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A comparative study of stock and commodity markets in India

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Abstract
India has one of the oldest stock exchanges in Asia. There have been many structural changes in its stock markets. To have pace with world, it has modified the trading at the stock exchanges. Commodity exchanges are also doing good in India. Present study has been undertaken with the objective of comparing the trading on two exchanges in India namely Bombay Stock Exchange and Multi commodity Exchange of India Ltd. For the purpose of study, monthly data for 16 financial years from April 2007 to March 2023 has been analysed. Results of the study show that trading data on both the exchanges is not normally distributed. Both the trading data is auto correlated but in case of Bombay Stock Exchange there is some indication of monthly pattern in data whereas it is not visible in Multi Commodity Exchange data.

Keywords: Arbitrage, autocorrelation, commodity derivatives, pattern in data, stock exchanges

1. Introduction

Presently India has seven exchanges recognised by Securities and Exchange Board of India. Six of these have been given permanent recognition. Two of the recognised exchanges, Calcutta Stock Exchange Ltd. and Indian Commodity Exchange Ltd. are not working actively. Recognition of Metropolitan Stock Exchange of India Ltd. is up to 15th September 2023. Out of the remaining four, two Multi Commodity Exchange of India Ltd. and National Commodity & Derivatives Exchange Ltd. trade only in commodity derivatives and other two Bombay Stock Exchange Ltd. and National Stock Exchange of India Ltd. have many trading segments including commodity derivative segment. Until September 2015, commodity exchanges in India were regulated by Forward Market Commission but from 28th September 2015 these are regulated by Securities and Exchange Board of India.

Bombay Stock Exchange, popularly known as BSE, is Asia's oldest stock exchange. It was formed during July 1875 as The Native Share & Stock Broker's Association. During August 1957, it became India's first recognised stock exchange as it was granted permanent recognition under Securities Contract (Regulation) Act 1956. During March 1995, it started trading through its online trading system BSE On-Line Trading (BOLT) system. In August 2005, it was incorporated as a Limited Company. During its journey, it achieved many milestones. Its 30-company index, SENSEX launched during 1986 is India's first equity index. It is looked as barometer of Indian Economy. National Stock Exchange of India Ltd. was incorporated in 1992 and recognised in 1993. It started its operations in 1994. It is one of the largest exchanges. It was the first exchange in India to start online trading.

Multi Commodity Exchange of India Limited, popularly known as MCX, is India's largest commodity derivative exchange. It was incorporated in 2002 and started operations during November 2003. Under the commodity derivative segment, it has launched many futures and option contracts. Its products range include indices, bullion, base metals, and energy and agri commodities. Under each range many contracts are actively traded. Other commodity derivative exchange is National Commodity & Derivatives Exchange ltd. it was incorporated in 2003 and started its operations in the same year. Like spot stock trading there is no organised spot trading exchange for commodities in India.

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Objective of the Study: Present study has been undertaken with the objective of comparing the trading on two exchanges namely Bombay Stock Exchange and Multi Commodity Exchange of India Ltd.

Period of Study and Source of data: Data for the present study has been collected from official websites of BSE and MCX. Monthly data for 16 financial years from April 2007 to March 2023 has been analysed.

Bombay Stock Exchange has so many segments for trading like equity, equity derivatives, indices, currency derivatives, interest rate derivatives, debt, mutual funds, commodity derivatives whereas in Multi Commodity Exchange of India Ltd. only commodity derivatives are traded, still it represents commodity derivates market by having launched many contracts with various maturity periods. Graph 1 represents the trading data for number of trades at Bombay Stock Exchange from April 2007 to March 2023.

