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Major Asian Stock Indices inter-relations during PHEIC Declarations; with emphasis to SHCOMP.

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Abstract

The nations of the world get into high alert when the World Health organisation declares Public Health Emergency of International Concern. It affects various economies and industries due to the preventive health measures taken by nations and lock downs. In the context of the pandemic Covid-19 this paper tries to analyses the reactions of five major Asian Stock indices to four PHEIC declarations after the year 2000. In this investigation it is found that during the SARS which started in China, the Chinese stock index SHCOMP had effects on the other major Asian Stock Indices. The other pandemics that originated in other nations the SHCOMP had very less effects on the Asian Stock Indices. This paper looks forward to further studies of stock indices effects during Covid-19.

Introduction

The economy willing to grow has many positive factors that help them. But it is also proven that there ae many other factors that pull down the economy. Any of these factors whether be positive or negative, normally gets reflected in the stock market indices. This paper is comparative analysis of the movements of Asia's five major stock indices- SHCOMP, HSI, Nikkei 225, Nifty 50, and SENSEX during the time of epidemic or pandemic that affected the global economy after the year 2000. This analysis helps to find out the movements of the five indices during the time range of Public Health Emergency of International Concern (PHEIC) declared by World Health Organisation (WHO) for the four PHEIC – SARS, Swine Flu, Ebola and Zika. The paper also intends to find out if there was any influence of SHCOMP on the other four major indices.

Past Studies (Review of Literature)

From the inquiry of various journals, it was found that there were very less studies pertaining to the area of study in which a public health matter was considered. However, the stock market's reactions to various other economic factors were available. The paper titled "Comparative Analysis of Indian Stock Market with International Markets" by Debjiban Mukherjee (2007). The paper captures the trends, similarities and patterns in the activities and movements of the Indian Stock Market in comparison to its international counterparts.
and other research papers were reviewed to set a frame work for the analysis.
In 2014 the paper "How Does Stock Market Volatility React to Oil Shocks?" authored by Andrea Bastianin and Matteo Manera studied the impact of oil price shocks on U S stock market volatility using bivariate structural VAR Models. It was found in the study that stock volatility responds significantly to oil price shocks caused by sudden changes in aggregate and oil-specific demand, while the impact of supply-side shocks was negligible.
The details of the five major Asian Stock Indices considered under this study are

Table 1.1 Major Asian Stock Indices

Index	Stock Exchange	Nation
SHCOMP	Shanghai Stock Exchange	China
HSI	HongKong Stock Exchange	Hong Kong
NIKKEI 225	Tokyo Stock Exchange	Japan
NIFTY 50	National Stock Exchange	India

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SENSEX	Bombay Stock Exchange	India

The four PHEIC that are considered under this study are

Table 1.2 PHEIC

Virus	Originated Country	Period	PHEIC Time Range
SARS (Severe Acute Respiratory Syndrome)	China	2002-2003	12-03-2003 to 05-07-2003
Swine Flu (H1N1)	Mexico	2009-2010	25-04-2009 to 11-08-2010
Ebola	West Africa	2014-2016	08-08-2014 to 29-03-2016
ZIKA	Brazil	2016	1-02-2016 to 18-09-2016

Problem

The Research problem for this paper is the investigate the relations between Asia's five major stock indices- SHCOMP, HSI, Nikkei 225, Nifty 50, SENSEX and how was the relation of the SHCOMP with that of the other indices taken for study during the time of SARS, Swine Flu, Ebola and Zika which was declared by PHEIC by WHO.

Objectives

The main Objective of the study include to find out the correlation between the stock indices mentioned during each of the epidemic or pandemic.

1. To find the correlation between various Asian indices.
2. To find out if the variance of indices are explained by SHCOMP.
3. To create a base for the interested to expand the study.

Methodology

For the study, the stock indices daily closing data was taken from the secondary sources www.macrotrends.net for SHCOMP, HSI and Nikkei 255 and www.nseindia.com for Nifty 50 and www.bseindia.com for SENSEX for the calculations which is done in percentage returns. To find out the relations between the indices during each epidemic or pandemic their Correlation is found out from the date of WHO declaring the start of PHEIC to the date of WHO declaring the end of PHEIC.

