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**ARTICLE**

# Analysis of the Effect of COVID-19 On the Stock Market and Potential Investing Strategies

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**Abstract**

In this paper, we analyze the potential effects that the coronavirus, "COVID-19", will have on the stock market and then we propose possible ways that an individual could profit off a market affected by a global viral outbreak. We look at past outbreaks and come to the conclusion that often markets will react adversely to these such incidents in the short run but that in the long run, markets eventually correct themselves and increase. In order to profit off of such a market, we propose shorting industries that will be immediately affected by the virus in the short run and then eventually buying back into those industries after their price has dropped significantly. Specifically, we look at the travel industry, technology industry, entertainment industry, and gold as potential areas where great profit can be made.

## 1 | INTRODUCTION

The Covid-19 outbreak is an international pandemic that has taken the world by storm. As of May 1, there are approximately 3.4 million reported cases of Covid-19 around the world with approximately 240,000 reported deaths [1]. When a new virus outbreak occurs, no one fully knows what the long term effect of the virus will be. There could be long lasting effects on both the health of the public and on the stock market. If we look back historically to the year 2003 when there was the SARS outbreak, another type of coronavirus, in retrospect, we know that the SARS outbreak did not affect nearly as many people, with only 8096 reported cases and 774 deaths [2]. However, the actual direct effects of a pandemic aren't always what moves the market. The stock market often moves with speculation. Between January 2013 and the middle of March 2013, the time period that the SARS outbreak was occuring, the Dow Jones Index fell roughly 15% from peak to trough due to fear and uncertainty surrounding the virus. This may seem bad but by the end of the year, the Dow Jones Index was up roughly 21% YTD or about 39% from its lowest point of the year! In fact, it only took about 3 months from when the Dow Jones hit its bottom to get back up to its previous peak (Exhibit 1). For a relatively tame outbreak like SARS, there was a short run market shock that decreased the value of stocks but in the long run, stocks returned to their previous levels and even reached new highs.

SARS is the same type of virus as COVID-19 but the reaction to the viruses couldn't be any more different. COVID-19 has caused locations to completely shut down, forcing residents to stay inside and either stop working or work from home. Travel bans have been instituted en masse completely preventing both people and goods from moving around. Currently, it isn't fully known what sort of long term effects that the virus may have on the economy as a whole. Because of this, it might be better to look further into the past at the Spanish Flu as a comparable pandemic. The Spanish Flu was the world's deadliest pandemic of the 20th century. It's estimated that at least one third of the world's population had the disease and that over 50 million people

[1] Worldometer, 2020
[2] World Health Organization, 2003

perished because of it [3]. One would think that such a pandemic disease would have huge negative effects on the stock market but that wasn't the case. Outbreak of the Spanish flu occurred in early 1918 with the worst of the pandemic being in the fall of 1918. If we actually look at stock returns from that period though, we will generally see that the market was not that greatly affected. From the beginning of 1918 to the end of 1918, the stock market was generally trending upward with a few hiccups. By the end of the year, the Dow Jones ended 7% higher than at the start. Furthermore, we actually see that in 1919, the market actually rallied almost 50% until it eventually came crashing back down in 1920(Exhibit 2)[4]. Of course, at that same time period world war 2 had just ended which undeniably fueled a market rally. Because of this, the Spanish flu is not an apples to apples comparison for the COVID-19 pandemic in terms of stock market effects but there is one important insight we can glean from looking at the Spanish flu; Even with market shocks, stocks do well in the long run.

If we conclude that the market will act similarly to how it has in the past, then we can assume that there will be short term stock decreases but increases in the long term. This means there is great potential to buy stocks from strong companies at a discounted price! We propose that in order to maximize profits from the virus, in the short run, we short various industries but in the long run, we should buy stocks that have dipped and hold them. In particular, we think that the travel industry would be hit the hardest by a pandemic and so shorting the industry in general would lead to the most guaranteed profit.

## 2 | ANALYSIS AND STRATEGY BY INDUSTRY

### 2.1 | Travel-related industry

Due to the outbreak of Covid-19, various travel bans and stay at home orders have been instated. Usually, March is the time where most universities have spring breaks and students decide to travel. However, due to travel bans and general concern surrounding the virus, many people are either unable to travel or are electing to not travel. Due to the large amount of travel cancellations and general apprehension about traveling, the travel-related industry will be affected deeply.

