

THE PANDEMIC FROM STOCK MARKET VIEWPOINT: A COMPARATIVE ANALYSIS

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Abstract

The two incidents around the world that shook the entire global stock market is the Covid-19 pandemic and the Sub-prime Crisis of 2007-08. Famously known as Mortgage crisis, the latter one resulted into steeper falls as observed through the results obtained on a one and half month time span studied for both the time periods. While the pandemic has resulted into a long-lasting effect. Both the periods witnessed high correlations among five stock indices studied randomly from around the world. For the satisfactory part this might also become a positive aspect towards climbing up again in the upcoming times. Various tools like charts, descriptive statistics, analysis of variance, etc. have made this study authentic and reliable.

Keyword: COVID-19, Sub-Prime Crisis, Stock Market.

INTRODUCTION

The Covid-19 pandemic is one of the biggest threats, world has faced till date. The novel virus led to destruction of economies around the world. This virus didn't even leave the Third World Countries. Major developed economies like USA, UK, Germany, etc. faced severe consequences. The virus declared by the name "Covid-19" by the W.H.O. took hold of the developing nations like India, China, etc. as well. A complete sentiment of the year 2020 got disturbed by the virus and inefficiency to beat it by devising a vaccine for it. As per the data available in the mid-December 2020 the number of total cases around the world have risen to more than 70 million and India alone forming around 10 million cases. The number of deaths in India has exceeded 140,000 by the deadly virus. The virus has primarily affected the stock market around the world. The market crashed in the months of March and majorly in April as it always works on the future expectations and sentiments. A sense of fear around the world grasped the market as well. Being the origination of virus, Wuhan City has recovered around full according to the Chinese Government. The vaccination developed by many countries may help this achieve throughout the world too. The similar breakdown in stock market was seen in the 2007-08 as well which is popularly known as the Subprime Crisis. The mortgage-backed securities defaulted on a heavy scale in US leading to a period which we all know today as period of Great Recession. Though the market fell more heavily in the current pandemic, still a proper validation will confirm this. The decision regarding which particular period was more drastically harmful to the economies will be a question to be dealt with overall economy too, in a specific manner.

LITERATURE REVIEW

Tripathi, S. and Chaubey, A. (2020) observed the intensity of fall during the two time periods over a six-month time span. The result showed that there was a sharp yet decent fall in the pandemic phase though the overall decline during the former period was higher than the pandemic period. They used One-way Anova to compare the performance of the stock indices of different countries and graphs and correlations to make a comparative analysis between the two incidents.

Castellanos, A. M. et. al (2011) saw that New York Stock Exchange fluctuations had a considerable impact, for the first two days, in countries such as Mexico, Chile, Peru, Canada, Germany, etc. Only eight working days passed and clearly 21 stock exchanges around the world can be seen as getting affected. They made a use of Pearson's parameter eventually concluding that all the stock markets around the world moved in complete correlation with each other during the period under consideration.

D McMinn (2020) observed a major decline through cycles and suggested that the recession in US were possible in the year 2020. A bearish market commenced on February 12 and a severe recession may come impactful.

D Zhang et. al (2020) gives statistics indicating the impact of Covid-19 on stock market risks around the market. The virus has taken thousands of lives around the world and also it is known that the intensity of fluctuation in the market depends upon the scale of event in any country. Thus, an uncertainty prevails regarding the pandemic in the stock markets.

OBJECTIVE OF STUDY

Following are the primary objectives of the study.

To compare five stock indices of five different countries.

To determine the average fall in prices in both the scenarios.

To ascertain the most vulnerable stock index.

To provide investors valuable details of the most crucial period in both the situation.

RESEARCH METHODOLOGY

The Adjusted Closing of every trading day has been obtained for both the time periods under consideration. This data is availed from the Yahoo Finance as well as the software used for making such analysis is Python version 2.7 Jupyter Notebook. The analysis is conducted on five Indices which go by the name "GSPC" indicating S&P500 of USA, "N225" indicating Nikkei of Japan, "HSI" indicating Hang Seng of Hong Kong, "GDAXI" indicating German DAX while "BSESN" indicating BSE Sensex of India. The following measures have been used to conduct the analysis: Descriptive Statistics, Anova, Correlation and Price Charts of both the periods under consideration.

