**The Effect of COVID Mortality Rates on the Stock Market Index**

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**Abstract**

In this research paper, I assessed the relationship between COVID Mortality Rates and their relationship to the stock market index. I created a regression model to show the relationship between COVID mortality rates and the stock market index. My regression included the independent and dependent variables along with other explanatory variables. I collected data from September 2018 - March 2021 for all my variables. I found that the p-value for COVID Mortality to by statistically insignificant at a significance level of 10% (p-value = 0.103). My model indicated that an increase in mortality rate by 1 percent will lead to an increase in 0.655 percent in the stock market. Investors can use this result to create an educated investment if another pandemic were to occur. There is no need for any government intervention since we assume that the COVID Mortality rate has a statistically insignificant effect.

**Introduction**

COVID has affected nearly everything in the economy, not only in the United States but also across the world. Such economic indicators that were affected were mortality rates and the stock market index. Due to COVID being highly contagious and the significant increase in the number of deaths per month involving COVID, many businesses were forced to close. As these businesses closed, they also lose their funds and can no longer continue to pay their workers. This then leads to an increase in unemployment, as well as a decrease in products and services. Since these businesses won’t be profiting any money, the people who have invested into these companies will also not be profiting any money either. This negative effect is then shown in the stock market. Since COVID is a broad subject, this paper will look into the effects of COVID mortality rates on the stock market index, specifically the S&P 500.

When COVID first hit the US, there was no immediate effect on the stock market index, but later on, many stock market indexes were negatively affected by it. The S&P 500, Dow Jones Industrial Average, and the NASDAQ composite, three of the biggest indexes in the United States stock market were all negatively affected by COVID. The S&P 500 dropped about 31%, Dow Jones Industrial Average dropped about 34%, and the NASDAQ composite dropped about 30% (Google finance, 2021). If we were to assume that COVID was the cause of this drop, there is a possibility that the COVID mortality rate could also be a factor in the drop.

When viewing the monthly COVID mortality rate, there was a similar trend to the stock market index at the start of the pandemic. A report from Nation Center for Health Statistics, which provides the monthly COVID mortality rates shows that there was a huge spike in deaths due to COVID. In March, the United States had a 2.26% death rate involving COVID, in April, it spiked all the way up to 20.23% deaths rate involving COVID and in May dropped down to 13.61% deaths involving COVID (Centers for Disease Control and Prevention, 2021). Even if the mortality rate did not line up perfectly month-to-month with the stock market index returns, it did show some effect a month later.

Comparing COVID with other pandemics such as SARS, also showed a little similar effect on the stock market index. Although there were not any immediate effects on the stock market, there was then a drop in the index sometime after. For SARS, the S&P 500 deceased 12.8%, Dow Jones Industrial Average decreased about 7%. However, for the NASDAQ composite, their index jumped by almost 13% (Google Finance, 2021).

The importance of this study is to determine whether mortality rate involving pandemics such as COVID have a significantly positive or negative effect on the stock market index. With information, trends, and patterns that have been gathered from these past experiences, many investors have gained the knowledge of what the stock market index could possibly look like. With COVID being considered a pandemic, if we were to assume there is a correlation between pandemics and the stock market, we can then assume that there is a correlation between mortality involving COVID and the stock market. Thus, the COVID mortality rates could be considered a factor of the stock market index.

In this paper, I will include control variables such as unemployment rate, interest rates, inflation/deflation rates, and real personal consumption expenditure. All variables will be monthly data, and this paper will show the effects of COVID mortality rates on the stock market index.

**Literature Review**

Although there is not any research that specified COVID mortality rate and the stock market index, there are many different studies between COVID and the stock market index, as well as the mortality rate and stock market index. An article discovered that the stock market had a greater reaction to COVID compared to past pandemics (Baker, Scott R., et al, 2020). However, this research not only studied COVID but also studied past infectious disease outbreaks, such as the Spanish flu, SARS, and Ebola. From this research, they noticed these pandemics did not have much of an impact on the stock market (Baker, Scott R., et al). This discovery confirmed that the impact COVID made on the stock market is not similar to the past pandemics. Therefore, showing the potential effect of mortality rate involving COVID on the stock market index.

