

Air Pollution and Stock Returns: Evidence from NSE and BSE of India



Chinnadurai Kathiravan, Murugesan Selvam, J. Gayathri, Marriappan Raja, Marxia Oli. Sigo

Abstract: Air pollution issue has become an important environmental problem in India. This paper proposes to examine the influence of Delhi Air Pollution on the two Indian stock indices, using Descriptive Statistics, Unit Root, and OLS regression. The analysis of the study found that Delhi Air Pollution did create a statistically significant effect on Nifty. This is the first study of this type to look into the effects of air quality issue on stock market indices in India

Keywords: Investors' Mood, Air Pollution, Stock Returns

I. INTRODUCTION

In the 21st Century, the rapid economic growth, experienced by some emerging countries have also increased the concern of Governments and social service organizations on its impact on the environment condition. India has been growing economies, after LPG, with GDP progress closely 10 percent (10%) through 2011 (Raghuram Rajan, 2014 & 2015). Over the past two decades, the researchers in behavioral finance have also found that the determinants of the mood played a role in the minds of the stock market investors (Weber, Hsee, & Welch, Loewenstein, 2001). Different ecological stressors, from weather factors to the change, have created significant impact on stock returns (C.Kathiravan et. al 2018 & 19 and Lucey & Dowling, 2005 & Sigo et al, 2018). The findings of above studies were in contradiction to the traditional financial theories like EMH (Fama, 1970) and CAPM (Sharp, 1964). Air pollution issue has been considered as the important variable for measuring investors' moods, attitude and decision making in recent behavioral finance studies (Levy & Yagil, 2011; Levy and Yagil 2013 and Lepori, 2016). The present study analyzed the impact of air pollution issues on stock

Market returns. Since prior studies were not available on analyzing the connection between air contamination and stock returns in India, the present examination looks to fill the gap.

The development of this investigation has five areas segment 1-centers around presentation segment 2 surveys the writing. Segment 3 portrays strategies and information Section 4 talks about experimental outcomes and the last area the discoveries of finishes up the present investigation.

II. REVIEW OF LITERATURE

The individual feeling and environmental changes can initiate and disturb investors' psychology and investors' attitude and behavior across the Globe. In the worldwide financial exchange, exchanging conduct could be affected by various components, including ecological elements changes, which lead to affect on stock value execution. Many studies have been reviewed to understand air pollution issues and stock price returns at the stock market across the Globe. The reviews of literature are given **Table-1**.

III. OBJECTIVES

The examination analyzed the impact of air contamination on the stock value top contamination organizations in China. It is discovered that air contamination affects the stock.

IV. HYPOTHESES OF THE STUDY

- NH 01:** There is no normal distribution among the Delhi Air Pollution and Stock Returns in India.
- NH 02:** There is no stationarity among the Delhi Air Pollution and Stock Market Returns in India, and
- NH 03:** There is no impact among the Delhi Air Pollution and Stock Market Returns in India.

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* Correspondence Author

Chinnadurai Kathiravan*, Ph.D. Research Scholar in Management, Department of Commerce and Financial Studies, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India, E-mail: kathirba@gmail.com

Murugesan Selvam, Dean, Faculty of Management, Chair, School of Business Studies, Professor and Head, Department of Commerce and Financial Studies, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India

J. Gayathri, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India.

Marriappan Raja, Bharathidasan University Constituent College, Lalgudi, Tamil Nadu, India.

Marxia Oli. Sigo, National Institute of Technology, Sikkim

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Table -1 Review of Literature

