The Effect of COVID-19 Pandemic toward Stock Market

1. Goal of the Project (Summary)

Background: The COVID-19 has impacted the world in a painful way. Families were broken. Companies went bankruptcy. Economy stopped. Stock market surged. As one of the most important tools of financial market, stock market movement infected numerous areas. We decided to study the effect of COVID-19 pandemic toward stock market not only for the importance of stock, but also for the extreme rare condition the public facing.

The goal of our project is to dig deeper than commonsense of the public. Everyone knows DOW dived 10,000 points in a month after COVID-19 break in the US. However, is it the worst condition we faced from 1900? Which industry is the most frangibility one during this crisis? How does the COVID-19 affect the stock market step by step?

1. Introduction of the data
   1. Stock market data: DOWs index, NASDAQ index, S&P500 index, industry and company data, 30-day cboe volatility index (VIX).

The DOWs index, NASDAQ index and S&P500 index are longest and most trusted index of the US stock market. The time series data can be easily downloaded from any stock software, or their official website. So as the industry index and company price change.

VIX is interpreted as annualized implied volatility of a hypothetical option on S&P500 with 30 days to expiration, based on the prices of near-term S&P500 options traded on CBOE. The data can be downloaded from <http://www.cboe.com/products/vix-index-volatility/vix-options-and-futures/vix-index/vix-historical-data>. The data can date back to 1986.

VIX Calculation: Select the options to be included in VIX calculation – a range of call and put strikes in two consecutive expirations around the target 30-day mark. Calculate each option’s contribution to the total variance of its expiration. Calculate the total variance for the first and the second expiration. Calculate 30-day variance by interpolating the two variances, depending on the time to expiration of each. Take the square root to get volatility as standard deviation. Multiply the volatility (standard deviation) by 100.The result is VIX.

* 1. COVID-19 data: The Daily number of confirmed infections, death rate, infection rate etc. We can download it from the public health department website of most of the countries, and Johns Hopkins University website <https://hub.jhu.edu/novel-coronavirus-information/>.