FOLLOWING HYPOTHESIS WAS FORMULATED FOR THE TEST

H0: No significant difference between the mean returns of five stock indices in the two periods.

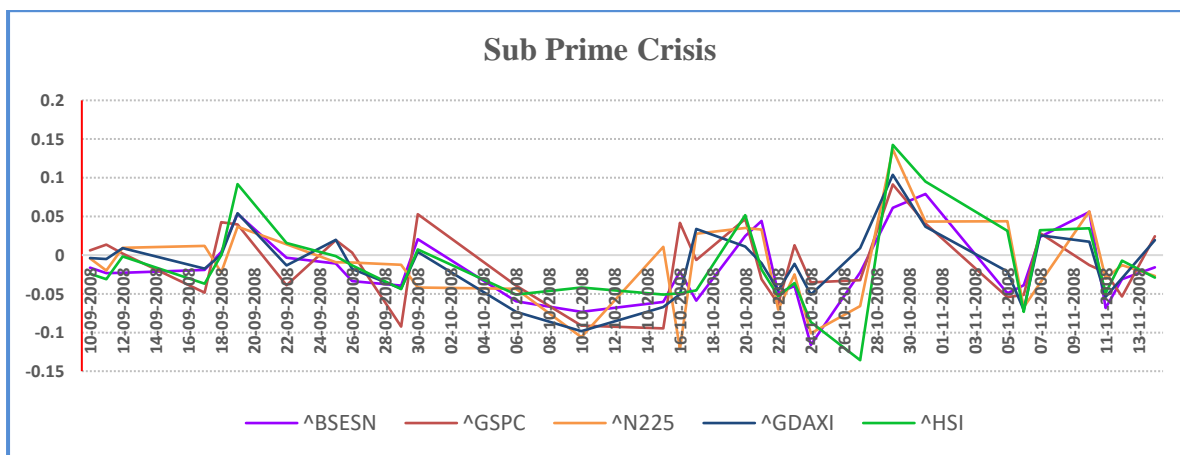
H1: There is a significant difference between the mean returns of stock indices in the two periods.

DATA ANALYSIS AND INTERPRETATION

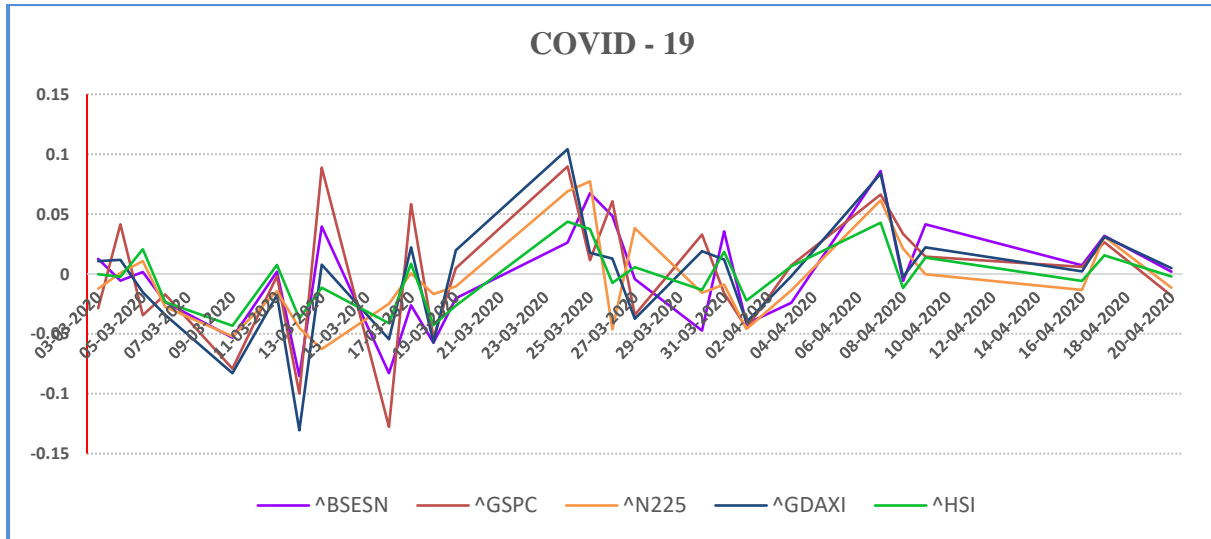
5 countries have been compared over the two periods wherein the period of almost one and half months is taken from both the Subprime crisis and the Coronavirus pandemic. The selection of one and half months was based on the time period considered as most essential for the crash in both the situations.

