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Comparative Analysis of COVID-19 Trend, Impact on S&P 500, and S&P 500 Forecasting

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Abstract

In this comparative analysis, distribution patterns of daily new positive COVID-19 cases with daily death rates in the top four US states were studied. The Impact of COVID-19 on the S&P 500 was analyzed. Also, the S&P 500 forecasting was investigated using the moving average model. Daily new positive COVID-19 cases show two surges in United States. However, daily new death cases does not have an obvious increase during the second surge. The impact of COVID-19 on the S&P 500 was dramatic right after the 1st reported case in United States but started to diminish shortly after a one-month quick drop. Using the moving average model, the S&P 500 forecasting showed that the US stock market will keep its increasing trend in the near future.

Keywords: COVID-19, SP500, Finance, Stock Market, Moving Average, Forecasting, Data Analysis

1. INTRODUCTION

The outbreak of the novel coronavirus (COVID-19) has dramatically affected people's lifestyle and economic markets around the globe. The first laboratory-confirmed case of COVID-19 in the United States was on January 20, 2020 and reported to the Centers for Disease Control and Prevention (CDC) on January 22, 2020.

As of August 9, 2020, United States has around 4.97 million COVID-19 cases that have been reported to the CDC, and the United States has the most COVID-19 cases in the world. The total deaths are around 161k.

Financial markets, employment, and many other industries have been greatly impacted by the COVID-19 pandemic in the United States.

There has been much research conducted on the predicted impact of this historical COVID-19 pandemic under challenging conditions. The impact of COVID-19 on the stock market and the economy is one of the research branches.

Badar Nadeem Ashraf found that stock markets reacted more proactively to the growth in number of confirmed COVID-19 cases as compared to the growth in number of deaths from 64 countries [1].

Mert Topcu and Omer Serkan Gulal found that the negative impact of pandemic on emerging stock markets has gradually fallen and begun to taper off by mid-April. Also, the impact of the outbreak has been the highest in Asian emerging markets whereas emerging markets in Europe have experienced the lowest impact [2].

Qing He, Junyi Liu et al. found that COVID-19 had a negative but short-term impact on stock markets of affected countries, and the impact of COVID-19 on stock markets had bidirectional spill-over effects between Asian countries and European and American countries [3].

Animesh Bhattacharjee and Joy Das founded that the Indian stock market was moving towards the bear market territory and March witnessed a massive FII sell-off. Further, the Indian IPO market has also suffered due to the outbreak [4].

2. DATA ANALYSIS METHODS

The COVID-19 data was provided by the CDC and the Center for Systems Science and Engineering (CSSE) at John Hopkins [5]. GitHub hosted the CSSE COVID-19 raw data repository [6].

The S&P 500 dataset is provided by Yahoo Finance [7]. The index at market close was used for the S&P 500. During weekends and holidays, the S&P 500 index carried the last working days' data.

In statistics, a moving average is a calculation that analyzes data points by creating a series of averages of different subsets of the full data set. It is often used in technical analysis of financial data, like in stock prices, returns or trading volumes. The average is taken over a specific period of time, like x minutes, y days, z weeks, or any time period that smooths out price data by creating a constantly updated average price. An example of an n-day sample of the closing price is the mean of the previous n days' closing prices. If those prices are P_M, P_{M-1}, …, $P_{M-(n-1)}$, then the formula is:

$$\overline{P_{SM}} = \frac{P_M + P_{M-1} + \cdots + P_{M-(n-1)}}{n} = \frac{1}{n}\sum_{i=0}^{n-1} P_{M=i}$$

In this analysis, the moving average was used as the forecasting model to predict S&P 500's trend. The 5-day moving average, 10-day moving average and 30-day moving average curves were developed to indicate the future S&P 500 trend.

3. ANALYSIS DISCUSSION AND RESULTS

As of August 9, 2020, California, Florida, Texas, and New York were the top four states with the highest accumulated positive COVID-19 cases reported to the CDC.

From the daily new COVID-19 case distribution curves shown in Figure 1, New York's daily new COVID-19 cases surged from March 20th to May 20th, around 2 months. The first case of COVID-19 was reported in New York City on February 29, and most New York cases were linked to Europe. California, Florida and Texas had outbreaks beginning in June and have not yet ended as of August 9. From the curve patterns, California, Florida, and Texas had already passed the daily new COVID-19 case peak, and fewer daily new COVID-19 cases can be expected in the future.