In addition, another research article discovered that for every increase in the growth of the number of COVID cases per million, the stock market returns rate decreases (Orhan Erdem, 2020). They also discovered the stock market of stricter countries is affected more by the same size of the increase in the number of COVID cases (Orhan Erdem, 2020). Since there is a relationship between COVID cases and mortality rate. If COVID cases rise, mortality has a great chance of also rising. Erdem concluded an increase in the number of COVID cases leads to less return from the stock market, thus, we can assume the mortality rate will lead to less return rate from the stock market as well.

In a research that explored the dependence between mortality and market risks, discovered a decrease in the performance of some financial stocks and an increase in correlation between mortality and market risks (Michel Dacorogna and Meitner Cadena, 2015). Additionally, to complement their study, they added a study by Phillippe Trainar who examined the dynamic consequences of the Spanish Flu on the US market. He concluded that there was no significant effect between the two variables (Michel Dacorogna and Meitner Cadena, 2015). Since they discovered that there was an effect between that pandemic and the US market, we can confirm that the COVID mortality rate is a factor affecting the stock market index because COVID is also a pandemic.

However, there was a research article that came to a conclusion of no significant relationship between mortality and market capitalization (P.J. Seguin and M.M. Smoller, 1998). This study contributes to the previous literature by estimating there is no effect of mortality rates on the stock market index. However, as stated before, COVID is different compared to other pandemics. COVID has had the greatest impact on the stock market index compared to past pandemics. Therefore, the COVID mortality rate could have an effect on the stock market index.

As a whole, the previous research supports the effect of COVID mortality rates on the stock market index. We will use the COVID mortality rate, unemployment rate, interest rates, inflation/deflation rates, and real personal consumption expenditures to test this theory. Our unit of analysis will be in months and we will collect data at a monthly level.

**Empirical Model**

Linear regression is used to estimate the relationship between the monthly rate of return and covid mortality rates. In this paper we estimate

In the model above S&P 500 variable measures the monthly rate of return of the S&P 500 index. Our independent variable of interest is Covid mortality which measures the proportion (%) of mortality rate involving COVID.

Unemployment variables measures the monthly rate of unemployment. The interest rate variable measures the monthly weighted average interest rates. The inflation rate variable measures the monthly inflation/deflation rate. Personal consumption variable measures the monthly spending of consumers. Lastly, monthyear variable indicates the date, and controls the trend.

**Data**

S&P 500 index data is based on Yahoo Finance that records the monthly rate of return as well as the annual rate of return for any stocks (e.g. TSLA, SPY, NIO, JNJ, etc.), stock market prices, real-time quotes, financial news, and analytics on many stocks. This data was collected at the beginning of 2020 and includes monthly data before and during COVID. More information about the weights of various factors is available here: <https://finance.yahoo.com/>

           COVID mortality variable is based on 2020-2021 publicly available monthly data. Data sources for the monthly mortality rate involving COVID are based on National Vital Statistics System. National Center for Health Statistics gather their data from National Vital Statistics System, thus the data shown will likely not include all deaths that occurred during a given time period especially for the more recent time periods (Center for Disease Control and Prevention, 2021). National Center for Health Statistics is a provisional data that presents the count of deaths in the United States due to COVID, deaths from all causes and percent of expected deaths, pneumonia deaths, pneumonia deaths involving COVID, influenza deaths, and deaths involving pneumonia, influenza, or COVID-19; by week ending date, month, and year, and specific jurisdiction (CDC, 2021). Information about the National Center for Health Statistics is available at <https://www.cdc.gov/nchs/index.htm>. Independent variable defines COVID mortality rate as a percentage of deaths involving COVID per month. In this study, we use monthly mortality rates involving COVID as reported by the CDC, <https://www.cdc.gov/nchs/nvss/vsrr/covid19/index.htm>.

