Basing Responses to Covid-19 Pandemic from the 1918 Influenza Data should be Avoided because of Their Massive Differences *

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Abstract

The Covid-19 pandemic has continued for almost four years now. It has impacted many aspects of our lives, such as personal wellbeing, anxiety and depression due to constant lockdowns, and the closing of many small businesses. On a country level scale, the pandemic wiped out many aged population, stagnated global economy, and forced many countries to restrict or close their borders. Beach, Clay, and Saavedra (2022) examined the Covid-19 pandemic and compared it to the 1918 Influenza; they argued that the two cases are quite similar, and we should be able to find out the pattern of the pandemic from the influenza datasets. However, they missed the valuable insight that the world is simply not like 1918 anymore, and comparing these two pandemics without thinking about the social economic setting can lead to dangerous wishful thinking. We replicated the result of their paper with respect to mortality rate between age groups, articles mentioning the pandemic, life expectancy, and world economics. We then investigated whether those results are useful, and should be considered when responding to the more recent Covid-19 pandemic. Unfortunately, when considering today's social economic setting, those older datasets are relatively fruitless and misleading; our findings are worth considering in order to implement better health and other guidlines.

1. Introduction

We are still amidst the COVID-19 pandemic, and it has continued to wreak havoc on a global scale. The unpreparedness of governments' healthcare systems and many nation's less than competent leadership all contributed to the rapid spread of this disease. Due to COVID-19 virus strand's unique biological similarity to the H1N1 virus that caused the 1918 Influenza (Spanish Flu), many scholars were trying to use the data recorded back then to predict possible futures for the coronavirus disease. Furthermore, they were also examining the past data sets in order to provide guidance on possible future policies. Beach et. al's paper, "The 1918 Influenza Pandemic and Its Lessons for COVID-19" showcases various data sets for the old Influenza and examines the similarity between them and COVID-19 data. They have touched on many aspects of the influenza, such as mortality, fertility, media coverage, and economic growth [@beach]. Due to the paper's relatively outdated publication, our team has determined that many of the authors' opinions about COVID-19 are not sufficient, their influenza graphs are relatively useless, and other more recent articles should be considered in order to determine the best course of action for governments around the world.

Although the Beach et. al's paper examines a wide range of topics, our team has determined that only four topics are worth considering in today's context: Excess mortality rate/mortality count, media coverage, life expectancy, and world economics. In the following paper, we have reproduced four graphs for those chosen topics from the replication package. Our team will examine the four topics in three stages. Firstly, we will have a descriptive analysis of the influenza data. Next, an extensive interpretation of the results will be carried out. Lastly, we will draw relevant information from related papers to further discuss interesting implications and the original data's relevance.

*Code and data are available at:https://github.com/Faustine123/1918-INFLUENZA-PANDEMIC-COVID-19.git. The orginial paper can be reached out at https://www.aeaweb.org/articles?id=10.1257/jel.20201641.

1.1 Overview of Additional Selected Articles

Firstly, despite the biological similarity of the H1N1 and COVID-19 virus, we should gain more insight on the most vulnerable age group through more recent data sets. Centers for Disease Control and Prevention (CDC)'s mortality count data can provide us with more information when comparing to the excess mortality rate data provided by Beach et. al's paper. Although the influenza data covers 13 countries while CDC's only covers the U.S, we can still see the general pattern and apply it on a global scale (CDC XXXX).

Secondly, forms of media have changed drastically since 1918, and they can easily be accessed by civilians. Beach et. al gave a brief overview of U.S media coverage rate in the 1918, but they did not have any in depth analysis; the graph itself does not tell much in terms of the effectiveness of media. Therefore, newer COVID-19 data about media coverage should be examined as well. Mach et.al examines media reporting in the U.S, Canada, and Great Britain and graphed the data in terms of scientific value and sensationalism (Mach et. al 2021). By delving deeper into their paper, we can understand more about the importance of news media in the recent pandemic.

