

## MEASURING INTEGRATION OF CAPITAL MARKET INDICES ACROSS WORLD

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### Abstract

An array of measures aimed at relaxation of the restrictions on international flow of capital markets and trade have been taken in most of the developed and developing countries. The worldwide policy changes and initiatives are expected to display a deep impact on the capital market indices such that their movements must be in tandem. The study closely examines the extent of integration of capital market indices across the major countries of the world.

Main findings: While S&P 500, Nasdaq, Dow Jones, Dax Index, BSE 30 and CAC 40 index have shown strong positive co relationship among themselves, indices like Shanghai, TSXE and Nikkei have displayed almost nonexistent coherency with other stock indices. Bovespa, Hang Seng, BSE 30 and DAX index seems to have a tangent influence on each other's stock prices. RTSI has portrayed certain movements in tandem with Hang Seng and Bovespa but no relationship with other indices. Thus, the study concluded safely that the markets do react to global cues and any happening in the global scenario be it macroeconomic or country specific (foreign trade channel) affect the various markets.

**Policy Implications of Study:** The study findings about the existence of inter-linkages among international capital markets has serious implications on determining the extent of portfolio diversification as well as macroeconomic policies changes that can be initiated at the national level for different countries. The current study will aid in better international portfolio diversification and will act as a tool for international price arbitrage. Further, study of level of correlation between Indian stock market and other major stock markets, helps the investors from India in international arena to comprehend easily the level of interdependence among the major stock markets in the world and its impact on Indian stock market. The study findings may be gainfully employed by policy makers, investors, business managers, etc. who need to know how far a global crisis can impact the regional stock markets in the globally integrated environment.

**Keywords;** BSE Sensex, Capital Market Indices, Dow Jones, DAX Index, Globalisation, Nasdaq, S & P 500.

The worldwide policy changes and initiatives aimed at moving capital freely from one country to another in form of loans, FDI, foreign currency markets etc. are expected to display a deep impact on the capital market such that their movements across countries must be in tandem. It is expected that in today's age most of the capital markets are integrated with each other. The foreseeable benefits of integration apply not only to the realm of financial markets but for economic growth and overall development of the country itself. Greater integration would lead to free or relatively freer access to foreign financial markets thereby providing many firms a broader source for fund raising. Domestic and international investors both can also benefit from enormous opportunities for diversification of investment by choosing securities across the globe. An equity market, by allowing diversification

across a variety of assets, helps reduce the risk the investors must bear, thus reducing the cost of capital, which in turn spurs investment and economic growth. The present study delves into the behavior of capital indices across the major countries of the world. The main objective of this study is to capture the patterns in the activities and co-movements of various global stock markets.

### **Rationale for Study**

The rationale for the current study can be found in development of future predictive behavior among the markets and ensuring the safety/ return of investors' wealth. In developing countries, reeling under umpteen pressure of liberalizations, there is a growing concern pertaining to exposure risk of a global/ regional crisis. The policy makers, investors, business managers need to know how far a global crisis can impact the regional stock markets in the globally integrated environment. The current study will aid investors in better international portfolio diversification and will act as a tool for international price arbitrage. The current study explores and compares global exchanges that belong to different geopolitical and socio-economic areas.

### **Research Methodology**

The study seeks to examine extent of integration of various stock exchanges globally in terms of whether indices had any impact on each other' or the presence or absence of correlation and, if so, to what extent.

Size of Sample: The study considered the twelve stock market indices over a period of 13 years beginning with January 1, 2003 and ending on December 31, 2015. A total of 78,562 data points was analyzed in detail. The share indices covered in study are given in Table I:

i) S&P 500 index, USA ii) NASDAQ, USA, iii) Dow Jones, USA, iv) Shanghai, China, v) Hang Seng, Hong Kong vi) Nikkei, Japan, vii) BSE 30, India viii) Dax Index, Germany ix) CAC 40, France, x) Bovespa, Brazil xi) RTSI, Russia and xii) TSXE, Toronto

### **Hypothesis**

The current study highlights the aspects related to the index values, trend over the last 12 years, volatility of the underlying movements and establishes relationship with other global indices. The study aims to test the following two hypotheses:

- i) There is a direct correlation between capital market indices such that the movements are mostly in the same direction.
- ii) The extent of dependence on the developed market is relatively higher than the developing countries.

