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The COVID-19 pandemic is having a devastating effect on both the economy and public health, but it has brought statistical reasoning to a wider audience. The concept of "flattening the curve" has gone viral since Dr. Fauci mentioned it at a White House press conference. However, what may not be clear to the public is that flattening the curve is not the end but merely the first step. The exigent data in this paper between performance of the US stock market and concurrent incidence of COVID-19 cases has also provided an opportunity to correct another common misunderstanding: "Negative" correlation does not immediately imply something undesirable. This paper also avoids the common misinterpretation that a p-value ≥ 0.05 signifies zero or no relationship.

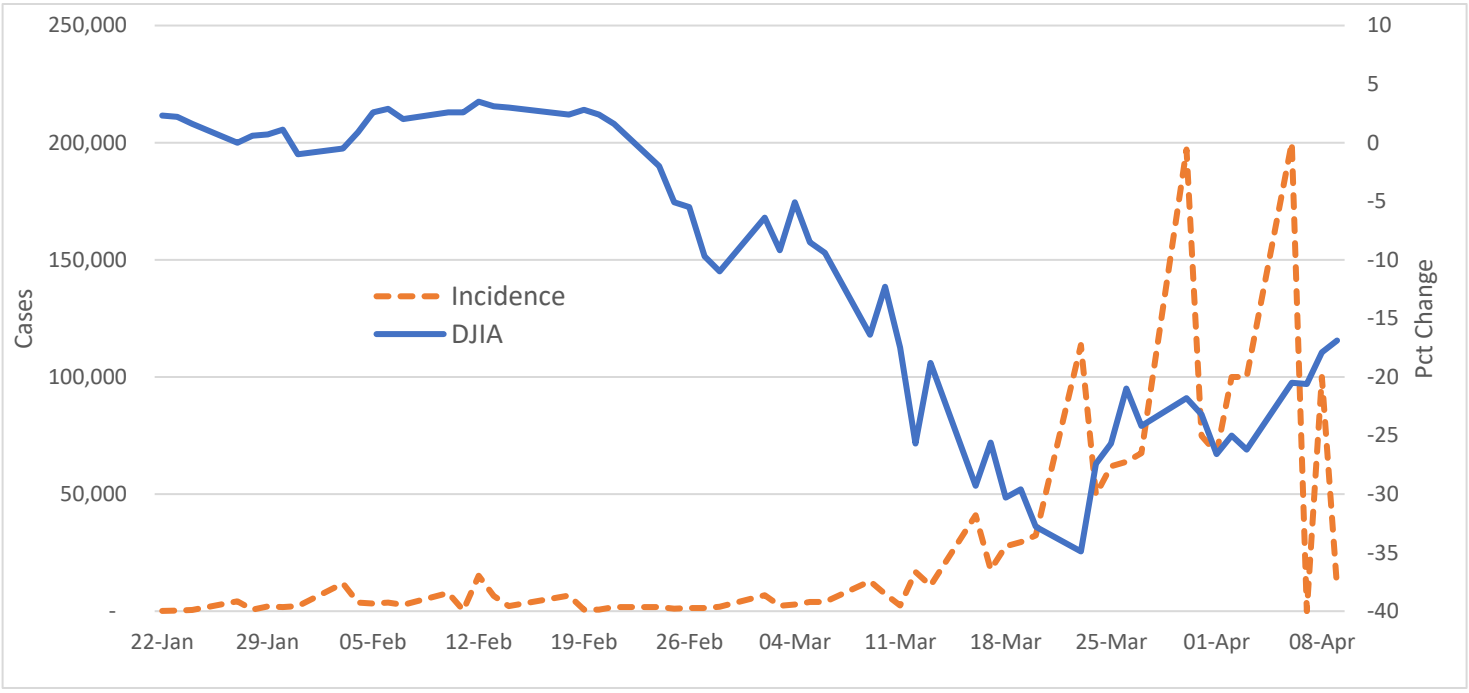

Figure 1. Worldwide incidence of COVID-19cases and Percent Change in Dow Jones Industrial Average (DJIA).

The goal of the paper is to correlate how increasing burden of disease correlates with loss of corporate wealth, and to consider possible causal factors for the correlation with the understanding that correlation does not imply causation.

The COVID-19 prevalence data was abstracted from the prevalence curve at the Johns Hopkins University website (see appendix). Incident cases that were derived from the daily increase in prevalence curves by using a "lag1" function in SAS. The data for the Dow Jones Industrial Average (DJIA) was downloaded from a business data website (see appendix).

These data are percent change in the DJIA (index of stock market wealth) for each trading day with reference to the index value on the last trading day of the previous year (Dec. 30, 2019). The diagram was created with EXCEL graphics.

Overall, the Spearman correlation between the curves is strong and negative (-0.66, $p<0.0001$], but parsing the data into three time intervals reveals that the relationship has changed substantially over time. Both curves are essentially flat between 22-Jan and 19-

Feb indicating that both corporations and the public were suffering poor health. Over these 20 trading days, the relationship between corporate and public health was weak and not even statistically significant [r_S (20) =0.14, p=0.549]. In the subsequent time-period(20-Feb to 10-Mar) the correlation strengthened and was negative [r_S (20) = -.65, p = 0.012]. However, this was not a welcome sign because stock prices plunged, and public health deteriorated. In the last interval (11 Mar to 9 Apr) the relationship was weak and positive but not statistically significant [r_S (22)=0.07, p=0.768]. It is impossible to unequivocally determine causal pathways with observational data, but we are free to speculate. The volatility (variance) in daily incident cases in the last interval perhaps reflects the public health preventative measures that were aggressively implemented by many governments. The stock market was probably aware of this development, but most likely responded aggressively to the economic stimulus package that was passed by the US Congress in late March. We do not want to see flat curves. What is needed are the curves crossing which would be a beneficial negative correlation. Multinational corporations would be rising to previous levels of performance and COVID-19incident cases would be disappearing, but not because the parasitic virus is killing the hosts.

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It is clear in this pandemic that trillion dollar bailouts to improve the health of multinational corporations must also be matched with trillions of dollars to improve public health care systems around the world. Corporations cannot sustain good health if there are no healthy people to do their work. Corporations and medical institutions need to be prepared to quickly trace cases, implement diagnostic tests, and have a stockpile of personal protection equipment and ventilators readily available for the next assault on humanity by a parasitic respiratory virus.

Data sources:

- COVID-19 prevalence from Johns Hopkins University: https://www.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6
- Dow Jones Industrial Average from https://www.macrotrends.net/2505/dow-jones-ytd-performance.