Online travel agencies such as Booking and Expedia are the first to experience these effects. These online travel agencies earn money from every reservation they sell. When people cancel their reservations or stop traveling, these agencies lose revenue. Similarly, hotel companies also suffer the same fate since there will be a lot of empty rooms. Additionally, people who are not willing to travel will also influence public transportation companies. Since the virus can infect people through the air, confined public transportation methods such as airlines, trains, and buses, are not safe. Due to this concern, people will decrease the frequency that they take these methods of transportation, especially airlines and cruises, where there are no quick escape routes. Looking at data relating to outbound flight bookings from China to worldwide regions for March and April, the bookings fell by almost 56% from the same period last year due to fears surrounding COVID-19. In particular, bookings to America dropped by 63.2% (Exhibit 3) [5]. We also looked at historical data relating to SARS. During the SARS outbreak, US airline stocks' prices dropped more than 30%[6]. To further corroborate the claim that flights are decreasing, we looked at data surround the number of international flights arriving into Sydney Airport. By comparing the number of flight in April 2019, before COVID-19, to April 2020, during COVID-19, see see a significant drop in the number of flights. (Exhibits 45)[7]. These pictures reflect that flights decreased significantly. Another popular way to travel is by cruise. Recently, the incident involving the Diamond Princess cruise ship, where 3500 passengers remained on board for 14 days and 700 passengers were confirmed to have COVID-19, dramatically affected the revenue for cruise companies.[8] Overall, we can predict that the price of stocks in travel-related industries will decrease for a long time and we will short sell those stocks and wait for the turning point to buy back stocks.

To analyze quantitatively, we will use the airline industry during the SARS period as an example to develop our strategy. The reason why we have chosen this industry is that compared to other industries, the airline industry has not changed significantly, meaning we can make a comparable comparison between now and during SARS. In addition, returns for airlines stocks are often highly correlated with other travel stocks so the airline industry can serve as an adequate base case .

We used three airline companies: Cathay Pacific(CP) , Eastern Airlines(CEA), and China Airline(CA). We have chosen three companies from Asia because Asia was hit hardest by the outbreak of SARS. We plotted the closing price, the 10 days

[3] Centers for Disease Control and Prevention, 2020
[4] Vercellone, 2020
[5] Statista, 2020
[6] Root, 2020
[7] Kaggle, 2020
[8] Normile,2020

moving average, and the 10 days momentum of these companies. The outbreak of SARS is distinguished by two periods. [9] One is from 1 December 2002 to 11 March 2002, called the "pre-event", the other is the sub-period, which is different for each country.The pattern of stock price movements in these two periods are slightly different from each other. The graph shows that stock prices dropped sharply from the beginning of 2003 and rebounded in the end of April(Exhibit 6). If we check the 10-days momentum(Exhibit 7), we can see the turning point obviously. From January to March, the momentum was very unstable, indicating that volatility was huge. Eventually, we see the gap between the maximum and minimum close while the data trends upward. Our 10 days moving average also shows a similar trend(Exhibit 8). After these stocks reached their lowest point during this period, they accelerated and rebounded quickly. Combining this all together, when we see a closing gap, upward trend, and more rapid change of stock price, we need to consider if we want to buy back these stocks.

Our overall strategy is first to short sell and then buy back these travel related stocks. We separate our portfolio into four categories: the airline companies, the cruises companies, the hotel companies, and the online travel agencies. The airline company stocks include United Airlines Holdings Inc(UAL), American Airlines Group Inc (AAL), Delta Air Lines, Inc(DAL), and Hawaiian Holdings, Inc.(HA) as they are the main airline companies that are operating flights both nationally and internationally. The online travel agencies include Tripadvisor Inc Common Stock(TRIP), Expedia Group Inc(EXPE), and Booking Holdings Inc(BKNG). The hotel industry includes Marriott International Inc(MAR) and Hilton Grand Vacations Inc(HGV). Lastly, the cruise industry includes Carnival Corp(CCL) and Royal Caribbean Cruises Ltd(RCL). Had we short sold these stocks from February 21 until May 1, we would get an average return of 50.24%. The details of these returns are shown in Exhibit 9. We will keep eyes on the situation of COVID-19 and try to catch the signal of the turning point.

## 2.2 | Technology

Technology companies come in two main structures, companies that mostly focus on hardware and companies that mostly focus on software. For this paper, we focus more on companies that mainly deal with hardware products because we believe that they will be hit harder from factories and stores shutting down than software companies. Specifically, we will look at Apple and Tesla as two examples. Looking at Apple, we know Apple is a technology company known for selling consumer electronics such as their computers and phones. To create an Apple i-phone, Apple requires parts imported from countries all over the world and assembly is done mostly in China [10]. With factories shutting down globally, we can predict that the supply chain of Apple will undoubtedly be affected. Even stronger to consider is the fact that a sizable portion of Apple's revenue is from their in person Apple stores. In 2019, revenue from Apple stores was 31% of Apple's income [11]. Without people shopping at these stores, we know that Apple will lose a sizable portion of their total income.

If we look into another "tech" company, Tesla, we already know that a lot of their valuation is based on future speculation. Tesla has only reported a few quarters where they achieved a positive profit(Exhibit 10)[12] . Despite this, Tesla investors seem to value Tesla quite highly with a current P/E ratio of 189.78X compared to the Automotive - Domestic industry's P/E of 20.88X or the Computer - Mini computers industry's P/E of 7.57X [13]. With valuations like this, investors would want to see promising prospects from Tesla. With factories being shut down however, we know that this will negatively affect Tesla since Tesla won't be able to produce new models.