### **Tools of Analysis**

Various statistical tools were used for analysis. For the present study, daily maximum and closing index prices were scrutinized. Multiple Correlation was computed for the select stock market indices. Statistical Significance of the correlation has been tested by applying correlation t-test. Correlation has been divided into three levels. Correlation below 0.40 is treated as Weak; correlation between 0.40 to 0.70 treated as moderate; and correlation between 0.70 to 1 as strong. A correlation greater than 0.8 is generally described as strong, whereas a correlation less than 0.5 is generally described as weak. Thus only when coefficient is greater than 80% over the majority of above mentioned

variables, we can safely profess a positive linear correlation. Descriptive statistics i.e., Minimum, Maximum, Mean, Standard Deviation, Coefficient of Variation, Skewness and Kurtosis have been computed for the select indices. A bird's eye view of the data points has been captured in the following table for understanding the overall dynamics of the stock market indices.

**Table 1: Descriptive Statistics from 2003 to 2015**

Particulars	Standard Deviation	Average Index Value	Maximum Index Values	Minimum Index Values	Average Deviation	Skew	Kurtosis
<b>S&amp;P 500</b>	338	1,360	2,131	677	265	0.74	(0.21)
<b>Nasdaq</b>	977	2,731	5,219	1,262	763	1.07	0.17
<b>Dow Jones</b>	2,732	12,272	18,312	6,547	2,209	0.59	(0.50)
<b>Shanghai</b>	989	2,438	6,092	1,011	764	1.03	1.05
<b>Hang Seng</b>	4,776	19,164	31,638	8,409	4,067	(0.38)	(0.75)
<b>Nikkei</b>	3,420	12,637	20,868	7,055	2,996	0.51	(0.89)
<b>BSE 30</b>	6,918	15,160	29,682	2,924	5,681	0.02	(0.76)
<b>Dax Index</b>	2,149	6,520	12,375	2,203	1,711	0.47	(0.29)
<b>CAC 40</b>	794	4,106	6,168	2,403	652	0.50	(0.46)
<b>Bovespa</b>	16,565	46,661	73,516	9,994	13,881	(0.57)	(0.77)
<b>RTSI</b>	506	1,247	2,488	336	431	0.09	(0.93)
<b>TSXE</b>	2,812	11,476	15,658	811	2,128	(1.42)	2.80

Major Findings: Study findings are listed further to assess the extent of integration across capital market indices;

1. Relationship between S&P 500 index with other world capital market indices: S&P 500 Index was assumed to be a dependent variable while being compared to other eleven indices which were assumed to be independent variables. Since the index values among various indices vary substantially in terms of their denomination, the study looked for alternate variables for determining the relationship among the indices under study. Thus Pearson coefficient of Correlation was calculated by plotting the following variables: Standard Deviation, Average Deviation, Average Values, Maximum Values and Minimum Values.

**Table 2: Pearson Coefficient of Correlation between S&P 500 index with other World Capital Market Indices**

S&P 500 Index	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
Nasdaq	97.06%	96.45%	95.75%	97.52%	97.71%	5	Yes
Dow Jones	99.35%	99.16%	98.79%	99.20%	99.13%	5	Yes
Shanghai	63.39%	59.17%	33.70%	81.57%	33.46%	1	No
Hang Seng	75.51%	75.17%	78.36%	89.77%	87.17%	2	No
Nikkei	83.99%	83.18%	69.28%	87.56%	55.25%	3	No
BSE 30	91.35%	89.84%	67.89%	92.49%	83.56%	4	Yes
Dax Index	92.04%	90.49%	82.38%	94.12%	87.39%	5	Yes
CAC 40	88.15%	85.40%	86.86%	91.06%	86.01%	5	Yes
Bovespa	91.31%	91.35%	62.63%	87.99%	64.78%	3	No
RTSI	80.91%	81.00%	68.65%	90.19%	70.44%	3	No
TSXE	75.95%	71.78%	78.10%	93.00%	38.40%	1	No

As may be observed from the **Table 2**, Positive correlation could be proved only in 5 out of 11 cases implying value of S&P index can be influenced by change in the value of Nasdaq, Dow Jones, Dax Index, BSE 30 and CAC 40. The strongest association has been displayed with Nasdaq, Dow Jones, Dax Index and CAC 40. There seems to be no or minimal impact of the indices such as Shanghai and TSXE on S&P 500 Index prices.

