Using Data Mining Technique to Measure the Impact of COVID-19: 1st Wave on the Stock Market of Top Fifteen Affected Countries

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ABSTRACT

The pandemic of Covid-19 which started in the year 2019 did not just cause an effect on the living of millions of people but in the economic and social sectors of every part of the world as well. It is a challenging task to determine the interrelation between COVID-19 cases concerning the economy in the top affected countries. This paper explores; how severe Impact of COVID-19 1st wave on the economic facets of Pakistan as compared to the Top Fifteen affected countries. Moreover, this paper uses COVID-19 well-known dataset provided by John Hopkins and Stock Market Datasets collectively to carry out the critical analysis successfully. We found a relationship between the cumulative numbers of confirmed cases in each country with a declining state of countries' economies: the higher decline in the stock market indicates a higher number of confirmed cases.

KEYWORDS: Covid-19, Pace of Surge, Economic Impact, Stock Market Indices, Economic Facets.

1. INTRODUCTION

A disastrous virus namely Coronavirus that originated from Wuhan, China in 2019 has become a worldwide calamity [1]. Numerous people have been inflicted by this virus and many have lost their lives to it. Corona has disturbed various frameworks that include social, economic, educational, and political agendas over the world. Due to preventive measures taken such as lockdowns number of patients varied accordingly within different countries. Countries that had quick responsive and responsible leaders had overcome this problem faster than others. They were strict on taking measures and thus had the situation under control. Whereas countries that had conservative leadership [2] were unsure about the lockdown because of the public's reaction and therefore didn't strictly implement it. Weak control as such caused a massive outbreak of the virus in countries which also includes Pakistan

[18]. The public and government of Pakistan feared the consequences of complete lockdown and the closing of flights because of how the economy could have been affected. Instead, Pakistan came up with a 'smart lockdown framework' [3]. This was done to reduce the severity of pandemic in which only places that had a high peak of virus cases were sealed whereas other than those areas were left open. Consequently, this control measure failed and the number of pandemic cases increased. Countries that had administrations like these suffered from a great increase in cases as compared to the USA which was 185,000 Covid-19 cases as the USA got to this number within 69 days whereas Pakistan in 118 days. The pandemic also damaged the economy and stock market. Countries that had the fastest virus cases toll increase include Spain, UK, Russia, Iran, Mexico, and Brazil. The buying power was fairly damaged because the economy was highly at risk because of Corona [4]. Worldwide stock

markets were also influenced badly because of pandemics especially in the top 15 countries [5]. Stock markets were affected from 24 to 28 February drastically and their largest loss was reported since 2008. There was a massive reduction in investments done by the companies in stock exchanges that include Dow Jones Industrial Average, the NASDAQ Composite [6] and S&P 500 Index in the United States, S&P/TSX in Canada, Bovespa in Brazil, FTSE 100 in the UK, CAC 40 in France, DAX in Germany, Shanghai Stock Exchange, Shenzhen Stock Exchange, Hong Kong Stock Exchange. Shares had dropped quite fast after a damaging wave of 'Black Monday' was followed by 'Black Thursday'. The Borsa Italiana's FTSE MIB became most severely affected with a fall of 17%. The 'Black Monday' of 1987 caused a massive fall of 9% for Wall Street. The majority of G20 countries faced a downswing of 25%-30% in shares internationally. Despite the fact, those have also recovered from the damage but still they remain at low in terms of investment rates. Ratings are Dow Jones at -13.3%, Nikkei at -5.2% and FTSE 100 stands at -19.3%. Not only are these countries under the wrath but also others than these. These countries were the ones that had a highly impact on the economy and stock exchange market. The damage was known to be massive when measured by using scales like the inflation unemployment rate, and GDP [7]. According to the IMF percentage of people being unemployed has reached 10.4%. This tells that it's time the world's largest economy is at stake. Specialists have proposed various plans to boost the economy which was a halt, for example, the tourism industry. Officials of the US state that the unemployment rate is almost 30%. Due to the major effects, it is hard to compensate the employers and thus they are dismissed. Covid has therefore left a long-lasting impact on the economy since there is no spending of money by people and therefore no income is produced too [8]. Shops are being closed down and significantly commercial establishments are doing so. The international economy is going through disastrous changes making it hard to regain a good economy. Business analysts have predicted that the ratio of inflation would increase with time [17]. Industrial and economic sectors are at threat of bailing out now due to the pandemic. FDI can drop between 5%-15%. Numerous other countries are also going through an increasing inflation and joblessness [9].