Source of Data: Official website of Bombay Stock Exchange: https://www.bseindia.com/
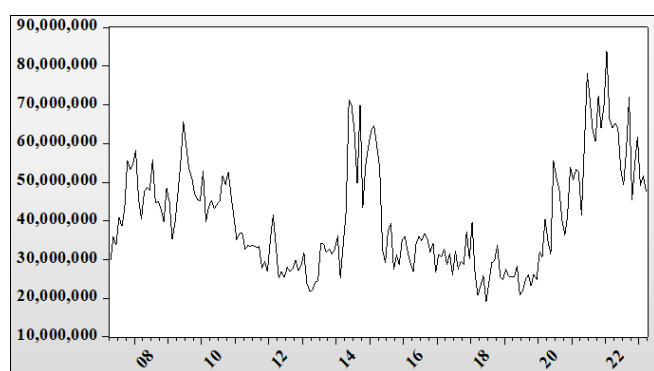
Graph 1: Bombay stock exchange number of trades

If we observe the graph, no particular trend is visible in the data but a sudden increase in the number of trades is observed during 2014 which was back in track during 2015. From 2019 to 2021 an increasing trend is observed and then a decreasing trend is visible.

Table 1: Descriptive Statistics of Number of Trades at Bombay Stock Exchange

Number of Trades at Bombay Stock Exchange	
Mean	40708174
Median	36571207
Maximum	83958016
Minimum	19117866
Std. Dev.	13817432
Skewness	0.737959
Kurtosis	2.767283
Jarque-Bera	17.85994
Probability	0.000132
Sum	7820000000
Observations	192

Source of Data: Official website of Bombay Stock Exchange: https://www.bseindia.com/

By observing the table, it can be said that the data is positively skewed, the value of kurtosis is near to 3 and the data is not normally distributed. Normality result is based on the p value of Jarque-Bera test. Null hypothesis for Jarque Bera test is that the distribution is normal and on the basis of p value less than 0.05, null hypothesis of normal distribution can be rejected at 5% level of significance.

Because the data under study is a time series data, we should also check for he autocorrelation in the data. Autocorrelation is the correlation of a variable with its own lags, this may be checked with the help of correlogram. Correlogram shows the value of Auto correlation and partial auto correlation. Partial Autocorrelation tells about the correlation of a variable with its particular lag by controlling the effect of other previous lags. Value of Autocorrelation and partial autocorrelation is always same for lag one as there is no previous lag/s for lag one but the values of autocorrelation and partial autocorrelation for other lags are different due to presence of in between lags.
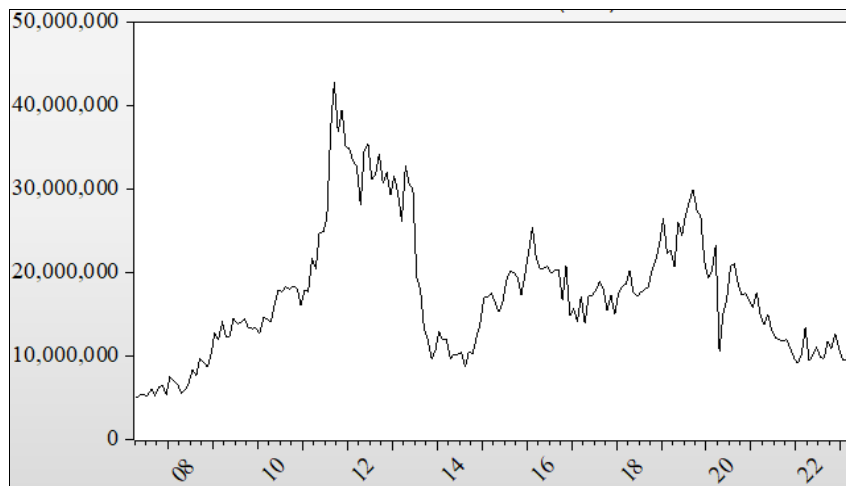