2. Relationship between Nasdaq and other world capital market indices: Nasdaq is a global electronic marketplace for buying and selling securities, as well as the benchmark index for U.S. technology stocks.

**Table 3: Pearson Coefficient of Correlation between Nasdaq and other World Capital Market Indices**

Nasdaq	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	97.06%	96.45%	95.75%	97.52%	97.71%	5	Yes
Dow Jones	96.25%	95.85%	94.35%	96.22%	97.22%	5	Yes
Shanghai	53.73%	47.49%	34.28%	83.51%	31.35%	1	No
Hang Seng	65.46%	64.06%	84.95%	92.17%	88.17%	3	No
Nikkei	88.39%	88.38%	62.11%	84.63%	51.35%	3	No
BSE 30	89.35%	87.43%	81.70%	96.75%	83.33%	5	Yes
Dax Index	90.62%	86.62%	88.16%	97.13%	80.46%	5	Yes
CAC 40	78.46%	75.06%	79.03%	87.02%	83.83%	2	No
Bovespa	83.94%	83.09%	76.17%	92.94%	63.79%	3	No
RTSI	65.18%	63.56%	73.23%	91.60%	69.39%	1	No
TSXE	71.97%	67.09%	85.24%	91.49%	37.61%	2	No

As may be observed from Table 3, Positive correlation could be proved in only 4 out of 11 cases implying value of Nasdaq index can be influenced by changes in the value of S&P 500, Dow Jones, BSE 30 and Dax Index or vice versa. There seems to be no or minimal impact of the indices such as Shanghai and RTSI on Nasdaq Index prices.

3. Relationship between The Dow Jones Industrial Average (DJIA) and other world capital market indices: DJIA is a price-weighted average of 30 significant stocks traded on the New York Stock Exchange (NYSE) and the NASDAQ. Table 4 summarises relationship between Dow Jones index with other world capital market indices. Dow Jones Index was assumed to be a dependent variable while being compared to other eleven indices which were assumed to be independent variables.

**Table 4: Pearson Coefficient of Correlation between The Dow Jones Industrial Average (DJIA) and other World Capital Market Indices**

Dow Jones	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	99.35%	99.16%	98.79%	99.20%	99.13%	5	Yes
Nasdaq	96.25%	95.85%	94.35%	96.22%	97.22%	5	Yes
Shanghai	68.64%	64.49%	40.68%	84.53%	33.60%	1	No
Hang Seng	80.49%	80.12%	79.95%	90.91%	86.50%	4	Yes
Nikkei	84.83%	84.90%	65.94%	86.50%	56.09%	3	No
BSE 30	92.40%	91.18%	66.67%	91.04%	83.77%	4	Yes
Dax Index	92.15%	90.67%	79.45%	92.15%	82.47%	4	Yes
CAC 40	88.87%	85.57%	83.35%	90.05%	83.68%	5	Yes
Bovespa	92.89%	92.84%	62.93%	87.18%	64.66%	3	No
RTSI	80.88%	80.17%	70.73%	89.68%	72.81%	3	No
TSXE	77.92%	73.65%	76.41%	91.26%	39.43%	1	No

As may be observed from Table 4, Positive correlation could be proved in 6 out of 11 cases implying value of Dow Jones can be influenced by change in the value of Nasdaq, S&P 500, Hang Seng, BSE 30, CAC 40 and Dax Index. The strongest association has been displayed with Nasdaq, S&P 500 and CAC 40. There seems to be no or minimal impact of the indices such as Shanghai and TSXE.

4. Relationship between Shanghai Stock Exchange Composite Index and other world capital market indices: The Shanghai Stock Exchange Composite tracks the daily price performance of all A-shares and B-shares listed on the Shanghai Stock Exchange. Table 5 shows the relationship between Shanghai 500 index with other world capital market indices. Shanghai Index was assumed to be a dependent variable while being compared to other eleven indices which were assumed to be independent variables.