S.No	Authors Details	Study Period	Tools	Samples	Findings
1.	Tamir Levy and Joseph Yagil (2011)	1997 to 2007	Descriptive statistics and Regression analysis	Daily stock returns on NYSE, AMEX NASDAQ and (PHLX). Daily AQI data	This examination inspected the relationship between air contamination and stock value returns in the USA. The study found that air pollution issues may even influence local traders.
2.	Tamir Levy and Joseph Yagil (2013)	1997 to 2007	Regression Analysis and Correlation Matrix	NYSE, NASDAQ, PHLX and Toronto Stock Index and Air Quality	This research study investigated the air quality and stock market returns in the USA, Netherlands, Australia, and China. The study found negative relationship
3.	Cahit Guven and Indrit Hoxha (2014)	1946 to 2014	Robustness tests	Primary Data (European 40 countries Data)	This research study examined the weather factors effects on happiness. It is observed that more joyful individuals to be progressively cautious in money related speculation choices
4.	Gabriele M. Lepori (2015)	1989 to 2006	Descriptive Statistics, Robustness Checks, and Instrumental Variables Estimation	Environmental Data (Temperature, Rain, Wind, Air Pressure). Italian stock market data (MSE, MIB and Commit Global)	This paper examined the air contamination and value returns in Italy. The examination found that the day by day increments in air contamination issue may influence people's hazard avoidance as far as speculation choices
5.	Anthony Heyes Matthew Neidell and South Siberian (2016)	2000 to 2014	Ordinary least squares (OLS), Sensitivity analysis and Placebo tests	S&P 500 index and New York Air quality data	This study examined air pollution and the New York Stock Exchange. It is found that negative relationship between
6.	Q. Li and C.H. Peng (2016)	2005 to 2014	Descriptive statistics, Sobel test, and Robustness checks	Air Pollution (China) and Shanghai and Shenzhen Stock Exchanges	This examination explored the impact of air contamination on stock returns via air contamination in China. The discoveries showed that air contamination adversely impacted stock returns in China.
7.	Yihao Zhang, Yu Jiang and Yongji Guo (2017)	2010 to 2014	Descriptive statistics and AR-GARCH Models	level of haze pollution in China and the CSI300 index in China	This paper analyzed the impacts of air contamination and stock cost in China. It is discovered that air contamination effects affect stock value returns.
8.	Qinqin Wu, Ying Hao and Jing Lu (2018)	2013, to 2015	Descriptive statistics, Baseline model and Regressions	Shanghai and Shenzhen Stock Exchanges in China and daily air quality data	This examination researched air contamination and stock estimating in China. The discoveries showed that the air contamination issue and firm execution was immaterial
9.	Xianhua Wu, Shanshan Chen, Ji Guo, and Ge Gao (2018)	2014 to 2016	Multi-discontinuities regression and Robustness test	Air Quality data and daily stock data of pollution enterprise	The examination analyzed the impact of air contamination on the stock value top contamination organizations in China. It is discovered that air contamination affects the stock cost.

V. RESEARCH METHODOLOGY/ SAMPLE METHOD

The present study used the data of two sample stock indices returns and the Air Quality Index (AQI), from January 1, 2001 to December 31, 2018. In India, there are two popular stock exchanges, namely, BSE and NIFTY. One index from each exchange was selected.

The investigation of the examination was made by utilizing apparatuses like Descriptive Statistics, Unite root tests and OLS relapse investigation. Enlightening Statistics was utilized to discover the typical dissemination while Unite root tests were utilized to look at the stationarity. The present study also used OLS regression to investigate the relationship between the air pollution issue and stock price returns.

VI. RESULTS AND SUGGESTION

a. Descriptive Statistics

The results of descriptive, for the Delhi Air Quality Index and two sample stock indices returns namely SENSEX and of NIFTY, for the period from 01.01.2001 to 31.12.2018, are presented in **Table-2**. It is clear that the lowest mean value of 0.0465 for BSE Sensex was recorded the highest mean value of 0.0967 for CNX NIFTY was registered. The Delhi Air Quality recorded the highest (Std. Dev.) value of 0.4514 which synchronized the high risk in the stock market. Additionally, the Jarque-Bera qualities inferred that information all the example factors were typically circulated. Hence, the Null Hypothesis (NH 01), “**There is no normal distribution among the Delhi Air Pollution and Stock Market Returns in India**”, was rejected

b. Unit Root Test

Table-3 shows the outcomes of the ADF and Phillips Perron test (PP), for returns for Delhi Air Quality Index and sample stock market indices (namely CNX NIFTY and BSE SENSEX), during the study period from 2001 to 2018. Delhi Air Quality data and two stock market indices in India were analyzed using ADP and PP test at three significant levels (1%, 5%, and 10%). The P-values for all the sample variables were nearby zero, on the basis of all the two tools used for the analysis. The results of ADF test clearly revealed that the data of all sample variables attained stationarity. Hence the Null Hypothesis (NH2), “**There is no stationarity of the Delhi Air Pollution and Stock Market Returns in India**”, was rejected.