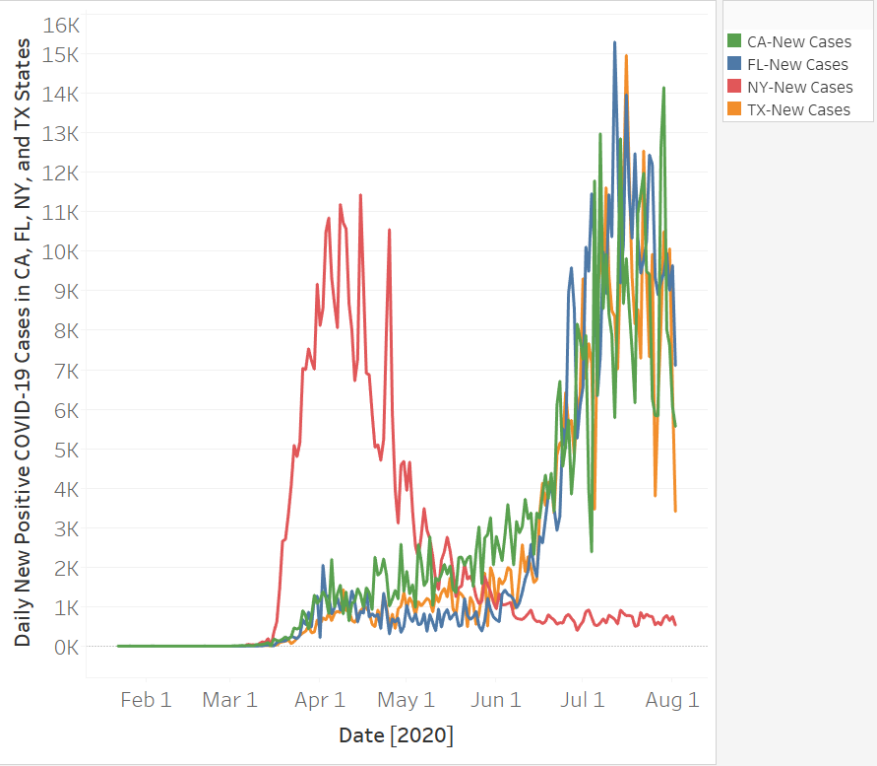

Figure 1. Distribution patterns of daily new positive COVID-19 cases in the top four US States with highest accumulated COVID-19 cases: California, Florida, Texas, and New York

Daily new COVID-19 death case distributions in California, Florida, Texas, and New York are presented in Figure 2. Please note that the -132 COVID-19 death cases on April 19th in New York State was due to the data correction of previous data.

As seen in figure 2, the daily new death cases has a similar pattern to the daily new positive cases in New York. After June, the daily new death cases in New York were much less than the daily new death cases in the surge (March 20th to May 20th).

However, for California, Florida, and Texas, although the daily new positive cases were

high during the surge period from June, the daily new death cases in in these three states were low compared to those in New York during New York's daily new COVID-19 surge period.