Source of data: Official website of Bombay Stock Exchange: https://www.bseindia.com/
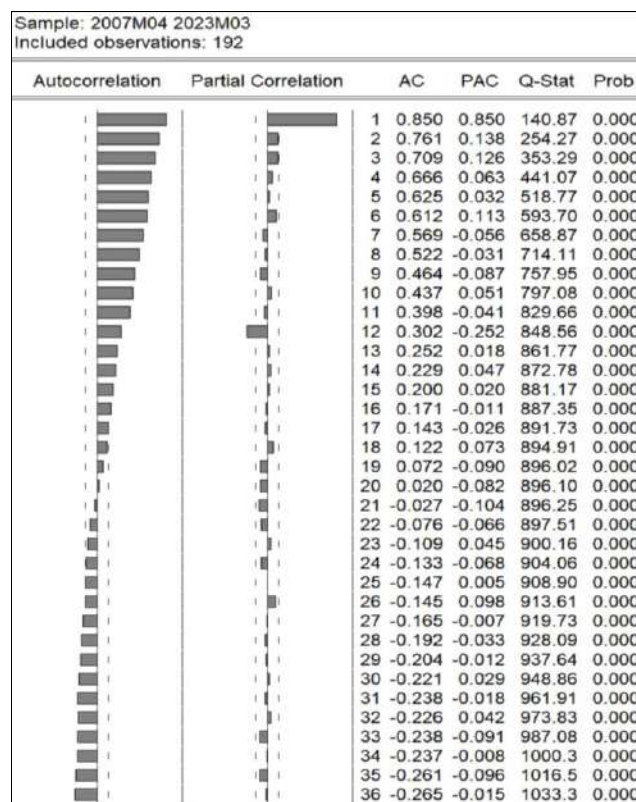
Graph 2: Correlogram of Number of Trades at Bombay Stock Exchange

On the basis of p value less than 0.05, it can be said that the variable is auto correlated. i.e. previous lags of the variable are important in forecasting the variable. Values of PAC, i.e., partial autocorrelation are sometimes positive and sometimes negative showing that the variable is positively correlated at some lags and negatively correlated at other lags. Graph shows that partial correlation is significant at 1st lag and at lag 12 (Bar for these lags are crossing the dotted line). As the data under study is monthly data, significant partial autocorrelation at lag 12 may be expected.

For Multi Commodity Exchange of India ltd. only the futures data has been considered because options were lately allowed on the exchange to be traded. Graph 3 shows the traded contract (lots) at multi commodity exchange of India ltd.

A look on the graph shows that there was a downward trend during 2013. Till 2011, in was on increasing trend and from 2014, no particular trend is observed in the data. Table 2 shows the descriptive statistics of lots of traded contracts on Multi Commodity Exchange of India ltd.

Source of Data: Official website of Multi Commodity Exchange of India Ltd. https://www.mcxindia.com/

Graph 3: Multi commodity exchange of India ltd. Traded contract (Lots)

Table 2: Traded contract (LOTS) on Multi Commodity Exchange of India Ltd.

Mean	17548680
Median	17104040
Maximum	42882649
Minimum	5112216
Std. Dev.	7840757
Skewness	0.801856
Kurtosis	3.288768
Jarque-Bera	21.24224
Probability	0.000024
Sum	3370000000
Observations	192

Source of Data: Official website of Multi Commodity Exchange of India Ltd. https://www.mcxindia.com/

Same like the trading data of Bombay Stock Exchange, trading data on Multi Commodity Exchange of India ltd. is also not normally distributed at 5% level of significance (p value of Jarque-Bera test is less than 0.05), it is positively skewed, the value of skewness is somewhat higher than that of value for Bombay Stock Exchange. Value of its kurtosis is also near to 3, but greater than that of value for Bombay Stock Exchange. Same like Bombay Stock Exchange, we also checked for autocorrelation in the data for Multi Commodity Exchange of India ltd. with the help of correlogram.
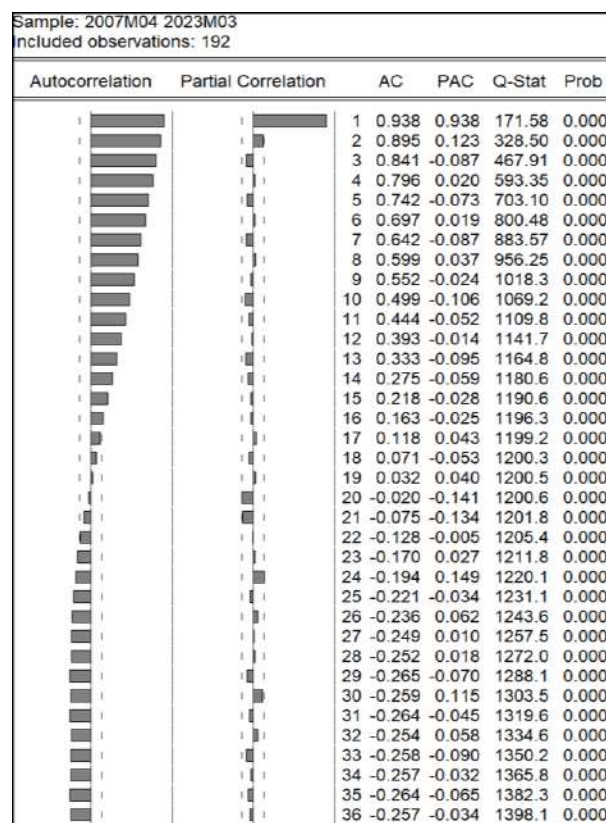