If we actually look at the total amount of manufacturing being done in China between the end of 2019 and the beginning of 2020, we see that the year on year production of all manufacturing in China dropped 13.5% for January and February, which was the first drop in production output since 1990. However, we see that for March, there was only a 1.8% drop suggesting that China is getting back into the swing of things when it comes to production (Exhibit 11)[14]. We see a similar trend if we look at America's manufacturing production. For March 2020, we see a year on year decrease of 6.6% for manufacturing production. (Exhibit 12)[15]. If we think of China as a sort of leading indicator for how the United States will act, then we can predict that manufacturing will suffer in April and also possibly May but should start to increase after that. With manufacturing being done mainly in America or China for Tesla and Apple, we believe that both stocks will fall in the short term but as time goes on, they will both recover and reach new highs.

[9] Loh, 2006
[10] Costello, 2020
[11] Owen,2019
[12] O'kane, 2020
[13] Zacks, 2020
[14] TradingEconomics,2020
[15] TradingEconomics,2020

Overall strategy: We recommend shorting Tesla and Apple stocks until late may or early June and then buying them outright when they are at a reduced price. The future of the market is still unsure at this moment but with all of the uncertainty, we believe that there will be another large sell off before stocks hit a bottom. Of course the time window of when to buy the stocks depends on current market news. That's why we recommend paying close attention to three different things: news regarding any cures or vaccines, the current level of the VIX index, and updates on the status of stay at home orders. If there's a breakthrough in a vaccine, we would recommend buying immediately since a vaccine would certainly assuage market worries. If the VIX index shoots up near to its recent highs of 50 or even 70, we would recommend waiting before buying or selling any more stocks. And if there are announcements saying that it is okay for everyone to resume normal activity outside, then we believe that would be another great signal for when to buy.

## 2.3 | Entertainment

The entertainment industry will also be negatively impacted by the spread of COVID-19. Due to the outbreak of the COVID-19, Disney closed its theme park in China indefinitely during Lunar New Year — a period known as a high volume week for the theme park. Theme parks, in general, are places where large amounts of people crowd together. So in order for people to avoid catching the virus, people will stop going to theme parks. This will further have a big negative impact on Disney's revenue since its theme parks generate around 34% of its revenue (Exhibit 13) [16].

In addition, Disney planned to release the new movie "Mulan" on March 27th, which was expected to be very popular in China, however the movie was delayed [17]. According to the Motion Picture Industry Association's (MPIA) data about the Hong Kong box office receipts during SARS, the revenue dropped around 47% in the peak period and also decreased 20% after two months[18]. When SARS broke out in Taiwan in April 2004, the amount of weekend box office sales in Taipei dropped around 60% and WanHwa Enterprise Company's, a company that leases entertainment buildings, stock price fell around 10% (Exhibit 14). Because of these outcomes, it is unlikely that new movies will be released, including Mulan. We forecast that the revenue of movie theaters will be impacted and drop.

To predict the impact of COVID-19 on the entertainment industry, we chose The Walt Disney Company (NYSE: DIS) and Universal Corporation (NYSE: UVV) as our targets. Since COVID-19 is an outbreak from China and both of these companies have theme parks in Asia and derive a significant portion of their revenues from the movie industry, we can predict that these two companies will be harshly affected. Therefore, our short-term approach is to short sell on these two stocks and then buy back these stocks once we think the situation of COVID-19 becomes steady. From February 21 to May 1, we found that shorting both of the stocks was profitable. The return rate from shorting Disney is great, around 24%. The return rate from shorting Universal Corporation is less, 9.72%, but still profitable (Exhibit 15).

In the long term, we will start buying these stocks when the amount of box office sales has a sharp increase. When COVID-19 subsides, people will be eager to engage in recreational activities that were prohibited during the pandemic.This will have a positive impact on the movie industry. When we checked the amount of weekend box office sales during the SARS pandemic in Taipei, the sales recovered in May and had a big increase at the end of the month. This resulted in an increases in the stock price of the WanHwa Enterprise Company (Exhibit 14). Because movie tickets are an immediate low-cost entertainment product, we predict that as their sales increase, people will also begin to spend money on other more expensive entertainment activities such as travel. This suggests that we can use the entertainment industry as a leading indicator of when to purchase travel stocks. Therefore, we should look closely at how entertainment stocks perform as a way to determine market stability.

## 2.4 | Gold

Gold is a precious metal and is used in trade.Because gold has intrinsic value, people replace their currency with gold as a safeguard against fluctuating currency values when the stock market becomes volatile. For example, the gold price increased from 310 to 350 during the SARS pandemic (Exhibit 16) [19]. Therefore, many investors regard gold as a "safe-haven investment" to hold during uncertain economic periods to reduce risk [20]. Because we expect high volatility in the market during the COVID-19 outbreak we suggest buying gold as a hedging method.

