

Stock Market Analysis of 10 Different Countries in the Period of Disease COVID-19

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ABSTRACT

Our effort is to analyze the effect of the rampant over the economies of 10 affected nations by studying their stock market values during the COVID-19 episode. We have endowed the nations with their respective stock markets stated in brackets - Brazil(Ibovespa), Canada (S&P/TSX Composite), France (AEX), Germany (DAX 30), India (NIFTY 50), Italy (FTSE MIB), Russia (IMOEX), Spain (IBEX 35), U.K. (FTSE 100), U.S.A. (DOW JONES INDUSTRIAL AVERAGE). We have gathered the indices of stock per country from 2 March to 23rd June, collected from official website of respective stocks. In order to collect data, we had to inculcate the fundamental lessons of Statistics. R-software aided us to plot the curves of stock values providing an ease to master our project. We also formulated a Python 3.7 language program code to solidify analysis on various aspects of economy of the countries and comparison between these aspects.

Keywords— % Change, Stock Market Volatility, COVID-19, Stock Market Analysis

I. INTRODUCTION

The world today is confined into homes with an enforced pandemic situation. A pneumonia virus was detected, in Wuhan city of China, and was reported to the WHO- World Health Organization on 31 December 2019. The outbreak was declared a Public Health Emergency of International Concern on 30 January 2020. Many of nations globally have administered 1 lockdown to counter the COVID-19 phenomenon. Every coin has two sides, although lockdown policy has been successfully adopted the upshot of the virus it also resulted in economic downswing. This research paper intends to compare the most destruction of stock markets of respective countries;

the working days required to gain relative stability; the volatility in the stock market for these countries and a factor which compares the economic stability of these stock markets from 2nd March to 23rd June 2020.

II. LITERATURE REVIEW

In “Policy News and Equity Market Volatility,” NBER working paper by Baker, Bloom, Davis and Sammon (2019), we examined next-day newspaper explanations for each daily move in the U.S. stock market greater than 2.5 percent, up or down. By this criterion, there were 1,129 stock market jumps (high % change than usual) from 2 January 1900 to 24 March 2020. Most of these jumps occurred during major pandemics which took place in U.S.[1] From the article “The Unprecedented Stock Market Reaction to COVID-19” by Scott R. Baker, Nicholas Bloom, Steven J. Davis, Kyle Kost, Marco Sammon, and Tasaneeya Viratyosin (27 March 2020),from 24 February to 24 March 2020, there were 22 trading days and 18 market jumps – more than any other period in history with the same number of trading days. Jump frequency during this period is 23 times the average pace since 1900. This explains the impact of COVID – 19 on volatility of stock market in U.S.; the article also compares the volatility in stock market during the 2003 SARS epidemic, the 2015 Ebola epidemic, Bird Flu and Swine Flu epidemics with COVID-19 [2] One article [5] states that different packages announced by different countries to manage volatility of stock market; it also states effect on G.D.P. of various countries along with comparison of world G.D.P.. This study investigates the effect of COVID-19 outbreak on global markets between January 21, 2020 and April 7, 2020. Global markets are represented by Morgan Stanley Capital International (MSCI) World, emerging

market, European and G7 indices. Fourier Cointegration test detects that a long term relationship between stock markets and COVID-19. COVID-19 is a supply shock and it is a demand shock. Both aspects will impact international trade in goods and services [3]. First, previous, post-war pandemics have generally affected much less economically important nations. This one is different. Supply-chain contagion will amplify the direct supply shocks as manufacturing sectors in less-affected nations find it harder and/or more expensive to acquire the necessary imported industrial inputs from the hard-hit nations, and subsequently from each other [3]. To the extent that COVID-19 is a supply shock, exports will fall, and they will fall most in the nations that are most severely hit. To the extent that COVID-19 is a demand shock, imports will fall, and they will fall most in the trade partners of the nations that are most severely hit. As the imports and exports reduce; the domestic industries and consequently the stock markets of nations are widely affected. The real economic impact of the virus requires evaluation through multiple data lenses: (1) manufacturing supply chains; (2) tourism, transportation, and services relationships; and (3) energy and commodity demand and prices [4]. These linkages and factors have different weights for different countries. Manufacturing will show a 'V' or 'U' shape. Services, on the other hand, will experience an 'L' shape. Energy and commodity prices are showing the pivot already, and there will be winners and losers. Thus, affecting the supply-demand cycle, the nation loses its economic stability. The interlinkage between economic conditions, financial conditions and uncertainty/sentiment increases the challenges facing policy authorities. To yield an overall tight level of financial conditions, a monetary policy response would be warranted to avoid a market overshoot beyond that consistent with the expected path of the real economy [4]. These policies help the stock market to regain the economic stability