Thirdly, life expectancy has also changed since 1918. People generally have more access to medicine and their lives are relatively healthier compared to the living conditions in 1918. For that reason, we also need newer pandemic data to support the claim that Beach et. al made. They argued that life expectancy around the world generally drops when a pandemic appears, and Schöley et. al's paper will be used to further support their claims with more recent and relevant data (Schöley et. al).

Lastly, the world economy also took a huge hit when COVID-19 forced countries to close their borders and restricted global trades. Our team believes that it is imperative to look at both the macroeconomic changes and the stock market changes during COVID-19. Although the replicated paper includes data on the 1918 influenza's stock market changes, we argue that people should consider the unique effects that COVID-19 has on a global economy. Therefore, Mazur et. al's paper will be used to analyze the stock market movements during the pandemic, and Barua's paper will highlight the impact of COVID-19 on global macroeconomics (Mazur et. al 2021)(Barua 2021).

2. Data

The original paper has more of a literature review style of writing, and the authors used various data sets to give a general overview of the 1918 Influenza and its similarities with COVID-19.

2.1 Source

Our paper will examine different areas of the original paper, and we will be using different data sets to achieve our goals. The data that we used for graphing purposes is pulled from various sources, and a general list can be found below.

1) Median excess mortality rate in 13 countries is from Murray et. al, "Estimation of potential global pandemic influenza mortality on the basis of vital registry data from the 1918–20 pandemic: a quantitative analysis."(2006)

2) Regional patterns of influenza newspaper coverage data is from the "Chronicling America" newspaper archive published by the Library of Congress.

3) Period life expectancy by year in 14 Countries data originates from ourworldindata.org.

4) Stock market indices data is from NBER Macrohistory database.

2.2 Methodology

This analysis will be performed in R [@R], using the dplyr [@dplyr], readxl [@readxl], tidyr [@tidyr], data.table [@table], lubridate [@lube], haven [@haven], and tidyverse [@tidy] packages. All figures in the report are generated using ggplot2 [@ggplot].

The collection method of our sources varies. For Figure 2, Figure 3, Figure 4 mentioned in the sources section above, our team believes that they are relatively impartial and objective. For source of Figure 1, Murray et. al compiled all countries with high-quality vital registration data for the 1918-20 pandemic and used these data to calculate excess mortality. This might cause certain biases and make the data inaccurate when applying it globally. For example, proper data collection just began in 1918, and only countries that have the resources to properly record the data are chosen. It is reasonable to argue that they are already developed nations, and only including them means that the data is not representing other affected developing nations at the time.

3. Results

Excess mortality rate is the rate of deaths from all causes during a crisis (in this case, the pandemic) above and beyond what we would have expected to see under "normal" conditions. It is imperative to understand which group is the most vulnerable, since that information can aid our healthcare system to mitigate the impact. In figure 1 below, we have compared the mortality rate with age groups and gender during the 1918 Influenza. There is a clear spike of excess death rate for male and female populations in the 25 to 29 age group. In addition, the H1N1 virus seems to be most effective at killing young adults and the middle age population from 15 to 39. Furthermore, males have a higher chance of death overall when compared to females during the influenza in those 13 recorded countries.

