive advantage. It is the outcome of interactions among buyers and sellers, taking into account market forces of supply and demand, as well as factors such as transaction size, cost, and location. Price discovery also plays a role in stabilizing spot price volatility (Vijayakumar, 2021).Commodity derivatives in India have seen slower growth compared to equity derivatives, partly due to a lack of complete understanding among investors. Awareness of equity products is higher, leading to their greater popularity. However, there is ample room for growth in commodity derivatives. The global equity market is identified as a factor affecting the commodity market, as commodities are increasingly treated as an asset class. This shift has led to funds from the equity market moving into commodities during times of market downturns. Therefore, understanding the relationship between equity and commodity markets in India is important (Dubey & Shankar, 2020).To reduce the concentration of silver imports at a few centers, it is suggested to extend importing centers to additional locations such as Chennai, Hyderabad, and Kolkata. Additionally, there is a need for Karvy Trade Ltd. to investigate and address the issue of customer attrition within 1-2 years to retain more customers (Aryasri & Krishna, 2014).In the case of aluminum, there is a bi-directional causality between Futures and Spot prices. However, in the short run, Futures returns have a greater impact on spot returns. In this context, Futures returns of aluminum lead spot returns, indicating unidirectional causality from futures to spot returns in the short term. The futures market demonstrates efficiency in discounting new information compared to the spot market (Arora & Kumar, 2013).A unique research work focused on understanding the effects of economic recession on the information efficiency of rubber contracts in the futures market (Nair, 2019).

Research Methodology:

Research Objectives:

The primary objectives of this research are as follows:

1. To analyze the volatility of metal derivatives in the Multi Commodity Exchange (MCX) over the past 10 years.
2. To examine the relationship between time and volume in Bullion Metal and Base Metal derivatives in the MCX over the past 10 years.
3. To investigate the lead-lag relationship between spot and futures prices of Metal derivatives in the MCX.

Data and Tools Used:

For this study, secondary data is collected from reliable sources, particularly from the MCX website, which is considered the authoritative source for metal derivatives. Econometric tests, including the Augmented Dickey-Fuller (ADF) test, Cointegration test, and Causality test, are employed to analyze the data. Microsoft Excel and EViews software are used for data analysis, particularly for examining time series data. Data spanning from 2003 to the present is collected to assess the transaction volumes and establish lead-lag relationships.

1. To analyze the volatility of metal derivatives in the Multi Commodity Exchange (MCX) over the past 10 years**.**

Standard deviations of seven metals of MCX for the period of Aug 2012 to Aug 2022 (10 Years) are calculated. The results reveal the most volatile metal is silver and Lead is the least.

2. To examine the relationship between time and volume in Bullion Metal and Base Metal derivatives in the MCX (India) over the past 10 years.

The data shows the contracts and value of metal derivatives traded in MCX for the last 10 years. Platinum is not traded from 2013 onwards because of low demand in the market from traders and hedgers. Bullion metals are traded more than non-bullion metals. Data also reveals that markets are not consistent and variations are seen more in the bullion segment than the other.

3. To investigate the lead-lag relationship between spot and futures prices of Metal derivatives in the MCX.

There are seven metals that are actively traded in the MCX. Analysis of 10 Years (2012-2022) of historical data is as follows.

ADF Test Results:

Aluminium:

Futures and spot prices of aluminium are nonstationary at the level but become stationary at the first difference. The null hypothesis of a unit root in both futures and spot prices is rejected.

Lead:

Futures and spot prices of lead are nonstationary at the level but become stationary at the first difference. The null hypothesis of a unit root in both futures and spot prices is rejected.

Nickel:

Futures and spot prices of nickel are nonstationary at the level but become stationary at the first difference. The null hypothesis of a unit root in both futures and spot prices is rejected.

Zinc:

Futures and spot prices of zinc are nonstationary at the level but become stationary at the first difference. The null hypothesis of a unit root in both futures and spot prices is rejected.

Gold:

Futures and spot prices of gold are nonstationary at the level but become stationary at the first difference. The null hypothesis of a unit root in both futures and spot prices is rejected.