This article will mainly discuss the effects of the pandemic on the economy [16]. The problem discovered was that since this pandemic has occurred, there is a lot of literature that describes where it came from, its medical perspective, and its preventive measures; however, the literature lacks how much it has impacted the stock market of the top fifteen affected countries of all around the world.

2. LITERATURE REVIEW

There has been lots of work done on every aspect of Coronavirus. However, it still lacks talk on the economic impacts of a pandemic. Maryla Maliszewska in her paper namely "The Potential Impact of COVID-19 on GDP and Trade" explained how the investment has been reduced, the absence of labor is increasing, and portable facilities are very less. Nonetheless, the issue that the economy-related gap is not discussed remains the same for this one too. A paper called "The Global Macroeconomic Impacts of COVID-19: Seven Scenarios" is written by Warwick McKibbin in which a 'modeling technique' is discussed for the progression of Covid. The impact of this is then studied upon macroeconomic results & economic sector in a global hybrid DSGE/CGE general equilibrium model [10]. Mortality and morbidity rate increased after the virus spread from Wuhan as reported by Baldwin, R., & di Mauro, B. W. (2020) [11]. How much ever developed or under-developed countries are present in the world they were somewhat and somehow affected by the pandemic in drastic ways. They had the biggest economic downfalls of times. Transport systems are closed and this allows very restricted import and export of goods. The buyers and sellers get in a panic when the economy is disturbed [12]. Since the major changes have occurred, the financial authorities have reacted to it by increasing the global stock indices. AA writer Peterson Ozili's paper called "Spillover of COVID-19: Impact on the Global Economy" explains the economic progress with financial strategies, safety measures, and travel rules and regulations [13]. The author known as Andrew Atkeson wrote a paper called "What will be the Economic Impact of Covid-19 in the US? Rough Estimates of Disease Scenarios" which uses the SIR model for predicting the future of this disastrous pandemic [14]. Nevertheless, the relationship between increasing cases of Covid and the economic loss is not discussed. The world has

been through great loss due to the pandemic and still is facing it. Under-developed countries cannot take as strict measures as rich developed countries can. How global stability is predicted to drop to 2.8% in 2020, therefore the progress doesn't seem that easy. At 3rd quarter, globally the decrease can be at -12.5% which is quite a worry full thing. The situation of economies right now is very weak and recovering from this position can be even harder.

3. METHODOLOGY

The methodology as shown in Figure 1 is used to achieve the objective of this research work. Firstly, utilizes the well know dataset of COVID-19 provided by John Hopkins on their official repository and performed the exploratory data analysis on it to identifies the missing values and filter the data from them. Then applied the median operation to avoid the outlier values and make the data meticulous. To achieve the major milestone of this work utilizes the data mining Group By Operation to extract the number of confirmed recovery and death cases all over the world. Apply the Filter operation on the extracted data to identify the top fifteen countries that are badly affected by the corona virus and also identified the specific number of confirmed cases of the top fifteen countries. Stock Market Datasets were put to carry the analysis of top fifteen affected

countries to compare their economic change with Pakistan.

4. RESULTS

Coronavirus which started in the year 2019 has an impact on the whole world. It has not only caused an impact on people's lives, but it has also caused an impact on the economic, social, and religious activities in each and every corner of the world. It has been a reason for death for more than a thousand people. The virus spread quite quickly and even the most advanced and powerful countries were not successful in protecting themselves from this virus.

Though, the rate of spread was is not the same in every country. Rather it is different. This is mainly because the countries responded to the virus in different ways by the time it started. Different countries like New Zealand Vietnam and South Korea were able to control the rate of the virus spread before becoming a pandemic to control its effect on a large scale due to their really good, liberal, and vibrant leadership styles. A few countries did not see a very huge impact on their financial sector and economies because of this pandemic. Meanwhile, in contrast, some countries had populist and conservative leadership and they responded to the wake of a virus with a hesitated and delayed response [15]. This resulted in a huge Covid-19 outbreak in such countries. Such countries faced

Figure 1: Methodology to measure the impact of COVID-19 1st wave on the Economic Facets of Pakistan Compared to the Top Fifteen Affected Countries

an increment in the number of deaths and patients as well as a high impact on the economic point of view. The reason behind the increment in the toll of deaths and patients plus an impact on the stock market and the economy was basically the reactionary policies put forward by their government.