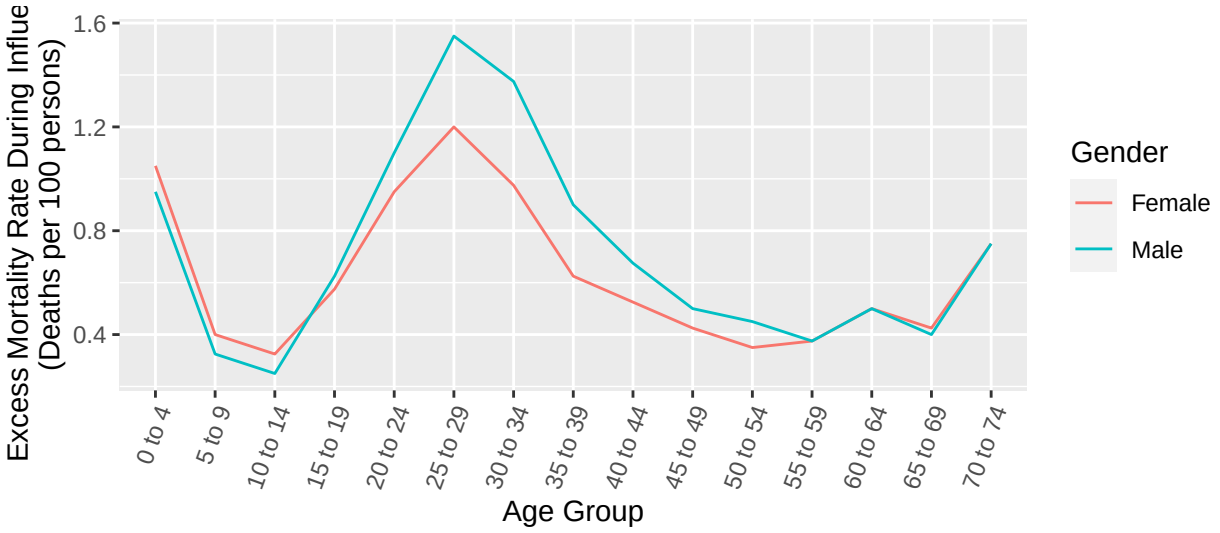

Figure 1: Median Excess Mortality Rate by Age and Sex in 13 Countries

We have produced Figure 2 below using the mortality data set form CDC in order to compare it with the influenza data from the original paper. Although the CDC data set only includes data collected from the U.S healthcare system, we believe that the mortality trend does apply well globally (CDC XXXX). There is a clear uptrend in mortality when the population is in the older age groups. Furthermore, the most at risk male population is the 75 to 84 age group, while the most at risk female population is the 85 years and older age group. In addition, males are also more likely to die from coronavirus than females. On the other hand, coronavirus barely affects the younger population, and we do not see the spike in mortality between teenager to middle age groups like the influenza data.