Silver:

Futures and spot prices of silver are nonstationary at the level but become stationary at the first difference. The null hypothesis of a unit root in both futures and spot prices is rejected.

Johansen Cointegration Test Results:

Aluminium:

There is at most one cointegration equation at the 0.05 level.

Lead:

There is at most one cointegration equation at the 0.05 level.

Nickel:

There is at most one cointegration equation at the 0.05 level.

Zinc:

There is at most one cointegration equation at the 0.05 level.

Gold:

There is at most one cointegration equation at the 0.05 level.

Silver:

There is at most one cointegration equation at the 0.05 level.

Granger Causality Test Results:

Aluminium:

Futures prices of aluminium lead to spot prices.

Lead:

Futures prices of lead lead to spot prices.

Nickel:

Futures prices of nickel lead to spot prices.

Zinc:

Futures prices of zinc lead to spot prices.
Gold:
Futures prices of gold lead to spot prices.
Silver:
Futures prices of silver lead to spot prices.
In summary, for all the metals (aluminium, lead, nickel, zinc, gold, and silver), the ADF tests indicate that both futures and spot prices become stationary at the first difference. The Johansen cointegration test suggests the presence of at most one cointegration equation for each metal. The Granger causality tests reveal that futures prices lead spot prices in all cases. These results provide insights into the stationarity, cointegration, and lead-lag relationships between futures and spot prices for each metal.

Results and Discussion:

To examine the unit root properties of the spot and future prices of the metals, the Augmented Dickey-Fuller (ADF) test was employed. The ADF test was conducted at both the level and first differentiation (log 1) for each series. The results indicate that all the series exhibit unit roots at the first differential level.
To investigate the presence of a long-term relationship between spot and future prices of the metals, a cointegration analysis was performed. Cointegration analysis helps determine whether spot and futures prices are linked in the long run. The Johansen maximum likelihood test procedure was employed for cointegration analysis, considering both the trace value and max eigenvalue. The analysis of Johansen's cointegration results provides evidence of a long-term relationship between spot and future prices of the metals under consideration.
Subsequently, the Vector Error Correction Model (VECM) and Granger causality tests were conducted, assuming the existence of cointegration. VECM is commonly used for forecasting interrelated time series and analyzing the dynamic impact of random disturbances on variables. The optimal lag length was determined using the Schwarz Information Criterion (SIC). Granger causality analysis was applied to examine the lead-lag relationship between the independent variable (futures price) and the dependent variable (spot prices). Based on the results, it can be concluded that metal derivatives, although still considered a niche segment, exhibit significant volatility in commodity markets. The volumes of bullion metals tend to be higher compared to base metals. The study finds evidence of a relationship between future and spot prices in all segments of the metal derivatives traded in the MCX.
In summary, this research contributes to the understanding of metal derivatives in commodity markets by providing insights into their volatility, long-term relationships between spot and future prices.

References:

Acharya, S. S. (2001). Domestic agricultural marketing policies, incentives, and integration. Jaipur: Rawat Publications.

Ali, J., & Gupta, K. B. (2011). Efficiency in agricultural commodity futures markets in India – Evidence from co-integration and causality tests. Agricultural Finance Review, 71(2), 162-178. https://doi.org/10.1108/00021461111152555

Anusakumar, S. V., Ali, R., & Hooy, C. W. (2017). The effect of investor sentiment on stock returns: The insight from emerging Asian Markets. Asian Academy of Management Journal of Accounting and Finance, 13, 159–178.

Arora, S., & Kumar, N. (2013). Role of futures market in price discovery. Decision, 40(3), 165-179. https://doi.org/10.1007/s40622-013-0019-8

Bai, J., & Perron, P. (1998). Estimating and testing linear models with multiple structural changes. Econometrica, 66(1), 47–78.

Bansal, A., & Kaur, S. (2017). Trading trends in Indian commodity exchanges with special reference to agricultural commodities. Int. J. Indian Culture and Business Management, 14(1), 94-108.

Bodhanwala, S., Purohit, H., & Choudhary, N. (2018). The causal dynamics in Indian agriculture commodity prices and macro-economic variables in the presence of a structural break. Global Business Review, 1-21.

https://doi.org/10.1177/0972150918800561

Brock, W., Davis, D., Scheinkman, J., & LeBaron, B. (1996). A test for independence based on the correlation dimension. Econometric Reviews, 15(3), 197–235.