**Table 5: Pearson Coefficient of Correlation between Shanghai Stock Exchange Composite Index and other World Capital Market Indices**

Shanghai	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	63.39%	59.17%	33.70%	81.57%	33.46%	1	No
Nasdaq	53.73%	47.49%	34.28%	83.51%	31.35%	1	No
Dow Jones	68.64%	64.49%	40.68%	84.53%	33.60%	1	No
Hang Seng	90.64%	88.71%	57.57%	95.75%	38.41%	3	No
Nikkei	46.95%	43.22%	33.17%	77.69%	26.33%	0	No
BSE 30	73.86%	68.31%	35.60%	87.21%	42.88%	1	No
Dax Index	66.34%	63.40%	43.68%	82.06%	40.75%	1	No
CAC 40	67.09%	60.63%	43.41%	81.50%	31.44%	1	No
Bovespa	79.17%	76.86%	37.32%	88.20%	22.08%	0	No
RTSI	72.89%	70.51%	35.02%	84.31%	44.14%	1	No
TSXE	42.56%	36.54%	28.42%	82.31%	-7.42%	1	No

As may be observed from the Table 5, certain degree of positive correlation has been only observed with Hang Seng. There seems to be no correlation with any global stock market index.

5. Relationship between Hang Seng index with other world capital market indices: The Hang Seng Index is a free-float capitalization-weighted index of a selection of companies from the Stock Exchange of Hong Kong. The study further looked into the relationship between Hang Seng index, assumed to be a dependent variable with other world capital market indices which were assumed to be independent variables.

**Table 6: Pearson Coefficient of Correlation between Hang Seng index with other World Capital Market Indices**

Hang Seng	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	75.51%	75.17%	78.36%	89.77%	87.17%	2	No
Nasdaq	65.46%	64.06%	84.95%	92.17%	88.17%	3	No
Dow Jones	80.49%	80.12%	79.95%	90.91%	86.50%	4	Yes
Shanghai	90.64%	88.71%	57.57%	95.75%	38.41%	2	No
Nikkei	63.15%	64.94%	61.65%	79.46%	40.59%	0	No
BSE 30	81.27%	79.64%	92.38%	94.70%	92.23%	4	Yes
Dax Index	74.13%	75.02%	89.06%	91.88%	83.99%	3	No
CAC 40	83.73%	82.35%	76.03%	88.24%	84.45%	4	Yes
Bovespa	93.11%	93.29%	93.50%	95.80%	81.78%	5	Yes
RTSI	82.43%	81.51%	88.40%	92.33%	83.00%	5	Yes
TSXE	60.30%	57.65%	92.20%	91.17%	31.22%	2	No

As may be observed from Table 6, Positive correlation could be proved only in 5 out of 11 cases implying value of Hang Seng index can be influenced by change in the value of Dow Jones, BSE 30, Bovespa, RTSI and CAC 40. The strongest association has been displayed with Bovespa and RTSI. There seems to be no or minimal impact of the Nikkei index on Hang Seng Index prices.

6. Relationship between Nikkei index with other world capital market indices: Nikkei is short for Japan's Nikkei 225 Stock Average, the leading and most-respected index of Japanese stocks. It is a price-weighted index comprised of Japan's top 225 blue-chip companies traded on the Tokyo Stock Exchange. The study further looked into the relationship between Nikkei index, assumed to be a dependent variable with other world capital market indices, which were assumed to be independent variables.

**Table 7: Pearson Coefficient of Correlation between Nikkei index with other World Capital Market Indices.**

Nikkei	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	83.99%	83.18%	69.28%	87.56%	55.25%	3	No
Nasdaq	88.39%	88.38%	62.11%	84.63%	51.35%	3	No
Dow Jones	84.83%	84.90%	65.94%	86.50%	56.09%	3	No
Shanghai	46.95%	43.22%	33.17%	77.69%	26.33%	0	No
Hang Seng	63.15%	64.94%	61.65%	79.46%	40.59%	0	No
BSE 30	84.87%	85.71%	54.39%	80.98%	55.75%	3	No
Dax Index	76.99%	73.74%	60.09%	82.66%	44.23%	1	No
CAC 40	65.74%	65.28%	80.31%	86.25%	59.80%	2	No
Bovespa	77.79%	78.62%	48.62%	77.42%	19.56%	0	No
RTSI	53.35%	51.95%	54.85%	79.36%	33.43%	1	No
TSXE	48.78%	43.81%	60.79%	79.48%	20.52%	0	No

As may be observed from Table 7, No relationship could be established with any of the other stock market indices under study. The study also observed not so strong positive correlation with S&P 500 Nasdaq, Dow Jones and BSE 30. There seems to be no impact of Shang Seng, Hang Seng Index and Bovespa on the Nikkei index prices.