In the second part of the analysis the variance of other indices explained by SHCOMP is analysed. The *f* test is used to find out the significance and testing hypothesis. For this purpose, the regression analysis is used and the R squared values are compared to find out the percentage of influence. The study is done at 5 % level of significance.

Hypothesis

H0 = Variance of independent variable (other indices) is explained by the dependent variable (SHCOMP)

H1 = Variance of independent variable (other indices) is not explained by the dependent variable (SHCOMP)

The R squared value greater than 0.60 (60%) is considered substantial and the values below 0.60 is considered as weak.

Analysis

A. SARS (Severe Acute Respiratory Syndrome)

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The SARS which was first identified in Guangdong in China was declared as PHEIC on 12-03-2003 by WHO and extended till 05-07-2003. Since the 05-07-2003 was not a working day in stock exchanges the next working day 07-07-2003 was taken as the last date of the study. A total of 83 days closing index is considered.

Part 1

The part one of the study looks at the correlation of the stock indices for the time period mentioned

Table 2.1 Correlation Matrix

	SHCOMP	HSI	NIKKEI 225	NIFTY 50	SENSEX
SHCOMP	1				
HIS	-0.1169	1			
NIKKEI 225	-0.09155	0.473131	1		
NIFTY 50	-0.13471	0.456671	0.408021	1	
SENSEX	-0.12876	0.422631	0.361331	0.976793	1

The analysis showed that all the indices except SHCOMP was having a positive correlation during these times. And SHCOMP showed negative correlation with all the other indices. And it is also found that only during the SARS the SHCOMP was negatively correlating with the other indices.

Part 2

In Part 2 of the analysis the *f* test and regression analysis is done considering SHCOMP as independent variable and the other indices as dependent variable.

Table 2.2

***f* test results**

f	HSI	Nikkei 225	Nifty 50	Sensex
f Value	1.125736	0.720131	1.420093	1.284308
Significance	0.29184	0.398602	0.236868	0.260443
Criteria	P>.05	P>.05	P>.05	P>.05
H0	Accepted	Accepted	Accepted	Accepted

Table 2.3

Regression analysis table taking SHCOMP as independent variable

Regression Statistics	*HSI*	*Nikkei 225*	*Nifty 50*	*Sensex*
Multiple R	0.117079	0.093873	0.131263	0.124933
R Square	0.013707	0.008812	0.01723	0.015608
Adjusted R Square	0.001531	-0.00342	0.005097	0.003455
Standard Error	1.113833	1.350737	1.057535	1.030024
Observations	83	83	83	83

Considering the *f* test it is found that there has been an influence of SHCOMP on the other Asian indices. All the significance level shows are >.05 which proves the above statement. When calculating R Square it is found that SHCOMP is

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having very less expression values.

B. Swine Flu (H1N1)

Swine flu which affected during the year 2009-2010 was first started in Mexico, also costed the life of 2,00,000 people. WHO declared PHEIC on 25-04-2009 and lasted till 11-08-2010. The date of analysis is taken from 27-04-2009 till 11-08-2010; 337 days data are considered for the study.

Part 1

The part one of the study looks at the correlation of the stock indices for the time period mentioned

Table 3.1 Correlation Matrix

	SHCOMP	***HSI***	***NIKKEI 225***	***NIFTY 50***	***SENSEX***
SHCOMP	1				
HSI	0.523636	1			
NIKKEI 225	0.317583	0.584502	1		
NIFTY 50	0.277289	0.505778	0.211741	1	
SENSEX	0.28472	0.504541	0.216496	0.994351	1

The correlation analysis shows that all the five indices had a positive correlation during the time of Swine flu. HSI and NIKKEI 225 is found to have the highest positive correlation in international indices category.

Part 2

In Part 2 of the analysis the *f* test and regression analysis is done considering SHCOMP as independent variable and the other indices as dependent variable.