[16]Noonan, 2018
[17]Owens, 2020
[18]Shackleton, 2003
[19]Sieroń, 2020
[20]Schroeder, 2020

With this objective in mind, we can use the performance of gold and the SP 500 to determine our strategy. We predict an unstable economy will have a negative impact on the stock market. Therefore, the price of the SP 500 would go down. During the SARS pandemic, the change in the price of gold and the SP 500 returns were anti-correlated. As the SP 500 fell, the price of gold increased up until late march when the opposite began to occur.(Exhibit 17). This same pattern also occurred during the 2008 Great Recession (Exhibit 18). Therefore, we can track these two trends and find the peak of the gold price and the bottom of the SP 500. Then we can sell gold products and prepare for entering the stock market.

Our approach for gold is to buy the gold ETF, SPDR Gold Shares (NYSE: GLD), and Ishares Gold Trust (NYSE: IAU), and follow our strategy to hold until we find the peak of gold price. Regarding the performance of the two ETFs from February 21 to May 1, they have increased only a small amount, both around 3.25% (Exhibit 19). We found that the gold price dropped dramatically from February 27 to February 28 and from March 10 to March 16 (Exhibit 20). These were correlated with the US stock market. Because the US stock market had a big drop from February 25 to February 28 and from March 4 to March 9, this made many investors need more money to put in their deposit to maintain their investment so they cashed out their gold. However, the price of gold has started growing since March 19.

## 3 | CONCLUSION

We have stipulated that outbreaks have a tendency to decrease the value of different industries during the short run but that eventually, all of the affected industries recover in the long run. We have analyzed the travel industry, the entertainment industry, the technology industry, and gold. We found that shorting travel stocks, entertainment stocks, and certain technology stocks, are likely ways to make short term profit due to the short-term panic selloff caused by the outbreak. To capitalize on the increased market volatility, we also suggest purchasing a gold ETF because gold performs well in volatile markets. As it stands currently, the market is still quite volatile with the VIX index measuring 31.19 on May 1st. Had we shorted the market from February 21 to May 1st, we would have achieved pretty significant returns. From the travel industry, we would have an average return of 50%. For the entertainment industry, we would have an average return of about 15%. We also discussed various metrics that one could use to gauge when to short or sell different stocks based off how the market reacted from past market shocks. Currently, we predict that because the market is still volatile, there is still room for the price of stocks to keep decreasing. Because of this, we still believe that holding short positions for the time being is a profitable strategy until we get clearer signals of the market stabilizing.