Brown, G. W., & Cliff M. T. (2001). Investor sentiment and the near-term stock market. https://doi.org/10.2139/ssrn.282915

Chakrabarty, R., & Sarkar, A. (2010). Efficiency of the Indian commodity and stock market with focus on some agricultural products. Paradigm, 14(1), 85-96. https://doi.org/10.1177/0971890720100110

Dash, M. (2019). A study on commodity market behavior, price discovery, and its factors. Journal of Applied Management and Investments, 8(3), 125-134.

David G. McMillan (2005). Threshold adjustment in spot-futures metals prices, Applied Financial Economics Letters, 1(1), 5-8. DOI: 10.1080/1744654042000335912

Dickey, D., & Fuller, W. A. (1979). Distribution of estimators for autoregressive time series with a unit root. Journal of American Statistical Association, 74(366), 427–431.

Diks, C., & Panchenko, V. (2006). A new statistic and practical guidelines for nonparametric Granger causality testing. Journal of Economic Dynamics & Control, 30, 1647–1669.

Divya, U., & Jahan, N. F. (2017). A study on the volatility of non-agricultural commodity prices with respect to BSE Sensex. ISBR Management Journal, 2(1).
Dubey, P., & Shankar, R. (2020). Determinants of the commodity futures market performance: An Indian perspective. South Asia Economic Journal, 1–19. https://doi.org/10.1177/1391561420970837

Easwaran, R. S., & Ramasundaram, P. (2008). Whether commodity futures market in agriculture is efficient in price discovery? An econometric analysis. Agricultural Economics Research Review, 21, 337-344.

Engle, R. F., & Granger, C. W. J. (1987). Cointegration and error correction representation, estimation, and testing. Econometrica, 55, 391-407.

Gujarati, D. (2004). Basic econometrics (4th ed.). New Delhi: The McGraw-Hill.

Hariharan, R., & Reddy, B. A. K. (2018). A study on Indian commodity market with special reference to commodity exchange. International Journal of Research Science & Management, 5(6). https://doi.org/10.5281/zenodo.1285539

Iyer, V., & Pillai, A. (2010). Price discovery and convergence in the Indian commodities market. Indian Growth and Development Review, 3(1), 53-61. https://doi.org/10.1108/17538251011035873

Joarder, S., & Mukherjee, D. (2019). The lead-lag relationship between futures and spot price – A case of the oil and oilseed contracts traded on Indian exchange. Arthaniti-Journal of Economic Theory and Practice, 1-27. https://doi.org/10.1177/0976747919842689

Johansen, S. (1988). Statistical analysis of cointegrating vectors. Journal of Economic Dynamics and Control, 12(2-3), 231-254.

Kellard, N., Newbold, P., Rayner, T., & Ennew, C. (1999). The relative efficiency of commodity futures markets. The Journal of Futures Markets, 19, 413-432.

Kumar, B., & Pandey, A. (2013). Market efficiency in Indian commodity futures markets. Journal of Indian Business Research, 5(2), 101-121. https://doi.org/10.1108/17554191311320773

Mukherjee, K. N. (2011). Impact of futures trading on Indian agricultural commodity market. SSRN Electronic Journal. http://dx.doi.org/10.2139/ssrn.1763910

Naik, P. K., & Padhi, P. (2016). Investor sentiment, stock market returns, and volatility: Evidence from National Stock Exchange of India. International Journal of Management Practice, 9(3), 213–237.

Oprea, D. S., & Brad, L. (2014). Investor sentiment and stock returns: Evidence from Romania. International Journal of Academic Research in Accounting, Finance and Management Sciences, 4, 19–25.

Periasamy, P., & Satish, R. (2014). A study on commodity derivative market of selected non-agricultural products (Gold, Crude Oil, Copper) in the Chennai market- An analysis. IOSR Journal of Economics and Finance, 2(6), 38-44.

Rajib, P. (2015). Indian agricultural commodity derivatives market – In conversation with S Sivakumar, divisional chief executive, agribusiness division, ITC Ltd.