III. METHODOLOGY

A. % Change

- The indices of different countries cannot be compared directly as stocks of different countries have different divisors used to calculate the index.
- The % change between the required indices of same stock can be calculated to manipulate and compare different properties for different 3 countries.
- The % change between two points, considered with respect to the prior point is given by:

$$\% \text{ change} = ((b - a) / a) * 100;$$
 a being the prior index

B. A Method to Get the Index Where the Stock Market Stabilizes

- A group of 6 consecutive indices to be picked with % change between + 2.3 % and - 2.3 % from the population.
- 6 indices ensure indices of more than a working week and range between +2.3 % and -2.3 % ensure that the group formed is stable.
- These groups may overlap each other.
- First index of the first overlapping group can be considered as the stable index.

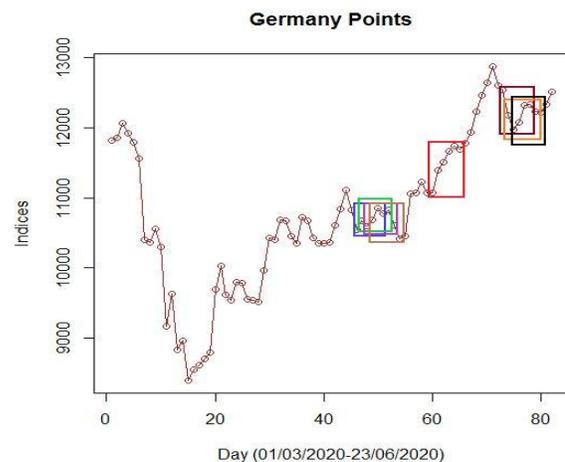


Figure 1: Germany points

- Graph in Figure 1 shows indices of a stock of Germany along with the 8 picked groups of 6 indices; here the first blue box group has first stable index is the one corresponding 46th working day from 1st march.
- More number of such groups are formed; the stability remains intact for higher number of working days (Volatility of stock market decreases).

C. Optimizations

The difference in the first index of the groups is calculated, if it is greater than 11; the first index of the prior group is further analyzed.

- If that first index belongs to the first four stable groups, that group along with the groups that are prior to it are removed from analysis as these groups show temporary stability; which means the market hasn't yet achieved stability from impact of disease COVID-19.
- If the first index does not belong to first four groups, the effect on market may be due to several other factors than disease COVID-19; hence these groups are kept for further analysis and counted as stable groups. [Refer: Figure 2]

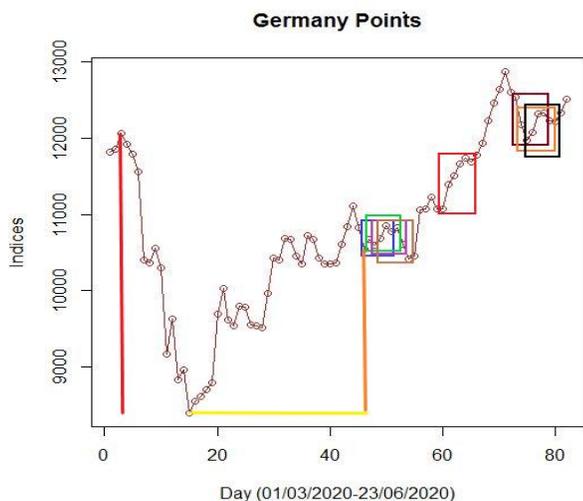


Figure 2: Germany points

D. Economic Fall

- Worst economic fall for indices can be manipulated by considering the % change between the highest index (prior to lowest index) and the lowest index. Red vertical line in above graph represents the worst economic fall.

E. Economic Growth

- Economic growth achieved after the lowest index is the % change between lowest index and further stable index found. Represented by orange vertical line in above graph.

F. Working days

- The number of working days required to achieve stability are calculated as the difference between the working day for stable index and the lowest index. Represented by Yellow horizontal line in the graph.

