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Risk & return analysis of oil and gas sector of India: A study of BSE indices

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Abstract
The Oil and Gas industry of India is growing rapidly and playing an important role for the development of Indian economy. The sector meets more than two third of the total primary energy needs of the country. The Oil & Gas Sector has been actively involved in putting India on the world map. The oil and gas industry has rebounded strongly throughout 2021, with oil prices reaching their highest levels in six years. While the industry's recovery is better than expected, uncertainty remains over market dynamics in the coming year. The development of the Indian economy is greatly aided by the stock markets. In comparison to other industries, the Oil and Gas sector accounts for a significant portion of the Indian stock market. This study examines the risk-return relationship between the BSE Sensex and stocks in the oil and gas sector from 01st April 2017 to 31st March 2022. The present study has been conducted by taking return variables i.e. annual mean return, minimum and maximum. The standard deviation, variance and coefficient of variance were used as the measures of risk factors. This study investigates the correlation between risk and return of the BSE Sensex and Oil and Gas Sector stocks of BSE 30 i.e. Indian Oil Corporation, ONGC, Oil India Corporation Limited, Hindustan Petroleum Corporation Limited and Gas Authority of India Limited. The study is based on secondary data and the analysis was done for testing the presence or absence of risk and return of Oil and Gas Sector and for testing hypothesis, different statistical methods like correlation, regression, descriptive statistics and t-test have been employed.

Keywords: Risk and return, oil and gas sector, beta, BSE, stock market

Introduction
The Oil & Gas industry of India has been instrumental in fueling the rapid growth of the Indian economy. The Oil and Gas Industry has been actively involved in stimulating rapid growth of the Indian economy, comprised over 15 per cent of the GDP. The stock market is where financial securities used to be bought and sold. It is mostly because there is a high level of volatility; prices change frequently and are based on the supply and demand for stocks at any particular moment. In order to achieve their financial goals from their investments, buyers and sellers engage in trading on various financial assets on the stock market. Future uncertainties are a risk that all investors must accept when making stock market investments in order to receive the anticipated rewards (Chikashi Tsuji, 2014) [7]. Investments in the stock market therefore involve risk as well as reward. In order to achieve greater returns, investors have invested in the stock market. Researches are currently adopting effective methods to force excessive attention on the stock market, which is helpful for investors over traditional market analysis (Ansar Mahmood, 2014) [2].
Indian stock market has been totally changed after liberalization policy adopted by the country with the free flow of information. In last two decades, financial sector has been totally changed both the capital market and the money market. Since then, many investors evaluate their speculative occasion with the aid of various approaches in order to reduce their risk by appropriate announcement. Investors can estimate their risk and associated returns when evaluating their investment opportunities. Investors frequently watch index ups and downs to gauge the health of the stock market (Jagannathan, 2013, Naila, 2018, Patjoshi, 2016) [14, 28, 29]. The Oil and Gas sector in India is a critical component of the country's economy, accounting for 15 per cent of the country's gross domestic product (GDP). Economic growth is directly linked with energy demand, and a conservative estimate of 7

per cent growth is expected to double India's per capita energy consumption from 560 kilograms of oil equivalent (kgoe) in FY10 to 1,124 kilograms of oil equivalent (kgoe) by FY32. As oil and gas is one of the main sources to meet the required demand for energy in India, its demand is forecast to rise further. In 2011, natural gas accounted for 10 per cent of the country's total energy requirements Oil and Gas sector played a vital role in Indian economy and Oil and Gas Sector stocks are the most important part of Bombay Stock Exchange (BSE). This study takes into consider the daily closing prices of five major Oil and Gas Sector stocks of BSE 30 (Indian Oil Corporation, ONGC, Oil India Limited, Hindustan Petroleum Corporation Limited and GAIL) to analyze the risk and returns of the selected stocks. To examine the performance of these stocks, daily closing prices taken into consideration to analyze the risk return a period of fifteen years from 1st April, 2017 to 31st March, 2022.

