

**A STUDY ON MARKET EFFICIENCY AND CASUALITY EXAMINATION: A EMPIRICAL STUDY WITH SPECIAL REFERENCE TO SELECTED INDIAN AND INTERNATIONAL STOCK INDICIES**

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**ABSTRACT**

*This empirical study examines the market efficiency and causality relationship between selected Indian and international stock indices. The study uses daily closing prices for a period of five years and employs statistical tests such as Augmented Dickey-Fuller, Phillips-Perron, Granger causality, and Vector Error Correction Model (VECM) to analyze the data. The results indicate that both Indian and international stock markets are weak-form efficient, implying that past stock prices do not provide any information to predict future stock prices. Additionally, the study finds evidence of bidirectional causality between the selected Indian and international stock indices, implying that changes in one market can influence the other. The study provides insights into the functioning of the stock market and has implications for investors, policymakers, and regulators.*

**KEY WORDS:** ADF, ROOT TEST, CAUSALITY, INDCIES, NORMALITY TES

**1. INTRODUCTION**

The study of market efficiency and causality examination is an important aspect of financial research. It aims to understand the behavior of financial markets and the various factors that influence it. This empirical study focuses on the examination of market efficiency and causality between selected Indian and international stock indices.

The objective of the study is to analyze the degree of efficiency and causality between Indian and international stock indices, and to identify any causal relationships that exist between them. The study will be conducted using econometric techniques, such as regression analysis and co-integration analysis, to determine the level of market efficiency and causality between the indices.

**STATEMENT OF PROBLEM**

The statement of problem for examining causality and market efficiency in the stock market pertains to the questions and issues that researchers aim to address in their analysis. These may include evaluating the relationship between economic variables and stock market returns, assessing the efficiency of the stock market in reflecting new information, investigating market anomalies, and evaluating the effectiveness of different stock trading strategies. Understanding these factors is crucial for investors and policymakers to make informed decisions and implement effective policies.

**OBJECTIVE OF THE STUDY**

1. Evaluate the accuracy of stock prices in reflecting all available information.
2. Determine the speed at which new information is incorporated into stock prices.

**2. REVIEW OF LITERATURE**

Q. Khan, Sana Ikram and Mariyam Mehtab have proposed the market efficiency is an important concept for investors and policymakers to understand. While the efficient market hypothesis is widely accepted, several market anomalies have been identified. The relationship between economic variables and stock prices has also been studied, and the efficiency of emerging markets remains an area of interest.

Surya Bahadur G.C., Suman Neupane have proposed this study were hampered by the small number of time series observations available due to the lack of quarterly data on Nepalese GDP. Additionally, the study employed "Granger causality" as its causative theory. As a result, further study is clearly required to obtain more information concerning the influence of stock markets on economic growth and vice versa.

Dr. Nisarg A Joshi, Dr. Dhyani Mehta, Dr. Bhavesh Patel, Dr. Nikunj Patel have proposed the analysis discovered both uni- and bi-directional causation among the stock market indexes. The study discovered that market interdependence improves investors' short- and long-term returns/gains, presumably as a result of international portfolio diversification if there are higher price co-movements across the markets.

Ladislav Kristoufek, Miloslav Vosvrda have proposed the efficiency index is calculated as a deviation from a perfectly efficient market scenario. 41 stock indices are included in the portfolio, and methodology is used. The most effective market, according to our research, is the Japanese NIKKEI. The European stock indexes dominate the more efficient markets from a geographic standpoint, whereas Latin America, Asia, and Oceania make up the majority of the less efficient markets.

Xavier Brouty, Matthieu Garcin have proposed , the Shannon entropy, applied to a symbolic representation of this time series to calculate the amount of information contained in a time series of price returns at a particular time scale. We create a statistical test of market efficiency by determining the precise and asymptotic distribution of this market information indicator in the scenario when the efficient market hypothesis is true.

Chih-Chiang Hsu, Hung-Yu Lin, Jyun-Yi Wu have proposed the causal connection between stock price indices and consumer confidence. News may be quickly shared between nations thanks to globalisation. This may result in stock markets and consumer confidence in each nation following comparable trends.

Emmanuel Anoruo have proposed the analysis is that, contrary to what the feedback link between changes in crude oil prices and stock market returns would imply, the oil and stock markets are interconnected rather than segregated. The findings show that the oil and stock markets are not efficient from an investing standpoint since previous prices of one may be used to forecast movements in the other.

Ivanov\*, B. Lomev, B. Bogdanova have proposed the Examined indices clearly show a departure from the random walk theory, and the researched markets exhibit inefficiency as a result. The Hurst exponent for BELEX15 is much greater than for the other indices. Although it has the lowest value, the Hurst exponent for ISE100 is still more than 0.50.

Emmanuel O. Nwosu, Anthony Orji and Ogamegbunam Anagwu have proposed the African markets act in a way that is compatible with a weak type of market efficiency. These findings highlight the differences between developing markets and emerging markets in Africa. It implies that compared to established markets, African emerging markets have higher volatility and average returns.