Sahadevan, K. G. (2002). The sagging agricultural commodity exchanges: Growth, constraints, and revival of policy options. Economic and Political Weekly, 37(30), 3153-3160.

Sahoo, P., & Kumar, R. (2009). Efficiency and futures trading – Price nexus in Indian commodity futures markets. Global Business Review, 10(2), 187-201. https://doi.org/10.1177/097215090901000204

Saji, T. G. (2019). Recession effect in pricing efficiency of rubber futures: The emerging markets experience. Journal of Agribusiness in Developing and Emerging Economies, 9(5), 503-519. https://doi.org/10.1108/JADEE-06-2018-0075.

Singh, J. P. (2001). Strategy for effective agricultural marketing extension to meet the challenges in the 21st century. Manage Extension Research Review, 1-8.

Vijayakumar, A. N. (2021). Price discovery and market efficiency of cardamom in India. Vilakshan - XIMB Journal of Management. https://doi.org/10.1108/XJM-11-2020-0215

Vikas, P. V., Sarma, S. B. P., & Srinivas, K. (2018). Indian commodity market: Need for awareness and education. International Journal of Engineering Technology Science and Research, 5(1).

Tables:

Table 1: Standard deviations of Metals of MCX

Sl. No	Metal	Std deviation
1	Silver	712
2	Gold	275
3	Nickel	55.26
4	Copper	6.4
5	zinc	2.63
6	Aluminum	2.24
7	Lead	1.9

Table 2: Data about contracts and value traded in metal derivatives in MCX for the last 10 years

	Gold		**Silver**		**Platinum**	
Year	Contracts	Value (Lacs)	Contracts	Value (Lacs)	Contracts	Value (Lacs)
2011	79408721	384272533.00	118104250	566692906.81	210	1325.36
2012	75926303	374309009.79	105024124	431525427.83	21	139.66
2013	47506628	303559670.15	65641962	240373132.03	NA	NA
2014	12876326	124716486.41	35897523	100562625.93	NA	NA
2015	11699801	116926687.34	31921236	87054715.94	NA	NA
2016	13095302	137738139.92	28611450	92167969.79	NA	NA
2017	6860535	74600029.65	20870577	62747255.25	NA	NA
2018	6478032	77703447.37	21823588	63782957.12	NA	NA
2019	11073253	147205500.47	29303637	93901280.13	NA	NA
2020	26822018	221711657.90	78054045	222637522.66	NA	NA
2021	23728020	135119863.79	64815685	162280446.81	NA	NA
2022	14721493	106208665.91	61722237	135650047.11	NA	NA

*NA-Not Available

	Copper		**Aluminium**		**Zinc**		**Lead**	
Year	Contracts	Value (Lacs)	Contracts	Value (Lacs)	Contracts	Value (Lacs)	Contracts	Value (Lacs)
2011	34454484	139193835.39	3230132	10584332.99	14901936	38087100.65	11654393	34569646.59
2012	50735051	158011796.33	7198805	19941160.23	14215371	37090539.43	17253283	50201479.14
2013	32019257	97072236.67	6396189	17847127.36	11558701	32294549.98	16739733	54080109.49
2014	12565434	35517908.40	5486369	15599668.42	6881519	23916251.36	6856703	23045528.50
2015	19278734	46190482.42	5784403	15647376.65	10391213	35170388.93	8462893	26150636.30
2016	19286707	43096434.68	4968279	13384053.79	15134303	57785625.37	9697814	32319541.63
2017	16689665	44553154.73	5499961	16668215.64	15040967	74195975.80	10198580	38475304.13
2018	21557359	61823889.90	8258006	29602793.36	17435052	88999540.70	11148399	41458101.01
2019	11672814	48953279.24	3923099	11382603.22	13144554	63309511.28	6892623	24403530.05
2020	4204615	51280635.98	1289245	3906376.79	6183239	24504859.82	2120309	6753709.54
2021	4090296	72849885.77	1161693	11817910.67	1835113	21879737.56	791262	6882237.48
2022	2743434	48523458.64	1556795	17738741.86	1278651	19142366.07	317793	2894392.06

Note: Value in Rs (Indian Currency)