Statement of the problem

The Oil and Gas sector plays a vital role in Indian economy. Oil prices have been rising for the past decade on concerns over supply. It is evident from the literature there are numbers of researches have been conducted on analyzing the risk and return but there is a need for further analysis exists still. This is due to the fact that the markets are very dynamic and the investors require the latest results and output. There is also the gap exist to examine the risk and return relationship with special focus on BSE Sensex and oil and gas sector of India.

Literature review

The key determining factor is the trade-off between risk and return. A number of statistical models and beta were also utilized to investigate the relationship between risk and return. Researchers focused on the relationship between stock markets and energy markets for taking investment decisions and a better understanding of the price fluctuations between the markets (Lin and Su 2020; Peng *et al*. 2021) [30-31]. Bhunia (2012) [4] determined that there is no competency displayed in the Indian market by measuring the Capital asset pricing model as a measurement instrument. Ratna (2013) [23] compared the performance of IT stocks to banking stocks and utilized a variety of statistical tools, including descriptive analysis and the t-test, to examine the hypothesis. She advised holding stocks to achieve the positive results. Sharma *et al*. (2012) [12] in their study investigates the risk and return of the stocks listed in South Asian stock markets. This study used descriptive statistics to determine how expected return and risk are related over time. The study discovered that in such South Asian nations, sensible risk and good returns were problematic. G. Shanmugasundram as well as Benedict, D. John (2013) [32] Intentional risk influence on the Nifty and Indian Sectoral indices. They discovered that the risk relationship changed with time. From 2004 to 2012, they chose five sectoral indexes from the NSE and Nifty Index. For the study t-Test and ANOVA carried out to find out the risk alteration between the sectors and Nifty. Lakshmi, (2013) [17] tried to assess the volatility pattern in various Indices of Indian stock market by the application of an econometric model i.e. Autoregressive Conditional Heteroscedasticity. The study was covering a period from 2008 to 2012 of eleven Sectoral Indices from National Stock Exchange. The banking industry has the lowest volatility over the time period, whereas the reality sector has the most volatility compared to other sectors. The relationship between risk and return in the equity markets of Latin America, Brazil, and Columbia for which quarterly data were measured over the period (Tsuji, 2014) [7].

Objectives of the study

- To investigate the relationship between risk and returns of Sensex and Oil and Gas Sector Stocks.
- To analyze the constancy of beta for major Oil and Gas Sector Stocks of BSE Sensex.
- To analyze and assess the performance of Oil and Gas Sector of India in terms of risk return relationship.

Hypothesis of the study

H_{01}: There is no significant relationship between Sensex returns and Oil and Gas Sector stock returns.

H_{02}: There is no significant impact of Sensex returns on Oil and Gas Sector stock returns.

Research methodology

In this study different BSE Sensex and five major Oil and Gas Sector stock indices have been used to examine the risk return of Oil and Gas Sector Indices. The five major oil and gas sector companies were taken for the purpose of analysis i.e. IOC, ONGC, OIC, HPCL and GAIL. The risks and returns have been examined by using the daily closing value of BSE Sensex and five Oil and Gas Stocks. The study is based on secondary data which have been taken from the BSE website over a period of 05 years from April 1, 2017 to March 31, 2022.

Mean Return (Mean): Daily average return multiplied by the number of observations in a year.

Standard Deviation (Stdev): It is the measure of the total risk in the daily returns.

Variance (Var): It is standard deviation raised to the power 2.

Coefficient of Variation (CV): It is the risk adjusted mean return, i.e. mean return per unit of standard. Deviation. = average/σ

Risk: Due to the constancy of reality, you cannot discuss revenue from speculation without first speaking to me about risk. Venture options include marketing and system-to-system buying. Risk shows the likelihood that the actual financial effects will delay the anticipated effects. Even more so, buyers are frequently under pressure due to actual results that are significantly worse than anticipated outcomes. The possibility increases with more noticeable results that you may find.

Return: Return is the primary motivating force behind a rumors. It is really an acclaim for financing. Since the venture game is prepared returns, the estimation of uncovered returns is basic to evaluate how appropriately a rumors has executed. Furthermore, noteworthy returns are often utilized as a contribution for looking forward to the future.