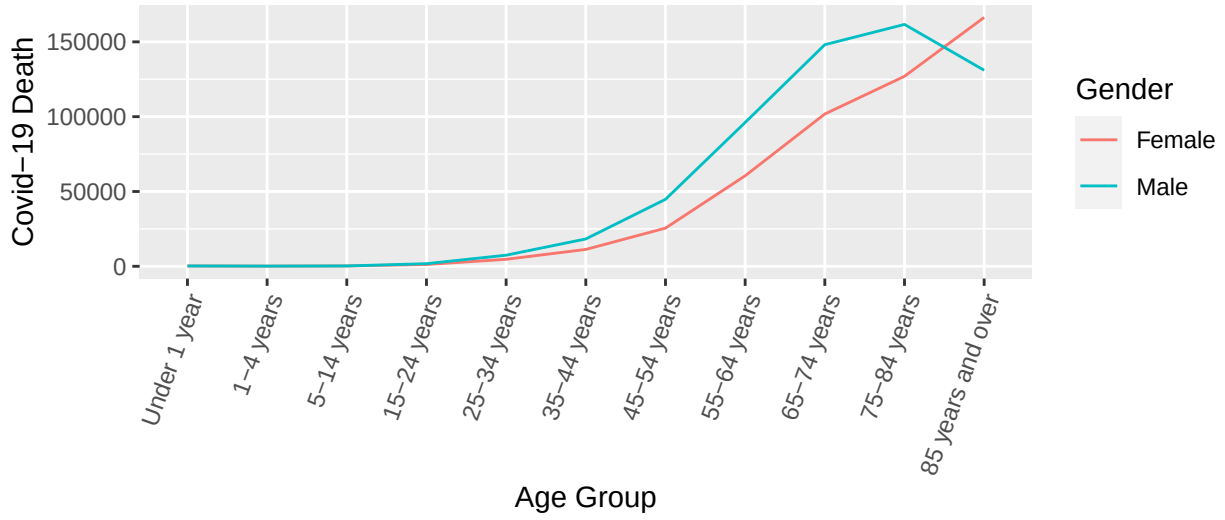

Figure 2: Covid-19 Death by Age in United States

Figure 3 below showcases a general overview of U.S media coverage about the influenza separated by areas. We can see that there is a clear spike in article mentions for all four areas during 1918 and it gradually decreases over the years. In addition, out of the considered areas, Southern states and Midwestern states mention the most about the influenza. The authors of the original paper did not do much analysis on the effect of media during a pandemic, since the U.S did not get affected too much by the H1N1 virus and the data only applies to the different states. Our team will be using Mach et. al's paper to supplement our understanding of the role of media in the discussion section, since their paper does a more systematic and detailed analysis.

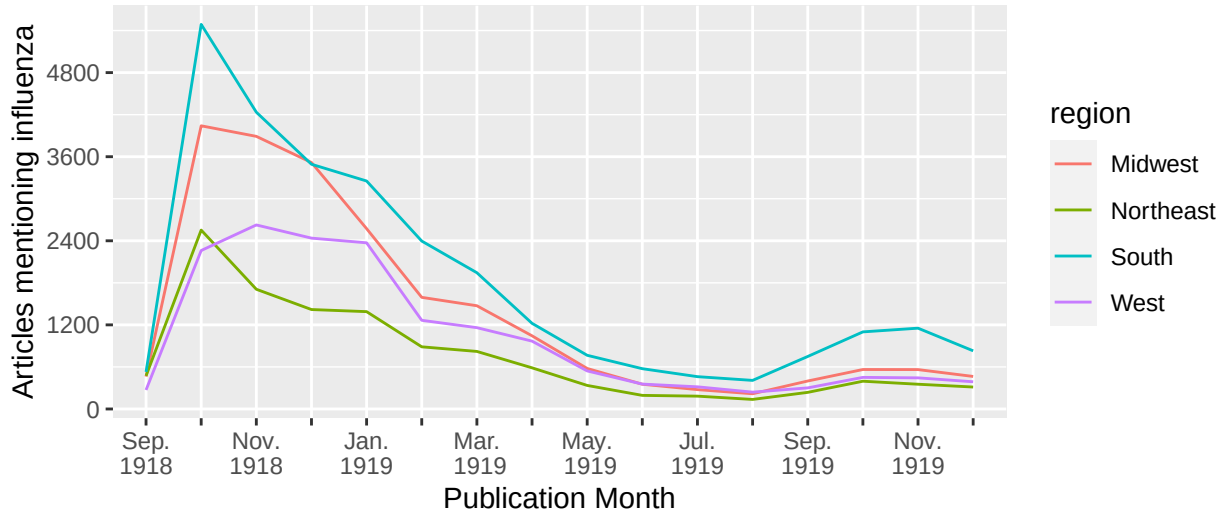

Figure 3: Regional Patterns of Influenza Newspaper Coverage

Figure 4 highlights the life expectancy changes before, during, and after the 1918 Influenza. Three main elements have been highlighted with different colours in the graph: Denmark (least affected), world average, and Italy (most affected). We can see a general uptick trend in this graph, and there are clear troughs around 1918. This means that the overwhelming majority of the countries included in this graph experienced decreased life expectancy during the Influenza era.