c. OLS regression analysis

The results of OLS for Delhi Air Quality Index and sample stock market indices (CNX NIFTY and BSE SENSEX), during the period from 2001 to 2018, are presented in **Table-3**. It is comprehended from the above Table that there was a positive coefficient value earned for all the sample variables during the investigation time frame. The coefficient and t-statistic values of CNX NIFTY (0.4139) were higher than BSE SENSEX during the period. The R-squared value was very low. Further, Durban-Watson statistic of 1.9708 indicated autocorrelation in the residuals. In another word, that out of two sample indices, only one sample index namely,

CNX NIFTY attained the conventional level of significance (0.0333). It indicated that the CNX NIFTY recorded measurably huge association with the Air Quality Index all through the investigation time frame. Hence the Null Hypothesis (NH 03), “**There is no impact among the Delhi Air Pollution and Stock Market Returns in India**”, was rejected

VII. CONCLUSION AND FUTURE DIRECTION

Air pollution issue has been one of the important environmental issues in India, especially in New Delhi during recent years. In the stock market, air pollution has created an impact on stock return performance. The present study clearly indicated that Air pollution did exercise effect on CNX NIFTY stock index returns. The study also implied that investors could consider air quality concentration as a useful reference while investment strategies. The stock market regulatory authorities could include air pollution of other cities of India into the tracking system while observing the stock trading

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AUTHORS PROFILE

Chinnadurai Kathiravan*, Ph.D. Research Scholar in Management, Department of Commerce and Financial Studies, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India, E-mail: kathirba@gmail.com

Murugesan Selvam, Dean, Faculty of Management, Chair, School of Business Studies, Professor and Head, Department of Commerce and Financial Studies, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India

J. Gayathri, Assistant Professor, Department of Commerce and Financial Studies, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India.

Marriappan Raja, Assistant Professor, PG AND Research Department of Commerce, Government College, Kumulur, Lalgudi, Tamil Nadu, India.

Marxia Oli. Sigo, Guest Faculty, National Institute of Technology, Sikkim

Table-2
Descriptive Statistics for Air Quality and Sample Indices return during the study period from 01.01.2001 to 31.12.2018

	Air Quality Index	CNX NIFTY	BSE SENSEX
Mean	0.0633	0.0967	0.0465
Standard Deviation	0.4514	0.0144	0.0143
Skew.	4.8787	-0.0129	0.1084
Kurtosis	46.3128	13.2296	12.2577
Jarque-Bera	367875.0000	19529.5100	16003.4000
Observations	4479	4479	4479

Source: <http://finance.yahoo.com/> and data.gov.in using E-Views 7 Version.

Table-3 Unit Root Test for Air Quality Index and Sample Indices during the study period from 01.01.2001 to 31.12.2018				
	ADF		PP	
	t- Stat.	Probability.*	t- Stat.	Probability.*
AIR QUALITY INDEX	-56.70795	0.0001	-79.0279	0.0001
CNX NIFTY	-47.8502	0.0000	-61.9982	0.0000
BSE SENSEX	-67.7405	0.0001	-52.8036	0.0001

Source: <http://finance.yahoo.com/> and data.gov.in using E-Views 7 Version.

Table-4 Results of the Linear Regression Analysis for Air Quality Index and Sample Indices during the study period from 01.01.2001 to 31.12.2018				
Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.2359	0.0914	2.5808	0.0103
CNX NIFTY	0.4139	0.1943	2.1297	0.0333*
BSE SENSEX	0.0440	0.0688	0.6403	0.5227
R-squared	0.0012	F-stat.		0.4453
Durbin-Watson	1.9708	Prob.		0.5050

Dependent Variable: Air Quality Index
Source: Compiled from yahoo finance and Computed by using SPSS