Return = (Ending Return – Beginning Return) / Beginning

Return

The Daily index returns of the stock markets have been computed using the following formula;
Rt = ln (It/It-1)

Where,
rt = Return on stock price, in = Natural logarithm, It = the closing index I, t -1 = the closing index
Beta (β) measures the market risk or systematic risk. Beta is commonly computed by the under given formula.

β= (Cov (ra, rm)) / (Var (rm))

Where,
Raise the return of an index and rm is benchmark index return

To predict the performance of BSE Sensex with the help of Oil and Gas Sector stock data linear relationship was presumed keeping Sensex as dependent variable and return of major Oil and Gas Sector stocks as independent variable. The formula used is given below:

R = a+ Σ(i=1)n [bi Ri]

Where,
R = Return of Sensex, Index a = constant, Ri = Return of Oil and Gas Sector stock indices bi is the coefficient of particular Oil and Gas Sector stock index.

The results have been derived by using paired t-test which decides whether the difference from between two sample is significant or not underneath the expectations that the paired differences are independent and identically normally distributed. The P value is the probability of discarding the null hypothesis of a study at what time that hypothesis is correct.

Data analysis and interpretation

This study has been conducting for the purpose of measuring risk and return of BSE Sensex and five major Oil and Gas Sector companies' stock. The below table exhibits the statistical results of daily stock market returns of different stock indices from April 2017 to March 2022 by the help of descriptive statistics.

Table 1: Descriptive Statistics of the Returns

Particulars	Sensex	IOC	ONGC	OIC	HPCL	GAIL
Mean	0.0505	0.0420	0.0151	0.0612	0.0037	0.0385
Standard Deviation	1.3792	3.3206	3.7998	3.9219	4.3973	3.8621
Kurtosis	7.8925	1141.3459	874.7088	785.9197	1682.1517	1247.023
Skew ness	-0.1366	-30.0456	-19.9302	-18.5088	-37.3454	-24.1863
Range	26.7992	179.2855	176.7594	169.8395	251.6704	81.5211

***Source*:** Data taken from BSE indices and oil and gas sector of India from April 2017 to March 2022

The above table presents the statistical description of all the sample companies of Oil and Gas sector of India from the period of April 2017 to March 2022, all indices showed positive average daily returns. The average daily returns showed the greatest value of 0.0612 for OIC and the lowest value of 0.0037 for HPCL. The daily average return of the Sensex is determined to be 0.0505, which is higher than the returns of IOC, ONGC, HPCL, and GAIL while being lower than the returns of OIC. Therefore, it is evident from the foregoing that over the study period, the average daily return of the Sensex is larger than that of all Oil and Gas Sector stock returns with the exception of ONGC. On the other hand, the Sensex's standard deviation is smaller than that of all stock returns in the Oil and Gas sector. For the time period mentioned, the GAIL stock return's standard deviation is highest. As a result, it shows that the risk associated with the ONGC stock return is the highest of all stock returns, while the risk associated with the Sensex return is the lowest. The daily returns distribution of all sample stock returns are found to be negatively skewed. All stock returns are observed to be peaked by nature i.e. it is lowest in case of Sensex and more peaked in case of GAIL.

Table 2: Correlation of Daily Stock Market Returns

Particulars	Sensex	IOC	ONGC	OIC	HPCL	GAIL
SENSEX	1.0000					
IOC	0.0248	1.0000				
ONGC	-0.0108	-0.0046	1.0000			
OIC	0.0842	0.0008	0.0051	1.0000		
HPCL	0.0125	-0.0058	0.0014	0.0266	1.0000	
GAIL	0.3600	0.0420	0.1420	0.4620	0.6521	1.0000

***Source*:** Data taken from BSE indices and oil and gas sector of India from April 2017 to March 2022

Table 2 elaborates the correlation matrix for daily stock returns of Sensex and Oil and Gas Sector stock over a span of five years from April 2017 to March 2022. It is evident that daily stock market returns of Sensex are positively correlated with that of all Oil and Gas Sector stock returns except that of ONGC (negatively correlated). The Sensex returns is highly correlated with that of GAIL, where as it has recorded negative correlation with that of ONGC.