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# 4 | APPENDIX

Exhibit 1 - Price of the Dow Jones during the SARS outbreak

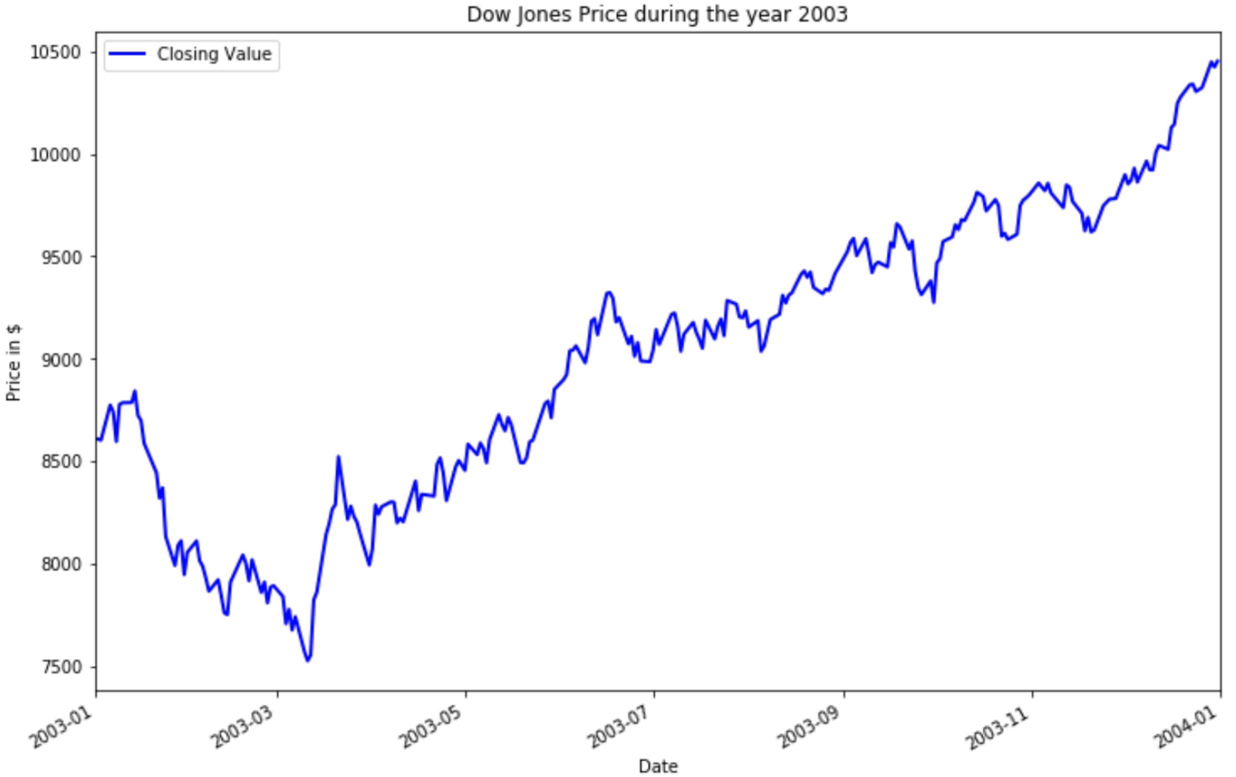



Exhibit 2 - Price of the Dow Jones during the Spanish flu outbreak.

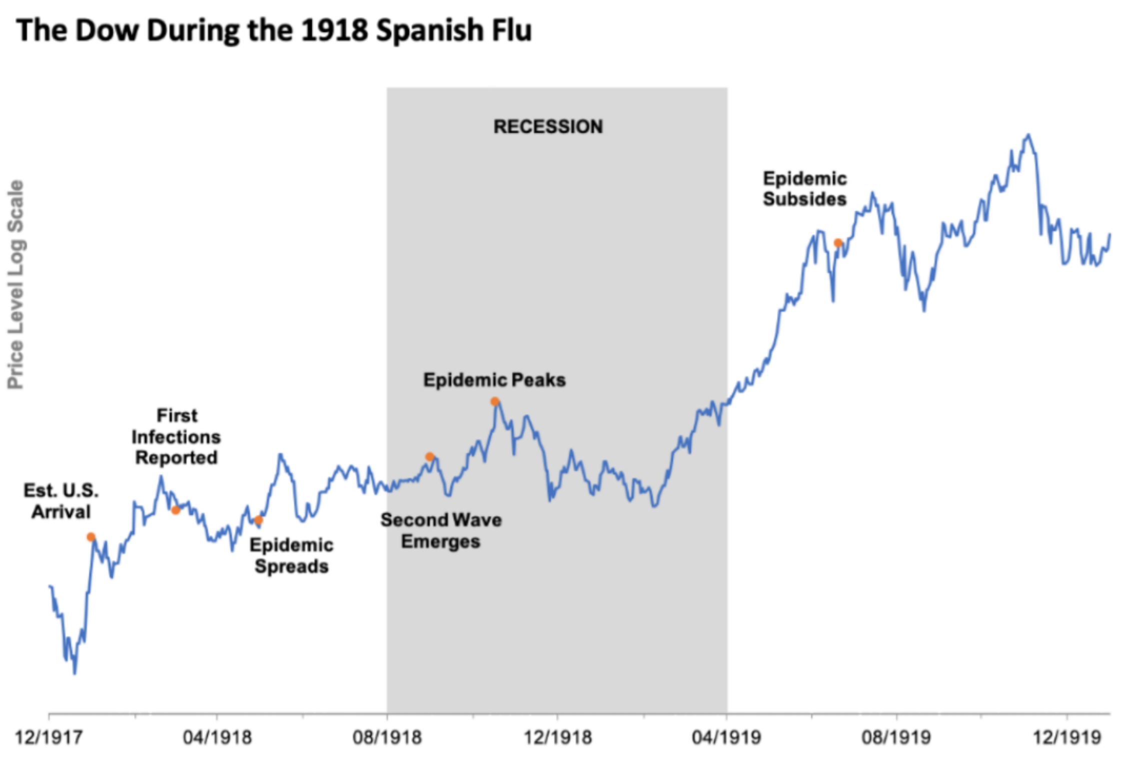


Exhibit 3 - Decrease in outbound flights bookings from China between March 1 and April 30, 2020