G. Growth Factor after Stability

- The value of first stable index of first group is stored separately; then indices after fixed interval of working days are selected and % change of each of those indices is calculated with respect to first stable index of first group.
- This fixed interval depends upon the number of stable groups formed; in order to achieve uniformity more the number of groups higher is the interval.
- Then the % changes calculated above are added together to give the growth factor, which determine growth rate over a certain interval.

IV. RESULTS AND DISCUSSION

Python code developed to study Stock Market of 10 different countries in the period of disease COVID-19

and different parameters studied to identify COVID-19 impact on different countries.

1. Country Wise Economic Fall

The Following chart [Refer: Figure 3] explains % of Destruction of the economy of the country due to COVID-19, the % change between the lowest index and highest index prior to the lowest index is evaluated. Highest % of Destruction : Brazil (40.71%) Lowest % of Destruction : Russia(25.29%).

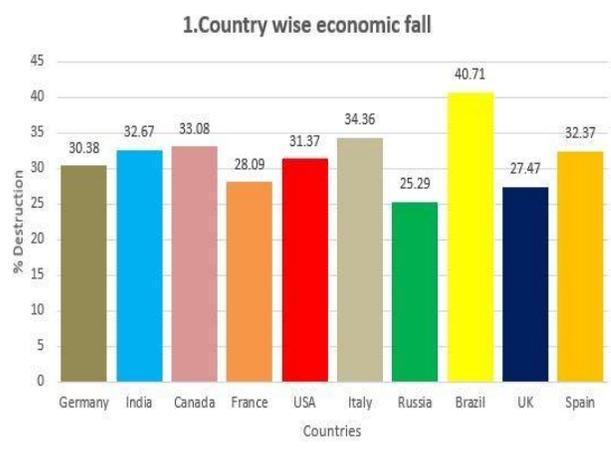


Figure 3: Country wise economic fall

2. The Following Chart [Refer: Figure 4] Explains Country Wise % Change of Index

- Highest % in index of country: Germany (24.9%)
- Lowest % index of country: Spain(4.91%).

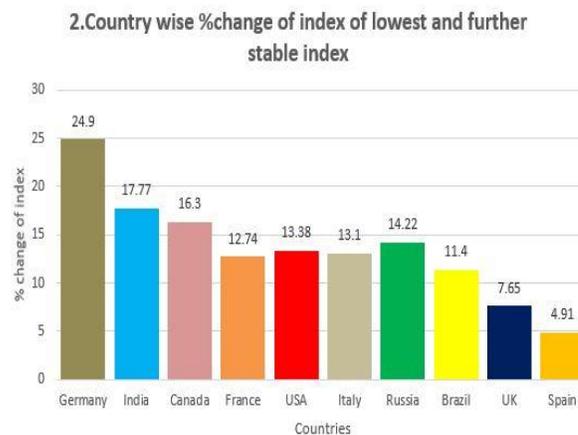


Figure 4: Country wise % change of index

3. Number of Groups of Stable Indices Formed

The Following chart [Refer: Figure 5] explains Country wise stable groups formed: Highest count of groups: Russia (30) Lowest count of groups: Germany(8).