           Monthly characteristics include unemployment rates, interest rates, inflation rates, and real personal consumption expenditure. Unemployment rate data for 2020-2021 is based on the estimates by the U.S. Bureau of Labor Statistics, [Unemployment Rate](https://data.bls.gov/timeseries/LNS14000000). Interest rate data for 2020-2021 is based on the estimates by IRS, [Weighted Average Interest Rate](https://www.irs.gov/retirement-plans/weighted-average-interest-rate-table). Inflation rates for 2020-2021 is based on the estimates by Inflation Data, [Historical Inflation Data](https://inflationdata.com/articles/charts/annual-inflation#:~:text=Statistics%20CPI%2DU-,Monthly%20Inflation,from%201.36%25%20to%201.40%25). Personal Consumption for 2020-2021 is based on the estimates by FRED Economic Data, [Real Personal Consumption Expenditure](https://fred.stlouisfed.org/series/PCEC96).

Table 1. Descriptive Statistics



Table 1 above shows a wide variance in S&P 500 index throughout the months from -12.51% in March 2020 to 12.68% in April 2020 with the average of 1.08%. COVID mortality prevalence in the United States varied from the rate of 0.00% in September 2018 to 18.55% in January 2021 with the average of 3.28%.

**Empirical Result**

Regression results in table 2 below show that Mortality rate involving COVID is an insignificant determinant of monthly rate of return on S&P 500 using a significance level of 10%. Higher rates of mortality involving COVID leads to an increase in the rate of return on S&P 500. When mortality rate involving COVID increases by 1%, the rate of return on the S&P 500 index increases by 0.6559 units (p-value > 0.5).

Table 2. Regression Results



Given the results from running the regression, we can assume that unemployment rate is the only significant determinate of rate of return on S&P 500 at a significance level of 10%. COVID mortality rate p-value is slightly greater than the desired p-value. All the other factors would be considered insignificant since they are not less than 0.10.

**Conclusion and Policy Implications**

Empirical results show that mortality rates involving COVID are not important determinants of the stock market index. This result is consistent with P.J. Seguin and M.M. Smoller that found no significant relationship between mortality and market capitalization. The empirical results also show that as the mortality rate involving COVID increases by 1%, the rate of return on the S&P 500 also increases by 0.65%. This result is not consistent with Michel Dacorogna and Meitner Cadena that found a decrease in the rate of return on the stock market when mortality rates increase. Although regulating the mortality rate is not considered an important target for policymakers as a potential means of improving the stock market index, this does not deny the importance of reducing mortality from pandemics. Deaths from unsanitary behaviors can be prevented, thus some policy interventions may include mandating hand sanitizer before entering stores, educating the importance of clean hygiene, and mandating other safety procedures before the pandemic arrives.

The results of this study are not without limitations. Since COVID has been around for a little over a year, there are nearly 0 research studies on the effect of mortality involving COVID on the stock market index. Therefore, comparing the results to see if it is accurate is difficult to do. However, there were individual studies like the effects of mortality on the stock market and the effects of COVID cases on the stock prices. One study concluded that mortality has no significant effect on the stock market, the other study concluded that COVID has a negative effect on the stock market. The regression result that we obtained stated that the mortality rate including COVID has an insignificant positive effect on the stock market index. With our results matching one of the other research studies, there is a possibility of our results being correct.

**Diagnostic Test:**

**Heteroscedasticity: Breusch-Pagan Test (Failed)**

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**Normal Residuals: Skewness -Kurtoisis All Normality Test (Passed)**

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**Multicollinearity: Variance Inflation Factor (VIF) (Passed)**

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**Autocorrelation: DW Test: (Passed)**

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H0: no serial correlation

N=30, k’=7 (0.748, 1.814)

Above upper limit therefore we fail to reject the null hypothesis.

**Ramsey Test: ( Passed)**

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All my test passed except for Heteroscedasticity: Breusch-Pagan Test (Failed), therefore I included the robust model of my regression.

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