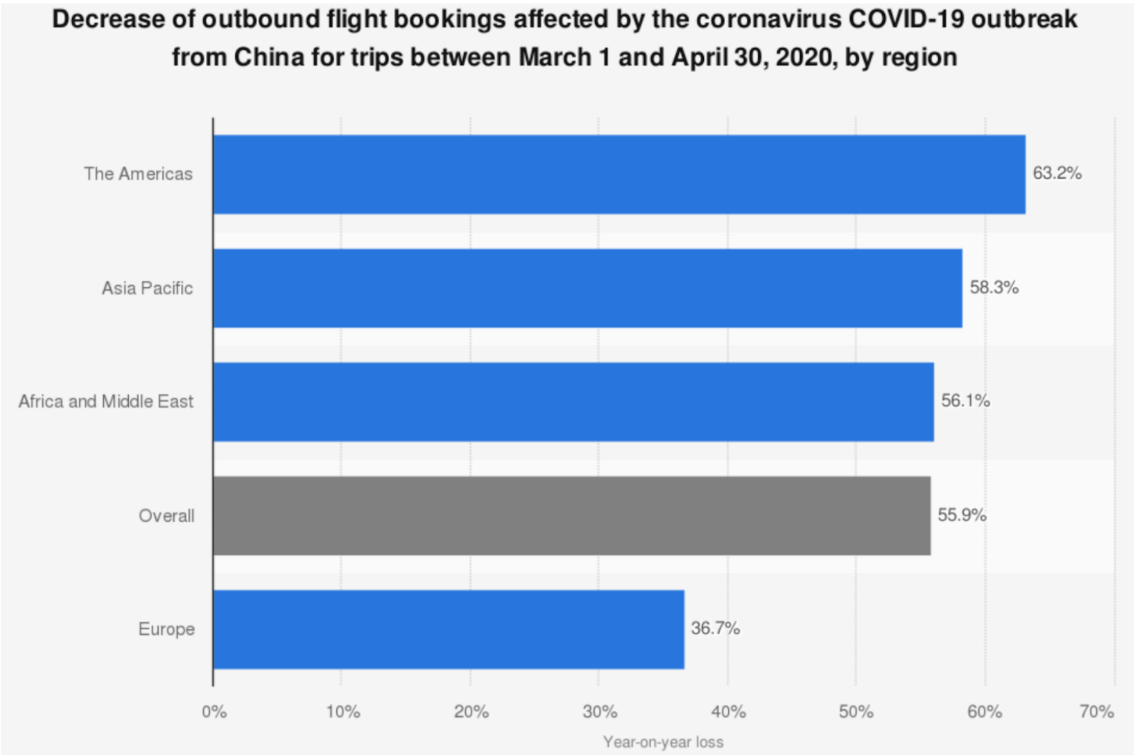



Exhibit 4 - The number of international flights arriving into Sydney Airport before COVID-19

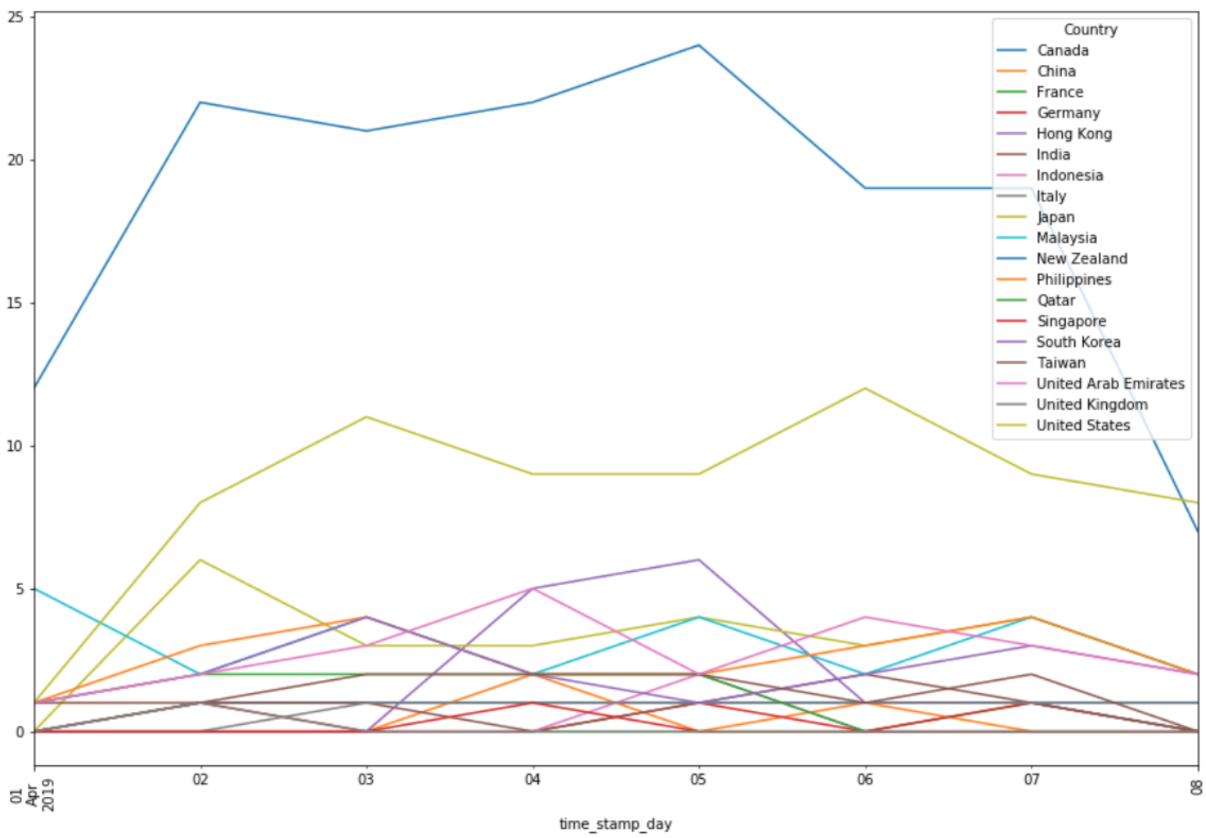


Exhibit 5 - The number of international flights arriving into Sydney Airport during COVID-19