Table 3: Beta coefficient of daily stock market returns

Particulars	IOC	ONGC	OIC	HPCL	GAIL
Beta	0.0112	-0.0043	0.0322	0.0043	0.02911
Rank	5	1	3	2	4

***Source*:** Data taken from BSE indices and Oil and Gas Sector of India from 2017 to 2022

Beta (market risk) of all sample Oil and Gas Sector stocks with reference to Sensex found out as discussed above. The above table displays that ONGC is greatest defensive stock i.e. it is negatively sensitive to variations happening to Sensex. However IOC is greatest sensitive stock, its' return existence 0.0112 which specifies 1 per cent variation in Sensex will give 0.0112 per cent change in IOC return, and formerly next to it are HPCL and OIC.

Table 4: Return per volatility daily stock market returns

Particulars	IOC	ONGC	OIC	HPCL	GAIL
Return/Beta	3.7515	-3.5478	1.8992	0.8602	2.0185
Rank	1	5	3	4	2

***Source*:** Data taken from BSE indices and Oil and Gas Sector of India from 2017 to 2022

Table 4 showed the order of stock returns for the oil and gas industry by return per unit of beta measured volatility. If investors have to choose between different stocks, ONGC has outperformed the other stocks throughout the course of the study, while IOC stock return ranks higher than other companies in the case of return per volatility and ONGC stock return has positioned at the backseat.

Table 5: Return per standard deviation daily stock market returns

Particulars	IOC	ONGC	OIC	HPCL	GAIL
Return/Standard Deviation	0.0127	0.0040	0.0156	0.0008	0.000617
Rank	2	3	1	4	5

***Source*:** Data taken from BSE indices and oil and gas sector of India from 2017 to 2022

Table 5 shows the daily stock market return position of sample Oil and Gas Sector stocks' with the relation to standard deviation. It is clearly evident that OIC has performed better (less risky), than other oil and gas sector company throughout the study period, whereas IOC has to improve in the measure of return per standard deviation for reducing the risk.

Table 6: Significance test results of comparisons of different stock index

Particulars	IOC	ONGC	OIC	HPCL	GAIL
t Stat	0.1377	0.5392	-0.1591	0.6311	0.4821
P Value	0.4395	0.3152	0.4278	0.2711	0.1685

***Source*:** Data taken from BSE indices and Oil and Gas Sector of India from April 2017 to March 2022

Table 6 exhibits the significance test results of comparisons of different stock index with the help of t-statistics Significance results and P-Value of daily returns for different stock returns for the study period from April 2017 to March 2022. The P value of 0.4395, 0.3152, 0.4278, 0.2711 and 0.1685 respectively of sample Oil and Gas sector stock returns i.e. IOC, ONGC, OIC, HPCL and GAIL indicate, there is no significant difference between daily returns of Sensex and other sample stock returns at 5 per cent degree of significance.

Table 7: Regression Results for Sensex as Dependent Variable and Various Factors as Predictors (Model Summary)

Multiple R	R Square	Adjusted R Square	Standard Error
0.0891	0.0079	0.0069	1.4944

***Source*:** Data taken from BSE indices and Oil and Gas Sector of India from April 2017 to March 2022

Table 8: Goodness of Fit - ANOVA

Particulars	SS	MS	F	Significance F
Regression	66.6217	16.6554	7.4578	0.0000
Residual	8332.4596	2.2333		
Total	8399.0814			

***Source*:** Data taken from BSE indices and Oil and Gas Sector of India from April 2017 to March 2022

Table 9: Regression Coefficients

Particulars	Coefficients	Standard Error	t Stat	P-value
Constant	0.0480	0.0245	1.9623	0.0498
IOC	0.0111	0.0074	1.5132	0.0303
ONGC	-0.0044	0.0064	-0.6797	0.4967
OIC	0.0321	0.0062	5.1482	0.0000
HPCL	0.0035	0.0056	0.6375	0.5239
GAIL	0.0210	0.0014	0.0410	0.0284

***Source*:** Data taken from BSE indices and Oil and Gas Sector of India from April 2017 to March 2022

Dependent Variable: Sensex

The above tables derived the regression analysis between Sensex returns as dependent variable with the Oil and Gas Sector returns as independent variables. The goodness of fit consequences of standard linear multiple regressions through Sensex as the dependent variable and numerous determinants as forecasters are described and the model result has elaborated. This model discloses that there is statistically significant association among Sensex and all sample oil and gas sector stock returns (Sig.> 0.05) except that of ONGC. This study indicates that, the impact of Sensex returns on sample oil and gas sector stock returns by suggesting that there are statistically significant impact of Sensex returns on sample oil and gas sector stock returns except that of IOC, OIC and GAIL.