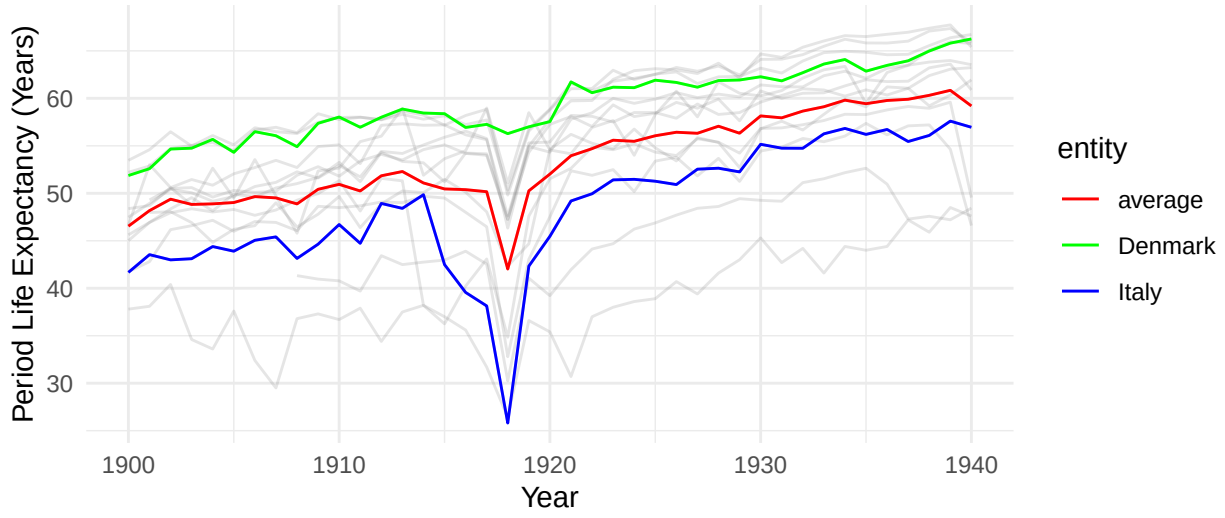

Figure 4: Period Life Expectancy by Year in 14 Countries

Figure 5 reveals stock market patterns during the Influenza separated by either the U.S or London stock exchange. Although this is not an exact reproduction of the original paper, we can still spot the overall trend. There is no clear pattern shown, and both stock markets seem to oscillate. They seemed to be relatively unaffected during the Influenza and did not show drastic increase or decrease in prices. In addition, both stock market prices gradually increased over the years and all ended up with a higher price in 1924 (which is the end of the chart) than in 1915.

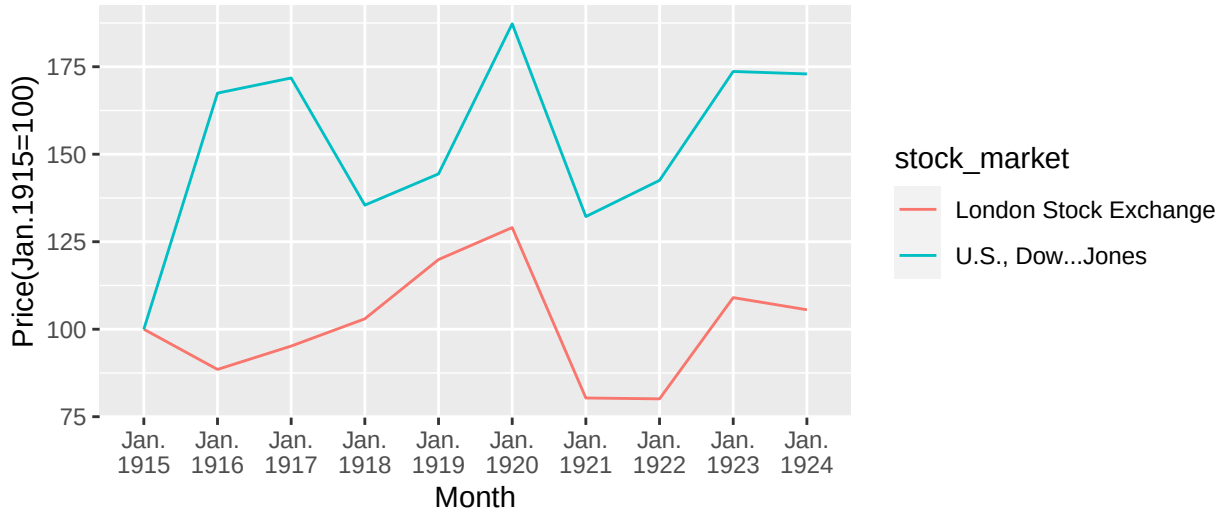

Figure 5: Stock Market Indices by year in London and U.S.