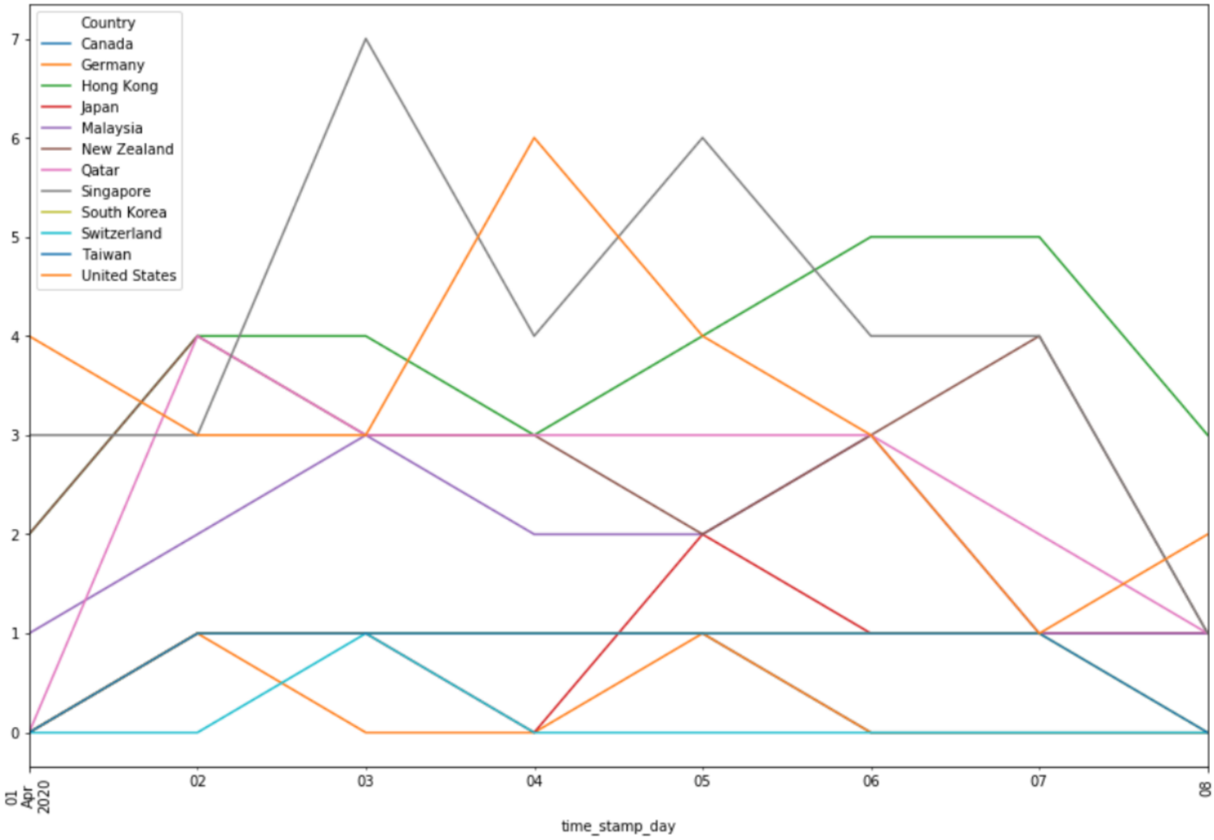



Exhibit 6 - Stock prices of Cathay Pacific , Eastern Airlines, and China Airline during SARS