The API required tickers and hence the name of the indices has been kept as per the tickers allotted to these indices.

CHART OF SIMPLE RETURNS



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Both the graphs are indicating major downfalls during the one and half month's span. Further, a steeper fall can be observed in the former that is for the mortgage crisis. The levels have gone below 60 showing the intense fall as compared to the downfall of pandemic phase showing the levels below 70 but still not as low as the crisis period. Though, the coronavirus breakdown has been a more lasting one as seen from the charts. The former thus validates that in terms of steep decline, the crisis hit more heavily.

This steep downfall may be the reason of major institutions collapsing one by one during the Subprime crisis. While on the other hand the coronavirus decline is due to the fear in the minds of people regarding the virus which had no proven cure available and also the lockdowns imposed by governments around the world led to heavy losses accumulating for the companies and the governments across the world due to no trade and commerce.

DESCRIPTIVE STATISTICS

Mean			
Sub-Prime Crisis		Covid-19 Pandemic	
^BSESN	-1.0750 %	^BSESN	-0.6223 %
^GSPC	-0.7861 %	^GSPC	-0.3013 %
^N225	-1.5042 %	^N225	-0.3634 %
^GDAXI	-0.6516 %	^GDAXI	-0.2773 %
^HSI	-0.6875 %	^HSI	-0.2541 %

The negative return is as expected of the two periods, as both the periods have shown fall in prices over the term. The log returns were used for ascertaining the results as generated above. The Nikkei fell most on an average during the time span in the former crisis. While the BSE Sensex fell on an average the second most in the subprime crisis as per the data availed. The latter data relating of pandemic times shows that on an average daily basis, the Sensex fell more heavily than any other index under consideration. The Nikkei which fell heavily on an average daily basis in the previous times has become more stable.

STANDARD DEVIATIONS

Standard Deviation			
Sub-Prime Crisis		Covid-19 Pandemic	
^BSESN	4.3000 %	^BSESN	4.8950 %
^GSPC	4.6348 %	^GSPC	5.1413 %
^N225	5.2453 %	^N225	3.5451 %
^GDAXI	4.2277 %	^GDAXI	4.6329 %
^HSI	5.5394 %	^HSI	2.7432 %

The standard deviation is measured to check the spread of the data around its mean or the average value. A standard deviation of 5% indicates that the observed data is fluctuating around 5% from the mean on

an average. In the subprime crisis period, it can be seen that amongst all the five indices under study, the most volatile one was Hang Seng. While the least volatile index during such crucial times was German Dax while held strong. Further it can also be seen that the Nikkei which had the lowest mean amongst the five also showed a relatively high volatility during such times.

During the Coronavirus breakdown, the highest level of volatility was seen in the S&P500 of USA which can be reasoned as being the effect of one of the most affected countries by the novel virus around the world. The distinction lies in observing the Hang Seng which was the most volatile in the subprime times has grown to become the least volatile stock in the pandemic phase. Nikkei also improved considerably. The results of Hang Seng must be so because of the lesser impact of Coronavirus in a country like that. While others usual.

CORRELATION ANALYSIS

The Correlation Co-efficient has been among the major tools for determining the degree and direction of the relationship between two variables. The data below shows the Correlation matrix obtained using Python 2.7 between the five stock indices in the one and half months.