Table 3.2: *f* test results

f	**HSI**	**Nikkei 225**	**Nifty 50**	**Sensex**
f Value	126.5565	37.577774	27.90325	29.55274
Significance	4.02E-25	2.47E-09	2.3E-07	1.05E-07
Criteria	P<.05	P<.05	P<.05	P<.05
H0	Not Accepted	Not Accepted	Not Accepted	Not Accepted

Table 3.3: Regression analysis table taking SHCOMP as independent variable

Regression Statistics	***HSI***	***Nikkei 225***	***Nifty 50***	***Sensex***
Multiple R	0.523636	0.317583	0.277289	0.28472
R Square	0.274195	0.100859	0.076889	0.081066
Adjusted R Square	0.272028	0.098175	0.074133	0.078323
Standard Error	1.27886	1.312266	1.620239	1.604136
Observations	337	337	337	337

Considering the *f* test the investigator found that SHCOMP was having no influence on other Asian Indices as the significance level was <.05 for all the indices. This proofs the acceptance of alternate hypothesis in all the dependent indices. Values of R Square it is found that SHCOMP is having very less regression values.

C. EBOLA

The year 2014 to 2016 was affected by EBOLA which was started from West Africa. WHO declared it un PHEIC on 08-08-2014 and was terminated the status on 29-03-2016.

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The same range was selected for the study which had 429 observations.

Part 1

The part one of the study looks at the correlation of the stock indices for the time period mentioned

Table 4.1 Correlation Matrix

	SHCOMP	***HSI***	***NIKKEI 225***	***NIFTY 50***	***SENSEX***
SHCOMP	1				
HSI	0.46921	1			
NIKKEI 225	0.228825	0.476303	1		
NIFTY 50	0.222267	0.478421	0.3925	1	
SENSEX	0.217688	0.479187	0.387644	0.995545	1

The correlation analysis shows that all the five indices had a positive correlation during the time of EBOLA. HSI and SENSEX is found to have the highest positive correlation in international category. The positiveness of all correlation forces to accept the null hypothesis.

Part 2

In Part 2 of the analysis the *f* test and regression analysis is done considering SHCOMP as independent variable and the other indices as dependent variable.

Table 4.2: *f* test results

f	*HSI*	*Nikkei 225*	*Nifty 50*	*Sensex*
f Value	120.5467	23.59357	22.19121	21.24127
Significance	7.16E-25	1.67E-06	3.34E-06	5.36E-06
Criteria	P<.05	P<.05	P<.05	P<.05
H0	Not Accepted	Not Accepted	Not Accepted	Not Accepted

Table 4.3: Regression analysis table taking SHCOMP as independent variable

Regression Statistics	***HSI***	***Nikkei 225***	***Nifty 50***	***Sensex***
Multiple R	0.46921	0.228825	0.222267	0.217688
R Square	0.220158	0.052361	0.049403	0.047388
Adjusted R Square	0.218332	0.050142	0.047176	0.045157
Standard Error	1.09483	1.407537	0.945114	0.940786
Observations	429	429	429	429

Considering the *f* test the investigator found that SHCOMP was having no influence on other Asian Indices as the significance level was <.05 for all the indices. This proofs the acceptance of alternate hypothesis in all the dependent indices. Values of R Square it is found that SHCOMP is having very less regression values.

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D. ZIKA

The Zika virus started in Brazil was later spread across the world. PHEIC dates for ZIKA virus was from 1-02-2016 to 18-09-2016. The number of observations considered are 167. The Dates taken for the study are from 01-02-2016 to 20-09-2016.

Part 1

The part one of the study looks at the correlation of the stock indices for the time period mentioned

Table 5.1 Correlation Matrix

	SHCOMP	***HSI***	***NIKKEI 225***	***NIFTY 50***	***SENSEX***
SHCOMP	1				
HSI	0.393441	1			
NIKKEI 225	0.127076	0.546139	1		
NIFTY 50	0.213264	0.62758	0.417273	1	
SENSEX	0.212095	0.625634	0.420646	0.995418	1

The correlation analysis shows that all the five indices had a positive correlation during the time of Zika Virus. HSI and Nifty 50 is found to have the highest positive correlation in international category. The positiveness of all correlation forces to accept the null hypothesis.

Part 2

In Part 2 of the analysis the *f* test and regression analysis is done considering SHCOMP as independent variable and the other indices as dependent variable.