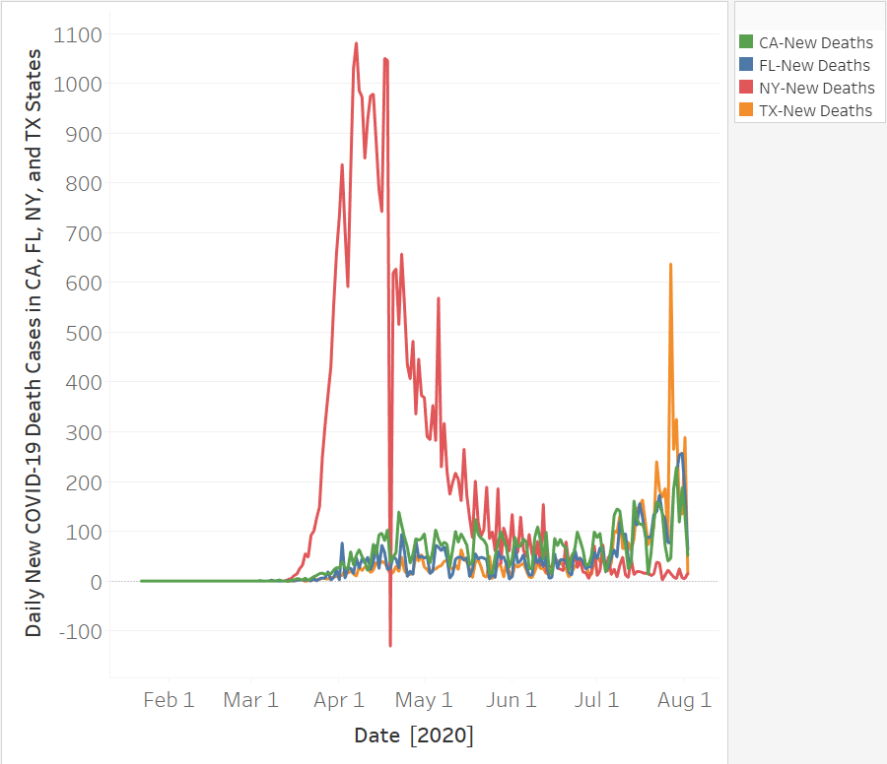

Figure 2. Distribution patterns of daily new COVID-19 death cases in top four US States: California, Florida, Texas, New York

To understand the impact of COVID-19 on the S&P 500, the daily new positive COVID-19 cases, daily new COVID-19 death cases, and the US stock market's S&P 500 data are presented together in Figure 3.

It is easy to see that the outbreak of COVID-19 had led to one of the fastest U.S. stock market declines in history. The S&P 500 index dropped from 3373 on February 20 to 2237 on March 23, a 33.68% drop in around one month. This is the most impactful pandemic since the Spanish flu of 1918. Rising fears and economic shutdown due to the COVID-19 pandemic are the two main causes of the stock market crash.

However, the S&P 500 started to be recovered quickly after the one-month quick drop. The economic relief orders played a major role on this stock market recovery. Although the outbreak of the 2nd surge of daily new positive cases happened after June, the S&P 500 index was not impacted much.

For the daily new death cases in US, there was not a large new daily death increase after June, which prevented the rising fears in US stock market.

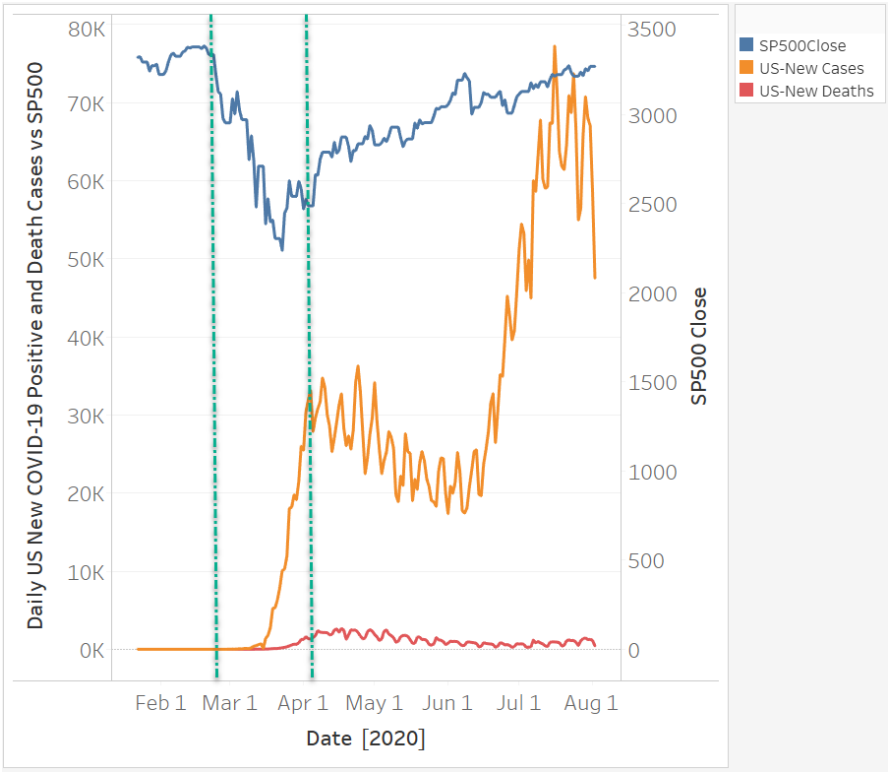

Figure 3. The effect of COVID-19 on S&P 500

Although the US stock market started to recover in June, the risk of a down market remains very high because of the economic impact of the pandemic. The stock market is particularly difficult for active investors to analyze under this challenging situation.

The moving average is a particularly useful tool to help see through the noise and identify trends. Figure 4 presents the 5-day, 10-day and 30-day moving average curves with the daily market close data. Shorter moving averages, specifically the 5-day and 10-day moving averages in Figure 4, will more closely follow the recent price action and are used to assess short-term patterns. The longer 30-day moving average serves as a valuable smoothing device for observing long-term trends.