There is no single negative number obtained showing that all the stock indices move in the same direction up to a certain degree. Following output was obtained when the test was run: -

Correlation Table											
Sub-Prime Crisis						Covid-19 Pandemic					
	^BSES N	^GSPC	^N225	^GDAX I	^HSI		^BSES N	^GSPC	^N225	^GDAX I	^HSI
^BSE SN 00	1.0000	-	-	-	-	^BSE SN 00	1.0000	-	-	-	-
^GSP C	0.6590 42	1.0000 00	-	-	-	^GSP C	0.5752 57	1.0000 00	-	-	-
^N22 5	0.6121 27	0.3219 16	1.0000 00	-	-	^N22 5	0.5185 38	0.3634 65	1.0000 00	-	-
^GD AXI	0.7509 99	0.7596 25	0.7103 33	1.0000 00	-	^GD AXI	0.6808 45	0.7831 71	0.6128 98	1.0000 00	-
^HSI	0.786 187	0.637 091	0.748 735	0.722 725	1.000 000	^HSI	0.832 918	0.501 316	0.778 928	0.752 062	1.000 000

The data shown in the table relates to correlations observed in both the periods of downfalls. The correlation data shows that during the period of Covid-19 the stock indices have shown stronger correlations than the Sub-prime crisis. This may be the result of increased technology creating the transparency in the world market as for the globalization measures. In the first segment relating to the Crisis situation, we can see that the correlation was highest between the Hang Seng and BSE Sensex, while the lowest correlation existed between the Nikkei and the S&P500 index. All other pairs have shown moderately high correlations.

During the Pandemic phase of 2020, we can see that the highest correlation was observed between the as usual Hang Seng and BSE Sensex of India. Further, the lowest correlation still remains with the same set of pairs. The correlation between the German DAX and the S&P500 has considerably increased during the current times. These correlations are showing how strongly the stock markets of one particular country might affect the other.

ONE-WAY ANOVA

One- way ANOVA	
Sub-prime Crisis	Covid-19 Pandemic
Fvalue, pvalue= stats.f_oneway(returns_1['^BSESN'], returns_1['^GSPC'], returns_1['^N225'], returns_1['^GDAXI'], returns_1['^HSI'])	Fvalue2, pvalue2= stats.f_oneway(returns_2['^BSESN'], returns_2['^GSPC'], returns_2['^N225'], returns_2['^GDAXI'], returns_2['^HSI'])
print Fvalue, pvalue	print Fvalue2, pvalue2
F-value calculated = 0.08128964887179177, Probability value= 0.9880076862914839	F-value calculated =0.028948432474114227, Probability value = 0.9983634711070629

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ANOVA is a tool to test the equality of means when there are two or more groups involved. The standard One-way ANOVA was conducted on the observations left after dropping the entire rows with any missing observations. The probability values in both the cases are greater than the 5% mark which states that we cannot reject the null hypothesis, hence there exists no significant difference between the mean values of the given indices. This also makes it clearer that no index has been able to perform unaffected by the global pressures in such modern times. The F-values also show the same results. Concluding, it can be stated that no two groups are different which should also not mean that the groups are completely identical.

SUGGESTIONS

The analysis was made here on the basis of fewer number of statistical tools which can be increased in order to ascertain more precise results. Further the time span of this research was only of one and half months, which can be increased to obtain more reliable results. This particular study is based upon five stock indices around the world which can be increased or decreased to study specific relations or attain a broader view regarding the entire global stock market.

CONCLUSION

The research concludes that the Subprime Crisis resulted into a steeper fall in the prices of stock market indices as compared to Covid-19 situation. The negative returns showed that both the periods have resulted into investors losing their faith and trust in the stock market. Many lost their money while a few made returns by going short.

Further, the correlation data helped in ascertaining the usual output of how the globalization has connected the countries around the world with a single thread. Almost all the indices have shown moderately strong relations with each other. The data regarding Anova test also confirmed the situation that on no such indices are performing differently from each other. The conclusions have thus been arrived that the pandemic times or the crisis era, the stock market has moved as per the sentiments of investors and the latter has shown a more drastic results though the former is resulting into a long-time bleeding.

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