4. Discussion

4.1 1918 Influenza and COVID-19 Affects Different Age Groups

We can clearly see that the Influenza and COVID-19 affects vastly different age groups in the above section(Figure 1)(Figure 2). Influenza has a higher lethality amongst the working population, while older people

are more likely to die from COVID-19 (CDC XXXX). Although it is scientifically proven that those two viruses are very similar in potential symptoms and biological structure, we shouldn't prepare our hospitals in the same way as when we are combating the influenza; they should be modified and expected to receive a large percentage of older patients. In addition, future policies and social benefits should prioritize the older generations, since they get affected the most and are more at risk than other age groups. Furthermore, it is especially important to prevent or minimize virus transmission to older generations, since they already have a weaker immune system and the virus is more effective on them.

4.2 Importance of Media Coverage

Media coverage is an essential element for staying informed and preventing the rapid spread of pandemics. Despite the original paper's authors not delving deeper with the Influenza data (Figure 3), our team used Mach et. al's paper to gain further understanding of the power of media during a pandemic. Mach et. al have a more detailed method of calculating the effectiveness of media coverage. They only examined traditional news outlets in three countries (Canada, U.S, and UK), and they separated the data into "scientific quality score" and "sensationalism score". These categorizations are very effective, since having high scientific quality scores means that the information is accurate and having low sensationalism scores means that the source did not sacrifice too much factual information to "grab eyeballs".

The authors uncover that newspaper reports have varying degrees of scientific quality. They generally have a moderate score on scientific quality, while the right leaning media platforms of each country have significantly lower score (Mach et. al xxxx). The score is extremely low for validity, precision, context, and the distinction between opinion versus facts in some cases. The various differences in quality suggest that readers from Canada, U.S, and UK will obtain varying degrees of scientific quality when they read different news outlets. Overall, Canada, does on average, has better scores in this category compared to the other two countries; it is reasonable to argue that the higher scientific quality score contributed to their lower COVID-19 cases and death counts (Mach et. al xxxx).

Another category examined by Mach et. al is sensationalism. While low sensationalism often correlates with more factual information, it also means that readers might be uninterested in reading the articles. Sensationalism scores are low overall across all news outlets, and the authors suggest that ideology affiliation might influence how media use information. They highlight that populist-right leaning media is more likely to include governments' interpretation of the science and implemented policies in their articles (Mach et. al XXXX).

Overall, new media plays an essential role in providing information for the public, explaining government actions, and guiding public perceptions of the pandemic. Through Mach et. al's paper, we can clearly see that higher scientific quality should be strongly encouraged in news outlets. It is also reasonable to increase the sensationalism to a certain degree without infringing the factual correctness. After all, the news article should be eye-catching enough to grab the attention of the readers and provide them with the most up-to-date facts to stay informed about the pandemic.

4.3 Life Expectancy Changes

Life expectancy is a measure of current population health, and it has an inverse relationship with mortality. Beach et. al examined the Influenza data in the original paper, and they argue that COVID-19 should make the affected countries have similar dips during the pandemic and bounce back years after [@beach]. We examined Schöley et. al's paper to obtain newer data for COVID-19, and we highlight that COVID-19 does have a similar effect on life expectancy around the world (Schöley et. al).