One can see from Figure 4 that on April 12th, the shorter-term moving average curves (5-day and 10-day) crossed above the longer-term 30-day moving average curve. This indicated a change in sentiment from bearish to bullish on April 12. As Figure 4 indicates, the S&P 500 remained bullish because the 5-day moving average and 10-day moving average curves were located higher than the 30-day moving average curve. This means that for the near future S&P 500 forecasting, the stock market will remain increasing.

However, the trending signals generated by moving averages are dynamic and can only predict the near future stock market. If the 5-day and 10-day moving average curves changed behavior, such as by crossing below the 30-day moving average curve, the forecasting will change as well.

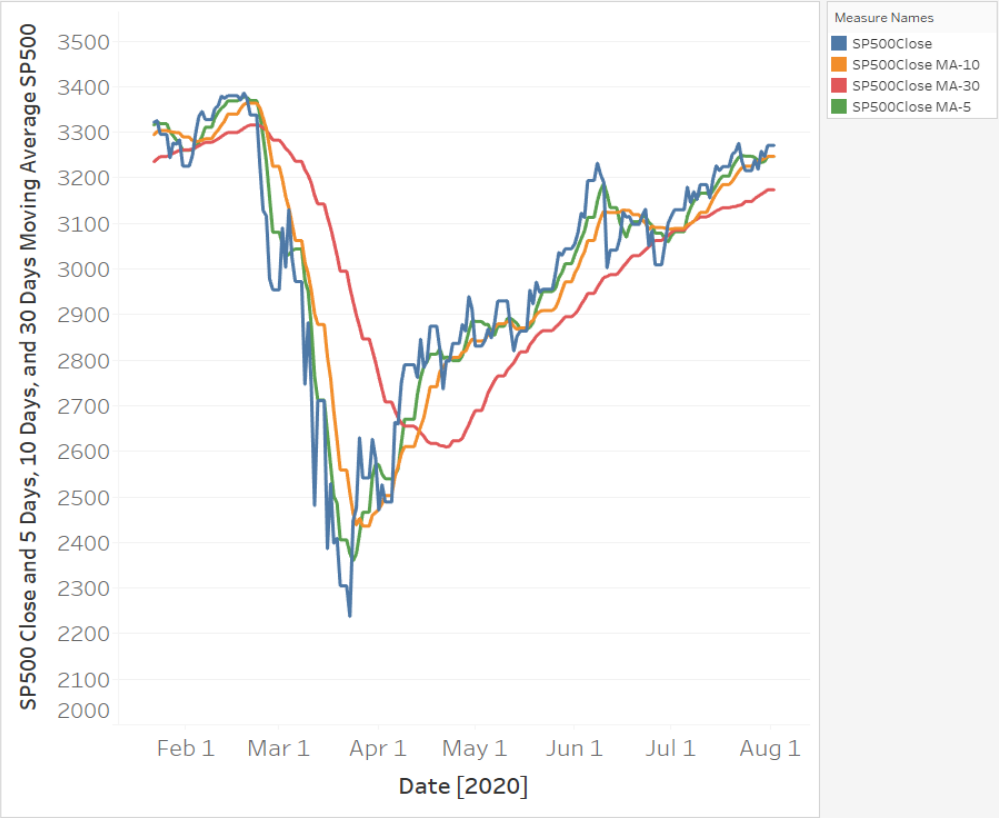

Figure 4. S&P 500 forecasting using the moving average model. The daily S&P 500 market closing data was used to create 5-day, 10-day and 30-day moving average curves for forecasting analysis.

4. CONCLUSION

There were two surges in the United States daily new COVID-19 case increase. The main contributor to the 1st surge was Now York state. The main contributors to the 2nd surge are California, Florida and Texas.

Although the daily new increase inCOVID-19 cases in the 2nd surge were much greater than the increase in COVID-19 cases during the 1st surge, the death cases in the 2nd surge were much less than the death cases in the 1st surge.

S&P 500 was heavily impacted right after the 1st COVID-19 positive case reported in US. The S&P 500 dropped 33.68% within around one month from February 20 to March 23, 2020. This was one of the fastest U.S. stock market declines in history. But the stock market began to recover shortly after the quick drop.

The results of the moving average forecast show that the 30-day moving average curve has been under both the 5-day and 10-day moving average curves since April 18, 2020. This predicts that the stock marking will keep increasing in the near future.

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