Concluding remarks

The present study was conducted in order to measure the risk and returns on the Sensex and the stocks in the Oil and Gas Sector have been used to compare risk-return analyses between the returns on the Sensex and the returns on the stocks in the Oil and Gas Sector. To look more closely at the relationship between the BSE Sensex index return and the IOC, ONGC, OIC, HPCL and GAIL stock market indexes and returns for the period from April 2017 to March 2022. As per results of the correlation research, there is a strong association between Sensex returns and HPCL returns and a negative correlation between Sensex returns and GAIL returns. On the other hand, descriptive analysis reveals that, during the chosen time, IOC return, Sensex returns, and all stock returns had positive average daily returns. With the exception of OIC return, the Sensex produced high returns in comparison to all other stocks. While Sensex return has

the lowest volatility during the period, ONGC return exhibits the greatest. It is evident from the foregoing that the Null Hypothesis, according to which there is no appreciable difference between the returns of the Sensex and the stocks in the Oil and Gas sector, is rejected. The most defensive stock in terms of market risk is IOC and OIC, whereas the most sensitive stock, HPCL, has a significant sensitivity to changes in the performance of the Sensex. All equities in the Oil & Gas sector, with the exception of GAIL, which has a negative beta, follow the Sensex's trend of change. The regression analysis study suggests that there are statistically significant correlations between Sensex returns and on the Oil and Gas sector stock returns, with the exception of OIC, indicating a relationship between Sensex returns and Oil and Gas sector stock returns. The regression analysis study indicates that, the association among Sensex returns and Oil and Gas sector stock returns by suggesting that there are statistically significant associations among Sensex returns and on the Oil and Gas sector stock returns except that of OIC. Investors can find the best use of the beta ratio in short-term decision-making, where price volatility is important. Beta is a good measure of risk to buy and sell within a short period, however, as a single predictor of risk for a long-term investor, the beta has too many flaws. Careful consideration of a company's fundamentals will give a much better picture of the potential long-term risk. The stocks may not be a safe but for a risk adverse investor and for a risk taker the reward may he heavy in the short run, than in the long run.