7. Relationship between BSE index with other world capital market indices: S&P BSE SENSEX, first compiled in 1986, was calculated on a "Market Capitalization-Weighted" methodology of 30 component stocks representing large, well-established and financially sound companies across key



sectors. The study further looked into the relationship between BSE index, assumed to be a dependent variable with other world capital market indices.

**Table 8: Pearson Coefficient of Correlation between BSE index with other World Capital Market Indices**

BSE Index	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	89.84%	91.35%	67.89%	92.49%	83.56%	5	Yes
Nasdaq	87.43%	89.35%	81.70%	96.75%	83.33%	5	Yes
Dow Jones	91.18%	92.40%	66.67%	91.04%	83.77%	4	Yes
Shanghai	68.31%	73.86%	35.60%	87.21%	42.88%	1	No
Hang Seng	79.64%	81.27%	92.38%	94.70%	92.23%	4	Yes
Nikkei	85.71%	84.87%	54.39%	80.98%	55.75%	3	No
Dax Index	81.76%	85.85%	88.00%	97.41%	80.19%	5	Yes
CAC 40	74.87%	79.49%	61.85%	86.82%	84.79%	2	No
Bovespa	91.03%	92.18%	98.15%	98.46%	82.39%	5	Yes
RTSI	73.23%	76.51%	87.65%	96.66%	91.50%	3	No
TSXE	55.33%	61.94%	91.75%	94.60%	36.65%	2	No

As may be observed from the Table 8, Positive correlation could be proved in 6 out of 11 cases implying value of BSE Index can be influenced by change in the value of Nasdaq, S&P 500, Dow Jones, DAX Index, Hang Seng and Bovespa Index. The strongest association has been displayed with Nasdaq, S&P 500 and Bovespa. There seems to be no or minimal impact of the indices such as Shanghai, CAC 40 and TSXE.

8. Relationship between DAX index with other world capital market indices: Dax index is the stock index that represents 30 of the largest and most liquid German companies that trade on the Frankfurt Exchange. The study further looked into the relationship between DAX index, assumed to be a dependent variable with other world capital market indices.

**Table 9: Pearson Coefficient of Correlation between DAX index with other World Capital Market Indices**

DAX Index	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	92.04%	90.49%	82.38%	94.12%	87.39%	5	Yes
Nasdaq	90.62%	86.62%	88.16%	97.13%	80.46%	5	Yes
Dow Jones	92.15%	90.67%	79.45%	92.15%	82.47%	4	Yes
Shanghai	66.34%	63.40%	43.68%	82.06%	40.75%	1	No
Hang Seng	74.13%	75.02%	89.06%	91.88%	83.99%	3	No
Nikkei	76.99%	73.74%	60.09%	82.66%	44.23%	1	No
BSE 30	85.85%	81.76%	88.00%	97.41%	80.19%	5	Yes
CAC 40	89.69%	91.11%	83.13%	91.40%	85.94%	5	Yes
Bovespa	85.43%	86.06%	82.51%	94.50%	68.69%	4	Yes
RTSI	75.42%	80.04%	79.80%	94.65%	68.14%	2	No
TSXE	64.60%	60.53%	82.20%	93.68%	29.24%	2	No

As may be observed from the Table 9, Positive correlation could be proved in 6 out of 11 cases implying value of Dax Index can be influenced by change in the value of Nasdaq, S&P 500, Dow Jones, BSE 30, CAC 40 and Bovespa Index. The strongest association has been displayed with Nasdaq, S&P 500, BSE 30 and CAC 40. There seems to be no or minimal impact of the indices such as Shanghai and Nikkei.

9. Relationship between CAC 40 index with other world capital market indices : The CAC 40, the most widely-used indicator of the Paris market, reflects the performance of the 40 largest equities listed in France, measured by free-float market-capitalization and liquidity. The study further looked into the relationship between CAC 40 index, assumed to be a dependent variable with other world capital market indices. CAC 40.