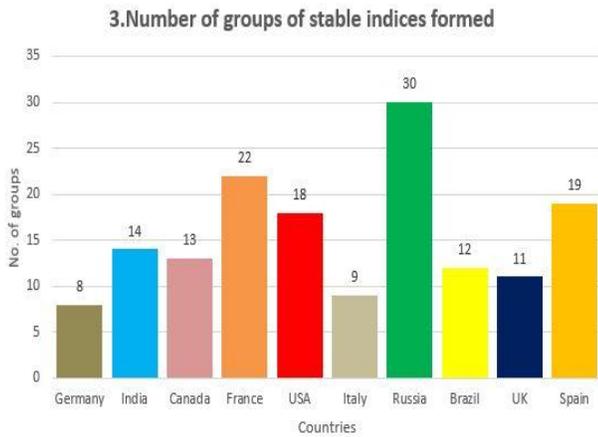


Figure 5: Number of Groups of Stable indices formed

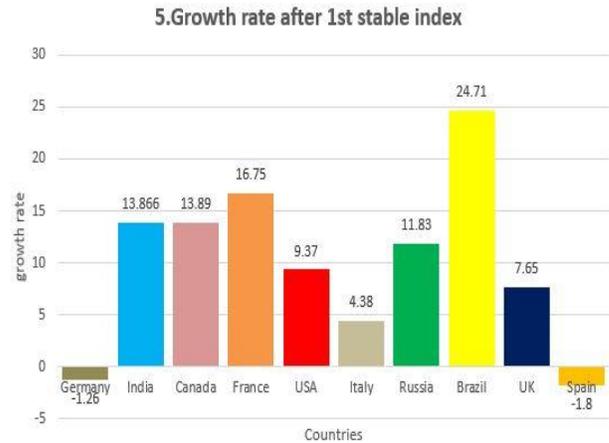


Figure 7: Growth rate after first stable index

4. Number of Working Days Required to Country to Reach its Stable Index

Refer: Figure 6 No. of working days: UK (32); Least no. of working days : Brazil(12).

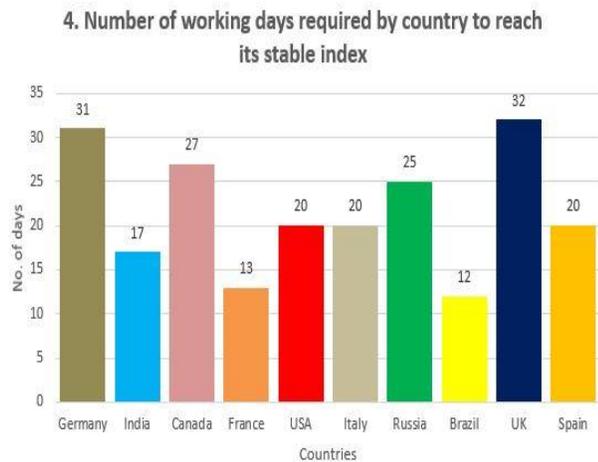


Figure 6: Number of working days required to country to reach its stable index

5. Growth Rate of Markets of Countries from the Day they Achieve Stability

Refer: Figure 7 Highest economic growth factor : Brazil(24.71) Least economic growth factor : Spain(-1.8).

6. The Working Day of First Index of the Groups Formed from 1st March Country Wise

U.S. = [36, 37, 44, 45, 46, 47, 48, 55, 56, 57, 58, 59, 60, 61, 62, 73, 74, 75]

Russia = [37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66] 9

Brazil = [28, 29, 30, 31, 42, 43, 44, 45, 46, 64, 71, 72]

France = [27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 43, 44, 45, 46, 47, 58, 59, 60, 61, 62, 63, 64]

Canada = [43, 44, 45, 55, 56, 57, 58, 59, 60, 61, 68, 69, 70]

India = [32, 40, 41, 50, 51, 62, 63, 64, 65, 66, 67, 68, 69, 70]

U.K. = [45, 46, 55, 56, 57, 58, 59, 60, 61, 62, 63]

Spain = [31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 71, 72, 73]

Italy = [31, 32, 33, 43, 44, 45, 46, 53, 54]

Germany = [46, 47, 48, 49, 61, 74, 75, 76]

This proves that most of the groups actually overlap and the volatility of stock market decrease at these indices.

V. CONCLUSION

From the methodological perspective, this study contributes to the economic crisis forecasting literature by using the concept of statistics and data analysis. The study's result suggests that the COVID-19 pandemic and economic crisis that began in the start of year 2020 has a negative impact on the stock market of almost every nation. The largest recorded declines in the stock exchange across the globe were in Germany, India, Canada, France, USA, Italy, Russia, Brazil, UK and Spain. In terms of economic fall, the most affected country was Brazil. In terms of country wise percentage change of index, the most decrease in index was of Germany. The greatest number of stable groups of stable indices formed were of Russia and the least were of UK. Our study predicts that the least time required by a country

to reach its stable index is of Russia and the most will be of UK. It shows that the Russia is the most stable country in this perspective. This study is not without limitations. First, we use data of those countries which was available in our limits. As many countries don't share all of its data. The second limitation of this study is that the proposed theoretical framework can only deal with two terms which are related at a time. The final limitation is that the theory only predicts the loss or profit within a defined interval. Interval forecasts would be more desirable, as they reduce the risk of complete forecast failure. However, when interval 10 forecasts are used to evaluate the impact of a crisis, the implications so derived may be weak or even barely meaningful. The current study thus focuses on point forecasts.

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