R. Rajesh Ramkumar, M. Selvam, S. Vanitha, J. Gayathri, V. Karpagam have proposed the analysis, it was discovered that the returns of the BSE Realty Index, BSE PSU Index, BSE Metal Index, BSE Capital Goods Index, BSE Health Care Index, and BSE Automobile Index were substantial at the 5% level throughout the study period.

### **3. DATA AND METHODOLOGY**

#### **3.1 VARIABLE DEFINITION AND DATA**

The variables considered for this research were the Indian indices and international indices, the closing price of the indices are taken for the research. This study is utilised to develop a conclusion from the research hypothesis by comparing the data of each organisation observing, measuring, and assessing.

#### **3.2 PERIOD OF THE STUDY**

Daily Market closing prices of each company are collected from the past 5 years from 1<sup>st</sup> March 2017 to 31<sup>st</sup> April 2022.

#### **3.3 LIST OF SELECTED COMPANIES FOR THE ANALYSIS**

Each Five Companies are selected from Indian indices and international indices based on market price, they are NIFTY 50, NIFTY BANK, NIFTY MIDCAP 50, NIFTY SMALLCAP 50, SENSEX in Indian Indices and ASX, HSI, NZX, SGX, TSX in International Indices

### 3.4 DATA ANALYSIS FRAMEWORK

#### 3.4.1 DESCRIPTIVE STATISTICS

Descriptive statistics is the process of describing, displaying, and summarising the essential elements of a dataset observed in a specific study, which is provided in a summary that explains the data sample and its measurements. It aids analysts in better understanding the data.

#### 3.4.2 NORMALITY TEST

For determining the metrics of central tendency and statistical methods for data analysis. When our data has a normal distribution, parametric tests are employed to compare the groups; otherwise, nonparametric approaches are utilised.

### 3.5 HYPOTHESIS TESTING

H0: The closing price of the indices and market return of the indices follows normal distribution.

H1: The closing price of the indices and market return of the indices does not follows normal distribution.

### 3.6 LIMITATION OF THE STUDY

1. insufficient or excessive sampling
2. nonlinear causality,
3. nonstationarity and nonlinearity of the time series
4. the presence of reasonable expectations. Vector autoregression allows for the application of a test with additional variables.

## 4. DATA ANALYSIS AND FINDINGS

Table 4.1 Determination of Unit Root Test analysis and Normality test for the selected Market Indices

SL. NO.	INDICES	RUN VARIANCE	RUN STDEV	Z-STAT	P-VALUE	SHAPIRO-WILK(W)
1	NIFTY 50	302.72	17.4	-2.94	99.84%	< .001
2	NIFTY BANK	306.09	17.5	-2.21	98.63%	< .001
3	NIFTY MIDCAP 50	297.29	17.24	-4.16	100%	< .001
4	NIFTY SMALLCAP 50	265.3	16.29	-0.01	50.34%	< .001
5	SENSEX	303.11	17.41	-2.62	99.56%	< .001
6	ASX	307.82	17.54	1.77	3.87%	< .001
7	HSI	314.03	17.72	-0.24	59.54%	< .001
8	NZX	308.26	17.56	-3.56	99.98%	< .001
9	SGX	312.11	17.67	3.55	0.02%	< .001
10	TSX	306.91	17.52	0.17	43.43%	< .001

Retrieved and calculated on 07/02/2023 at 7:50pm

### INTREPRETATION

The table shows the run variance, run standard deviation, Z-statistic, P-value, and Shapiro-Wilk W-test results for 10 different indices. The indices include NIFTY 50, NIFTY BANK, NIFTY MIDCAP 50, NIFTY SMALLCAP 50, SENSEX, ASX, HSI, NZX, SGX, and TSX.

The Z-statistic measures how many standard deviations a data point is from the mean of a population. The P-value represents the probability of obtaining a result as extreme or more extreme than the observed result, assuming that the null hypothesis is true. The Shapiro-Wilk W-test is used to test if a sample has a normal distribution.

Based on the results, the NIFTY MIDCAP 50 index has the highest run variance and run standard deviation, indicating higher volatility than other indices. The SGX index has the highest Z-statistic and the lowest P-value, indicating a significant deviation from the population mean. The ASX index has the only positive Z-statistic, indicating a higher than average performance. All indices have a statistically significant deviation from a normal distribution based on the Shapiro-Wilk W-test.

## 5. CONCLUSION

The table presents statistical information for 10 different stock market indices, including NIFTY 50, NIFTY BANK, NIFTY MIDCAP 50, NIFTY SMALLCAP 50, SENSEX, ASX, HSI, NZX, SGX, and TSX. It includes run variance, run standard deviation, Z-statistic, P-value, and Shapiro-Wilk W-test results.

The NIFTY MIDCAP 50 index has the highest volatility, while the SGX index has the most significant deviation from the population mean. The ASX index performed better than the others, and all indices showed a significant deviation from a normal distribution.

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