**Table 10: Pearson Coefficient of Correlation between CAC 40 index with other World Capital Market Indices**

CAC 40	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	88.15%	85.40%	86.86%	91.06%	86.01%	5	Yes
Nasdaq	78.46%	75.06%	79.03%	87.02%	83.83%	2	No
Dow Jones	88.87%	85.57%	83.35%	90.05%	83.68%	5	Yes
Shanghai	67.09%	60.63%	43.41%	81.50%	31.44%	1	No
Hang Seng	83.73%	82.35%	76.03%	88.24%	84.45%	4	Yes
Nikkei	65.74%	65.28%	80.31%	86.25%	59.80%	2	No
BSE 30	79.49%	74.87%	61.85%	86.82%	84.79%	2	No
Dax Index	89.69%	91.11%	83.13%	91.40%	85.94%	5	Yes
Bovespa	90.96%	89.66%	57.44%	83.99%	75.61%	3	No
RTSI	91.75%	90.60%	69.13%	87.68%	71.67%	3	No
TSXE	75.35%	70.48%	72.90%	93.67%	55.79%	1	No

As may be observed from the Table10, Positive correlation could be proved in 4 out of 11 cases implying value of CAC 40 Index can be influenced by change in the value of S&P 500, Dow Jones, Hang Seng and DAX Index. Not so strong correlation has been also observed with Bovespa and RTSI. There seems to be no or minimal impact of the indices such as Shanghai and TSXE.

11. Relationship between Bovespa index with other world capital market indices: The Bovespa Index is the flagship index of the Brazilian stock exchange. The index includes 68 of the 370 companies listed on the exchange, which represent roughly 70% of the exchange's total capitalization and 80% of its trades. The study further looked into the relationship between Bovespa index, assumed to be a dependent variable with other world capital market indices.

**Table 12: Pearson Coefficient of Correlation between Bovespa index with other World Capital Market Indices**

Bovespa	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	91.31%	91.35%	62.63%	87.99%	64.78%	3	No
Nasdaq	83.94%	83.09%	76.17%	92.94%	63.79%	3	No
Dow Jones	92.89%	92.84%	62.93%	87.18%	64.66%	3	No
Shanghai	79.17%	76.86%	37.32%	88.20%	22.08%	1	No
Hang Seng	93.11%	93.29%	93.50%	95.80%	81.78%	5	Yes
Nikkei	77.79%	78.62%	48.62%	77.42%	19.56%	0	No
BSE 30	92.18%	91.03%	98.15%	98.46%	82.39%	5	Yes
Dax Index	85.43%	86.06%	82.51%	94.50%	68.69%	4	Yes
CAC 40	90.96%	89.66%	57.44%	83.99%	75.61%	3	No
RTSI	88.25%	87.58%	88.85%	97.20%	76.43%	4	No
TSXE	67.89%	64.23%	93.06%	92.75%	63.33%	2	No

As may be observed from the Table 12, Positive correlation could be proved in 3 out of 11 cases implying value of Bovespa Index can be influenced by change in the value of Hang Seng, BSE 30 and DAX Index. Not so strong association can be observed with S&P 500, Nasdaq, Dow Jones and CAC



40. There seems to be no or minimal impact of the indices such as Shanghai and Nikkei.

12. Relationship between RTSI index with other world capital market indices: RTS Index is cap-weighted composite index calculated based on prices of the 50 most liquid Russian stocks of the largest and dynamically developing Russian issuers presented on the Moscow Exchange. The study further looked into the relationship between RTSI index, assumed to be a dependent variable with other world capital market indices.

**Table 13: Pearson Coefficient of Correlation between RTSI index with other World Capital Market Indices**

RTSI	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	80.91%	81.00%	68.65%	90.19%	70.44%	3	No
Nasdaq	65.18%	63.56%	73.23%	91.60%	69.39%	1	No
Dow Jones	80.88%	80.17%	70.73%	89.68%	72.81%	3	No
Shanghai	72.89%	70.51%	35.02%	84.31%	44.14%	1	No
Hang Seng	82.43%	81.51%	88.40%	92.33%	83.00%	5	Yes
Nikkei	53.35%	51.95%	54.85%	79.36%	33.43%	0	No
BSE 30	76.51%	73.23%	87.65%	96.66%	91.50%	3	No
Dax Index	75.42%	80.04%	79.80%	94.65%	68.14%	2	No
CAC 40	91.75%	90.60%	69.13%	87.68%	71.67%	3	No
Bovespa	88.25%	87.58%	88.85%	97.20%	76.43%	4	Yes
TSXE	62.66%	60.51%	86.73%	95.65%	24.83%	2	No

As may be observed from the Table 13, Positive correlation could be proved in 2 out of 11 cases implying value of RTSI Index can be influenced by change in the value of Hang Seng and Bovespa. Not so strong association can be observed with S&P 500, BSE 30, Dow Jones and CAC 40. There seems to be no or minimal impact of the indices such as Nasdaq, Shanghai and Nikkei.