Schöley et. al uncover that the pandemic has already induced a mortality shock in the majority of European countries and the U.S by 2021, and even some of the best performing countries are struggling to keep up with their pre-pandemic projections. France, Sweden, Belgium, and Switzerland managed to recover from their losses in 2020 and restored their life expectancy back to 2019 level. Interestingly, the Scandinavian countries (Finland, Norway, and Denmark) also managed to maintain their life expectancy at a pre-pandemic

level. Schöley et. al argue that this phenomenon is caused due to them delivering vaccines faster on average, introducing various effective non-pharmaceutical public health interventions, and their effective health care systems.

4.4 Macroeconomic impact and the March 2020 Stock Market Crash

Beach et. al provided us with the stock market data during the Influenza era, but the world is simply not the same anymore. Globalization and the ease of transportation makes certain countries heavily depend on each other for materials. The world economy stagnates when COVID-19 forces governments to restrict borders, introduce lock down measures, and have tighter controls on imported and exported goods. By examining the macroeconomics and the stock market, we can have a deeper understanding of the unprecedented effects of COVID-19.

Barua developed a potential timeline for a country's economy based on Chinese data. He argues that we should consider both short and long term effects of COVID-19. To begin with, countries will experience distortion in supply chains, interruption of human workers, and demand/supply shock in the short term. Next, distortion in trade will lead to changes in essential goods demand/supply, loss of employment, and rise in financial instability. Lastly, countries will experience reduced economic growth and a possible recession in the long term (Barua xxxx). This timeline urges governments to reduce the negative effects with fiscal and monetary policies. Furthermore, this timeline is supported by anecdotal evidence and Mazur et. al's paper on the stock market evaluation.

Mazur et. al investigated the US stock market performance during the crash of March 2020 triggered by COVID-19, and they concluded that healthcare, food, tech, and natural gas stocks earned high positive returns, while value in real estate, entertainment, hospitality, and petroleum decreased dramatically (Mazur et. al xxxx). This discovery coincides with Barua's claims. Essential goods demand such as healthcare and food sees rise in value, while non-essential goods such as entertainment suffers heavy losses. The stock market crash in March 2020 also preludes to the possible repossession claim made by Barua.

Overall, although Mazur et. al only examined the U.S stock exchange, it is considered the most influential stock market and can easily send ripples of its effect towards other stock exchanges. Therefore, it is imperative that governments should help the economy to prevent it from going into a recession and introduce new policies to rebuild it back to pre-pandemic levels.

4.5 Potential Bias

Apart from the possible bias introduced in the methodology section, there are various biases in our sources. To begin with, the data on the Influenza has various competing factors that we can not account for. For example, the excess mortality rate graph includes death count from every cause. World War I, different illness, and poor living conditions all contributed to the death of young people during that era. Next, the scope of the data we used to examine the importance of media coverage is extremely narrow. It only investigates traditional media (news) for three countries, and misses out on covering various social media platforms. This data might be biased towards older generations, since younger cultures obtain most of their information through those platforms instead of traditional news. Lastly, the paper we used to examine stock performances during a pandemic focused heavily on the U.S stock market. While it is true that it can be considered the most influential stock market in the world, it can be more informative if we also get to investigate the impact of COVID-19 on other lesser stock markets such as the Hong Kong stock exchange (HKEX).

4.6 Weakness of our Paper

One of the biggest weaknesses of our paper is the limited data sets obtained from the original paper. During our replications, we discovered that most of the data sets have been cleaned and already filtered to answer certain questions. This makes it extremely hard to manipulate the data sets in other ways to gain more

insights and ask more questions. Furthermore, due to the ongoing nature of COVID-19, new data sets are constantly developed. Therefore, newer data can completely render our analysis obsolete or challenge certain arguments made in this paper.

4.7 Possible Next Steps

This study can be improved upon by utilizing more data sets to further confirm or modify the claims made in the above sections. Understanding a pandemic does not only include how the virus transmits or how it is constructed biologically. We should also consider the social economical context when developing new policies for COVID-19. Lastly, due to the volatile nature of the virus and its constant mutation, it is best to examine newer papers with more recent data sets when they are available.

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References