References

1. Ackermann Carl Richard McEnally, David Ravenscraft. The performance of hedge funds: Risk, returns, and incentives, The Journal of Finance. 1999;54;833-874.
2. Fard H, Ansar M, Yekezare A. A risk-return based model to measure the performance of portfolio management. Management Science Letters. 2014;4 (10):2183-90.
3. Attilio Meucci. Exercises in Advanced Risk and Portfolio Management Last version available at. c2010. http://ssrn.com/abstract=1447443.
4. Bhunia A. Stock market efficiency in India: Evidence from NSE. Universal Journal of Marketing and Business Research. 2012;1(2):072-78.
5. Cao D, Long W, Yang W. Sector indices correlation analysis in China's stock market', in Proc. International Conference on Information Technology and Quantitative Management, Procedia Computer Science; c2013. p. 1241-1249.
6. Chandra Setiawan. Syariah and Conventional Stocks Performance of Public Companies Listed on Indonesia Stock Exchange. Journal of Accounting, Finance and Economics. 2013;3(1)51-64.
7. Tsuji C. An Investigation of the Relationship between Risk and Return: The Case of the Latin American Stock Markets. Accounting and Finance Research. 2014;3(1):1-9.
8. Mukherjee D. Comparative analysis of Indian stock market with international markets. Great Lakes Herald. 2007 Apr;1(1):39-71.
9. Donald B Keim. Size Related Anomalies and Stock Return Seasonality. Journal of Financial Economics. 1983;12:13-32.
10. Fama EF, French KR. Common risk factors in the returns on stocks and bonds. Journal of financial economics. 1993 Feb 1;33(1):3-56.
11. Fischer Black, John C Cox. Valuing Corporate Securities: Some Effects of Bond Indenture Provisions, the Journal of Finance. 1976;31(2):351-367.
12. Gagan Deep Sharma *et al*. Rewards and Risks in Stock Markets: A Case of South Asia. The International Journal of Applied Economics and Finance. 2012;6(2): 37-52.
13. Gupta R, Basu PK. Weak form efficiency in Indian stock markets. International Business & Economics Research Journal. 2007;6(3):57-64.
14. Jagannathan UKNS. Risk/Return of major Indian Stock Indices. MSRUAS/Journal of Management and Commerce. 2013, 4.
15. Krishnankutty R, Tiwari AK. Are the Bombay stock exchange sectoral Indices of indian stock market co-integrated? Evidence using fractional co-integration test, MPRA Paper No 48590, Journal of Emerging Financial Markets. 2011;(2)137-45.
16. Kumar PVV, Singh PK. A study of return, liquidity of sectoral indices, market index return of Indian financial market (BSE), International Journal of Research in Commerce & Management. 2011;2(6);1-8.
17. Lakshmi PS. Volatility patterns in various sectoral indices in Indian stock market, Global Journal of Management and Business Studies. 2013;(3)8:879-886.
18. Mohandass S, Renukadevi P. Modeling volatility of BSE sectoral indices, International Journal of Marketing, Financial Services & Management Research. 2013;2(3):12-24.
19. Nalla BK. A Study on risk and return analysis of selected securities in India. International Journal of Engineering Technologies and Management Research. 2018;5(4):79-86.
20. Prabhu RN. (March 2. Comparative risk return analysis of Bombay Stock Market with selected banking stocks in India. IRA-International journal of management and Social Sciences. 4(01):9.
21. Prabhu RN. Risk and return analysis of nifty stockin Indian capital market. International Journal of Multi-Disciplinary Research and Development. 2018 Mar;5 (3):8-12.
22. Rajamohan S, Muthukamu M. Bank nifty index and other sectoral indices of NSE-A comparative study, PARIPEX-Indian Journal of Research. 2014;3(4):147-149.
23. Ratna Sinha. An Analysis of Risk and Return in Equity Investment in Banking Sector. International Journal of Current Research. 2013;5(8):2336-2338.
24. Rawashdeh M, Squalli J. A sectoral efficiency analysis of the Amman stock exchange, Working Paper No. 05-04, Economic Policy Research Unit; c2005.
25. Shanmugasundram G, Benedict DJ. Volatility of the Indian sectoral indices-A study with reference to national stock exchange, International Journal of Marketing, Financial Services & Management Research. 2013;2(8):1-11.
26. Srivastava. Stability of sector wise beta: Case study of India, GFJMR. 2012;5(1-9).

27. Thomas Barnes. The IT Industry and Economic Development in India: A Critical Study. Journal of South Asian Development. 2013;8(1):61-83.
28. Naila A, Flint SH, Sulaiman AZ, Ajit A, Weeds Z. Classical and novel approaches to the analysis of honey and detection of adulterants. Food Control. 2018 Aug 1;90:152-65.
29. Patjoshi RK, Mahapatra K. High-performance unified power quality conditioner using command generator tracker-based direct adaptive control strategy. IET Power Electronics. 2016 May;9(6):1267-78.
30. Lin SU, Huang J, Wang M, Kumar R, Liu Y, Liu S, Wu Y, Wang X, Zhu Y. Comparison of MAFLD and NAFLD diagnostic criteria in real world. Liver international. 2020 Sep;40(9):2082-9.
31. Peng J, Walter D, Ren Y, Tebyetekerwa M, Wu Y, Duong T, Lin Q, Li J, Lu T, Mahmud MA, Lem OL. Nanoscale localized contacts for high fill factors in polymer-passivated perovskite solar cells. Science. 2021 Jan 22;371(6527):390-5.
32. John D, Sasaki J, Staudenmayer J, Mavilia M, Freedson PS. Comparison of raw acceleration from the GENEA and ActiGraph™ GT3X+ activity monitors. Sensors. 2013 Oct 30;13(11):14754-63.