Source of Data: Official website of Multi Commodity Exchange of India Ltd. https://www.mcxindia.com/

Graph 4: Correlogram of traded contract (LOTS) on Multi Commodity Exchange of India Ltd.

Partial autocorrelation for trading data of Multi Commodity Exchange of India Ltd. is also significant for lag one, showing that lag one is important for forecasting the variable, but like the data for Bombay Stock Exchange it is not significant for lag 12, indicating that this variable is not showing any pattern for monthly data.
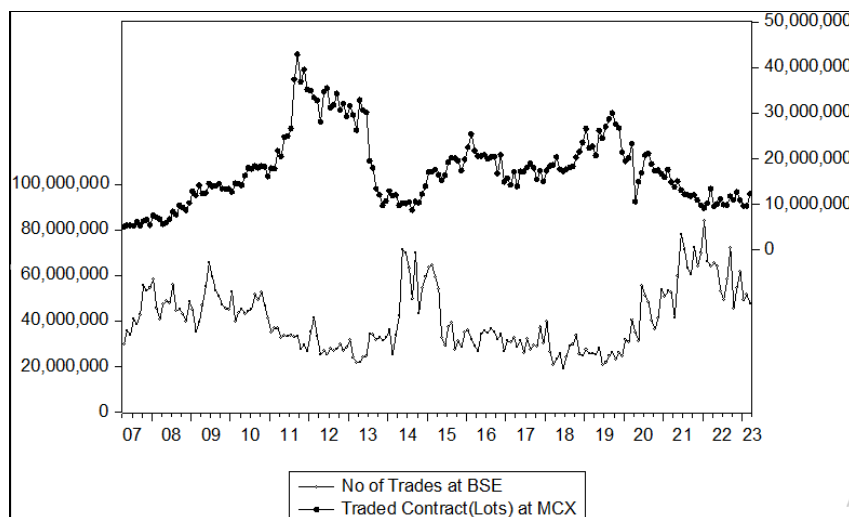
Graph 5: Trading at BSE and MCX

For better comparison, we plotted the two variables in one graph by changing the axis for MCX trading to right and keeping for BSE to left. While observing the common graph, it is visible that trading at both the exchanges have almost reverse trend, when trading at BSE was increasing, it was decreasing at MCX and when it was increasing at BSE, it was decreasing at MCX. Reason for the same may be arbitrage, i.e., investors withdraw money from one market and invest in the other market to earn riskless profit, the same has not been tested statistically in the present study and may be tested statistically by some other researcher. When we tried to find the details of commodity derivatives on Bombay Stock Exchange, we could find only two active contracts, one related to almond and other related to steel, we could not find futures contracts related to these two commodities on Multi Commodity Exchange of India Ltd. Under bullion head Multi Commodity Exchange has launched seven contracts namely, Gold, Gold mini, Gold Guinea, Gold Petal, Silver, Silver mini and Silver micro. While going through the contract specifications of steel contract at BSE and Gold contract at MCX, we observed the trading timings for these futures contract are different. For steel contract at BSE trading timings are 9 am to 9 pm and for gold futures contract at MCX trading timings are 9 am to 11.30/11.55 pm. Trading timings for equity at BSE are 9 am to 4 pm including pre-open and post-close sessions. It seems that for commodity derivative markets the timings are extended to incorporate the global trends. For cotton contract at MCX trading timings are observed to be 9 am to 9 pm. In brief, it can be said that major exchanges in India are working for catering the needs of various types of investors.

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