Figure 2: Top fifteen affected countries with the highest number of confirmed Covid-19 1st wave cases

According to data from Johns Hopkins University, the top fifteen countries with the largest number of confirmed recovered and died all over the world are shown in Figure 2. The US and Brazil, Russia, India, UK, Peru, Netherland, Spain, Italy France, Belgium, Canada, Mexico, and Pakistan are at the top affected countries during the first wave of covid19 pandemic. With the passage of time, the number kept rising and due to this worst situation, different governments have adopted different strategies and policies to either complete shutdown or smart lockdown. Due to such initiatives, the economy of the world shambled.

Figure 3: Top fifteen affected countries where the Covid-19 1st wave cases at the highest pace within first 20 Days

With the help of Figure 3, it can be seen very clearly that the countries present in the top fifteen were the same which met the toll at the greatest speed. Thus, it is clear that a direct

proportionality is present between the case amount and the days taken for reaching the pole. The US is the country that had the most number of cases and it also had its pace for the deaths and patients at the greatest speed. In the same way, every country present in the list, in which Pakistan is included. With the 20 days of these top affected countries during the first wave of COVID pandemic the number of confirmed patient in US, Brazil, Russia, India, UK, Peru, Netherland, Spain, Italy France, Belgium, Canada, Mexico, and Pakistan is 169, 107, 118, 122, 153, 99, 187, 126, 82, 125, 140, 149, 115 respectively. The increasing trend of Covid-19 cases for different countries is different but Netherland, USA and UK are at the top ranking with massive increasing trend from the beginning. These countries were not vulnerable at the start of the Covid-19 but later they became vulnerable and faced the most number of cases. Later on, the whole of Europe faced huge turmoil because of Covid-19. The Asian countries like Pakistan, India, and Bangladesh were also vulnerable but not as much like European nations due to the first wave of the pandemic.

Figure 4: Stock Markets Decline of top 15 countries where Covid-19 1st wave cases

Figure 3: Top fifteen affected countries where the Covid-19 1st wave cases at the highest pace within first 20 Days

The COVID-19 epidemic has brought about an unprecedented human and health crisis. The necessary measures to contain the virus have triggered an economic downturn. At this juncture, there is great uncertainty due to the increasing trend of COVID-19 patients and unpredicted policies to shut down all of the commercial activities. The main suppliers of intermediate products have been severely affected due to the lockdown/shutdown policies of each country but these countries are affected due to numerous restrictions as instructed by their government that reduces industrial output and it plays a massive role in the economy of a country. So, therefore a massive decline had been seen in Figure 4 of the top fifteen affected countries. This Figure also demonstrates that the stock market of Pakistan, the US, Brazil, the UK, Italy, France, Spain, Mexico, India, Iran, Belgium, Canada, Peru, Russia, Netherland fell down 25, 36, 45, 32, 41, 38, 39, 26, 37, 35, 39, 37, 35, 32, 35 respectively. The economies of these countries were hit very hard by the first wave of this pandemic.

Figure 5. Demonstrate the positive correlation between the cumulative numbers of confirmed cases in each country with a declining state of countries' economies: the higher decline in the stock market indicates a higher number of confirmed cases. There may be three explanations for the positive correlation between First, the degree of internationalization is higher, which may easily cause infection and spread of the epidemic; second, the population

of some economically developed countries is aging. However, the current clinical data shows that the elderly are more likely to be infected with the new crown virus, which has also caused an increase in the number of confirmed cases in these countries. Third, the health care system in developing countries is usually relatively backward, and the virus is carried out on a large scale. Insufficient testing capabilities have led to a low number of confirmed cases. The third possibility is particularly worthy of attention because it means that the current number of confirmed cases in the world may still be underestimated. It is not that the virus has not spread in economically backward countries, but because of its insufficient detection capabilities, the number of confirmed diagnoses is underestimated. Therefore, while the world is paying attention to the prevention and control of the epidemic.

5. CONCLUSION

The COVID-19 pandemic has caused a significant impact on the economies of different countries all over the world. The expansion of COVID has accelerated on a global scale, uncertainty has increased abruptly, and big financier firm's confidence has been down, causing financial and capital market confusion; while the different countries have strictly restricted the movement of people and transportation in order to control the spread of the epidemic. The pause button puts pressure on the economic operation from both the consumer

side and the production side. We analyzed the impact of the epidemic on the stock market of the Top Fifteen Affected Countries. The study's findings indicate a positive correlation in decline in stock market shares with the number of Covid-19 cases. The findings of our research are valuable to investors and policymakers, and they could aid financial authorities in their mission to mitigate the detrimental impact of the COVID-19 on capital markets.

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