Table 5.2: *f* test results

f	***HSI***	***Nikkei 225***	***Nifty 50***	***Sensex***
f Value	30.21902	2.708196	7.862048	7.771995
Significance	1.44E-07	0.101737	0.005654	0.005929
Criteria	P<.05	P>05	P<.05	P<.05
H0	Not Accepted	Accepted	Not Accepted	Not Accepted

Table 5.2: Regression analysis table taking SHCOMP as independent variable

Regression Statistics	***HSI***	***Nikkei 225***	***Nifty 50***	***Sensex***
Multiple R	0.393441	0.127076	0.213264	0.212095
R Square	0.154795	0.016148	0.045482	0.044984
Adjusted R Square	0.149673	0.010186	0.039697	0.039196
Standard Error	1.037556	1.690294	0.892779	0.894999
Observations	167	167	167	167

Considering the *f* test the investigator found that SHCOMP was having no influence on other Asian Indices except Nikkei 225. The Japanese index showed a significance >.05 which results in accepting in it null hypothesis. In all the other cases the alternate

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hypothesis is accepted. Values of R Square it is found that SHCOMP is having very less regression values.

Summary

The study shows that all the five indices are positively correlated during the time of PHEIC that was originated outside their nation or Asian continent. The SARS which was originated in China had impacted the stock indices with the SHCOMP having negative correlation with all the other indices. It is also found the HSI has better positive correlation with other nation's indices and least positive correlation is shown by SHCOMP. The *f* test also proves that during the time of SARS the SHCOMP had influence on other Asian Indices. Where as in all the other cases except Nikkei 225 during ZIKA all the other epidemic\pandemic there is no significant impact of SHCOMP on other Asian Indices.

When it comes to R Squared all the Independent Variable were not able to prove their variance with the Dependent Variable for the Epidemic/pandemic that was under study. This shows that changes in the Asian indices during these times where not influenced by SHCOMP.

References.

Bastianin, A., & Manera, M. (2015). How does stock market volatility react to oil shocks? *SSRN Electronic Journal*. doi:10.2139/ssrn.2550719.

Becker, K. G., Finnerty, J. E., & Gupta, M. (1990). The Intertemporal Relation Between the U. S. and Japanese Stock Markets. The Journal of Finance. 45(4), 1297.

Froot, K., & Dabora, E. (1998). How are stock prices affected by the location of trade? doi:10.3386/w6572.

Levin, R. I. (2011). *Statistics for management*. Pearson Education India.

Masih, A. M. M., & Masih, R. (1997). A comparative analysis of the propagation of stock market fluctuations in alternative models of dynamic causal linkages. Applied Financial Economics, 7(1), 59-74.

Mukherjee, Debjiban. (2007). Comparative Analysis of Indian Stock Market with International Markets. Great Lakes Herald, 1(1).

Rosen, R. (2006). Merger momentum and investor sentiment: The stock market reaction to merger announcements*. *The Journal of Business, 79*(2), 987-1017. doi:10.1086/499146

Website References

2009 H1N1 flu pandemic timeline. (2020, February 21). Retrieved from https://www.cdc.gov/flu/pandemic-resources/2009-pandemic-timeline.html

Bse (formerly Bombay stock exchange) - Live stock/share market updates from Asia's premier stock exchange. Get all the current stock/share market news; real-time information to investors on s&p bse sensex, stock quotes, indices, derivatives and corporate announcements. (n.d.). Retrieved from https://www.bseindia.com

CDC SARS response timeline. (2018, July 18). Retrieved from https://www.cdc.gov/about/history/sars/timeline.htm

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Ebola virus disease: An emerging and re-emerging viral threat. (n.d.). Retrieved from https://www.sciencedirect.com/science/article/pii/S0896841119306572

From where did the 2009 'swine-origin' influenza A virus (H1N1) emerge? (n.d.). Retrieved from https://virologyj.biomedcentral.com/articles/10.1186/1743-422X-6-207

Gordon, A. (2020, January 31). WHO declares global health emergency over coronavirus: 4 questions answered. Retrieved from https://theconversation.com/who-declares-global-health-emergency-over-coronavirus-4-questions-answered-130940

India, N. (2020, April 13). NSE - National stock exchange of India Ltd: Live share/Stock market news & updates, quotes- Nseindia.com. Retrieved from https://www.nseindia.com

Insight into 2019 novel coronavirus — an updated intrim review and lessons from SARS-Cov and MERS-Cov. (n.d.). Retrieved from https://www.sciencedirect.com/science/article/pii/S1201971220302046

Macrotrends | The long term perspective on markets. (n.d.). Retrieved from https://www.macrotrends.net