13. Relationship between TSXE index with other world capital market indices: The TSXE is the headline index for the Canadian equity market. The TSXE Composite Index contains stocks of the largest companies on the Toronto Stock Exchange (TSX). The study further looked into the relationship between TSXE index, assumed to be a dependent variable with other world capital market indices.

**Table 14: Pearson Coefficient of Correlation between TSXE index with other World Capital Market Indices**

TSEX	On the basis of Standard Deviation	On the basis of Average Deviation	On the basis of Average Values	On the basis of Maximum Values	On the basis of Minimum Values	Number of times >80%	Hypothesis Proved
S&P 500 Index	75.95%	71.78%	78.10%	93.00%	38.40%	1	No
Nasdaq	71.97%	67.09%	85.24%	91.49%	37.61%	2	No
Dow Jones	77.92%	73.65%	76.41%	91.26%	39.43%	1	No
Shanghai	42.56%	36.54%	28.42%	82.31%	-7.42%	1	No
Hang Seng	60.30%	57.65%	92.20%	91.17%	31.22%	2	No
Nikkei	48.78%	43.81%	60.79%	79.48%	20.52%	0	No
BSE 30	61.94%	55.33%	91.75%	94.60%	36.65%	2	No
Dax Index	64.60%	60.53%	82.20%	93.68%	29.24%	2	No
CAC 40	75.35%	70.48%	72.90%	93.67%	55.79%	1	No
Bovespa	67.89%	64.23%	93.06%	92.75%	63.33%	2	No
RTSI	62.66%	60.51%	86.73%	95.65%	24.83%	2	No

As may be observed from the Table 14, Strong Positive correlation could not be proved with any of the 11 global indices. There seems to be no or minimal impact of the indices such as Nasdaq.

**CONCLUSION:** While S&P 500, Nasdaq, Dow Jones, Dax Index, BSE 30 and CAC 40 index have shown strong positive co relationship among themselves. Indices like Shanghai, TSXE and Nikkei have displayed almost nonexistent coherency with other stock indices. Bovespa, Hang Seng, BSE 30 and DAX index seems to have a tangent influence on each other's stock prices. RTSI has portrayed certain movements in tandem with Hang Seng and Bovespa but no relationship with other indices. Thus, it can be safely concluded that that the markets do react to global cues and any happening in the global scenario be it macroeconomic or country specific (foreign trade channel) affect the various markets.

**Policy Implications of the Study:** The current study has demonstrated strong to weak relationship among various global indices. However, there are divergent views on the multiplicity of factors impacting the share price movements. So far, this study provides some directional data analytics in future prediction models for capital markets. The study of the existence of interlinkages among international capital markets has serious implications on determining the extent of portfolio diversification as well as macroeconomic policies of individual countries. An insight into international capital market relationships also have policy implications on how economic policy changes can be initiated by regulatory authorities/policy makers at the national level for different countries. Findings on the nature of co- movements or long term dependencies among various global indices can be used as a ready reference to comprehend gains derived from portfolio diversification and indicate their market vulnerabilities.

Further, the study findings shall enable Indian investors to comprehend the level of interdependence among the major stock markets in the world and its impact on Indian stock market. Study of level of correlation between Indian stock market and other major stock markets, shall be useful to Indian investors in planning for international price arbitrage and international portfolio diversification.

The study can be augmented with a deeper evaluation of the multiple domestic and international factors impacting capital markets. The interdependencies of the world markets has been evidently concluded by the researchers, further studies can be undertaken to determine the extent of such relationships. Arising out of the conclusions, is a pertinent question whether international diversification of investment is desirable and profitable regarding both risk and return, which could be topic for further studies in this area.

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