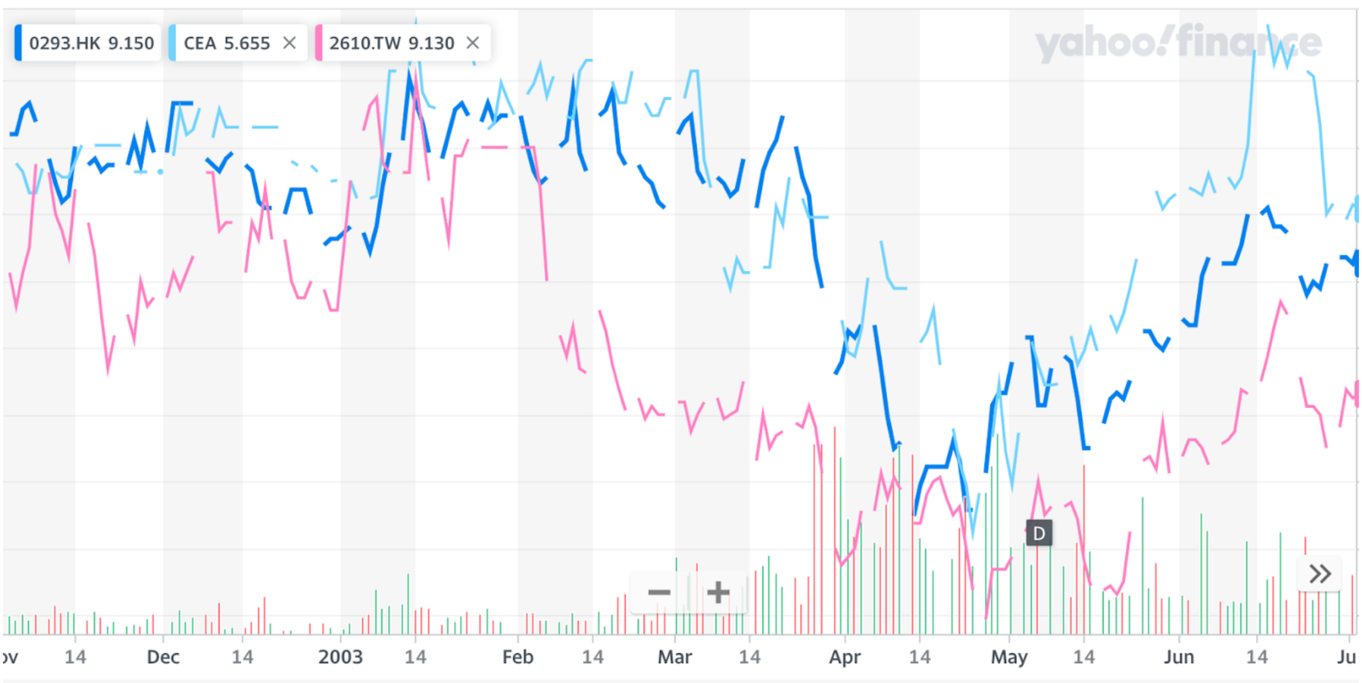


Exhibit 7 - 10-day Momentums of three stocks

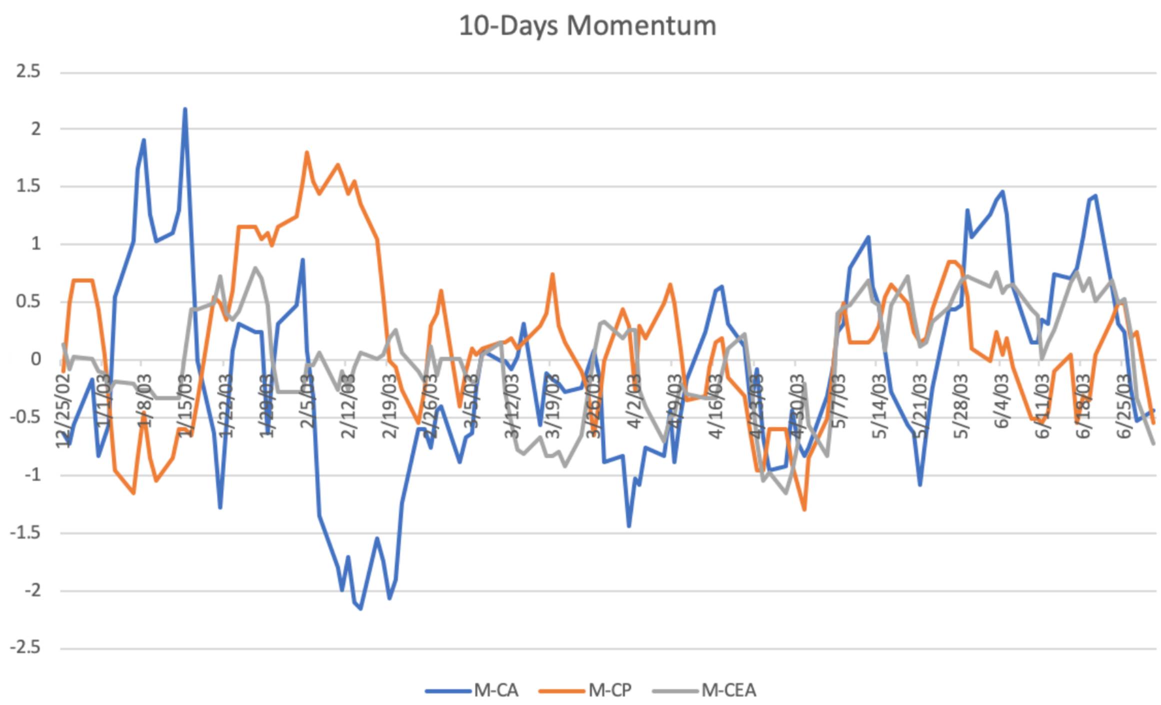



Exhibit 8 - 10 days simple moving average with three stocks

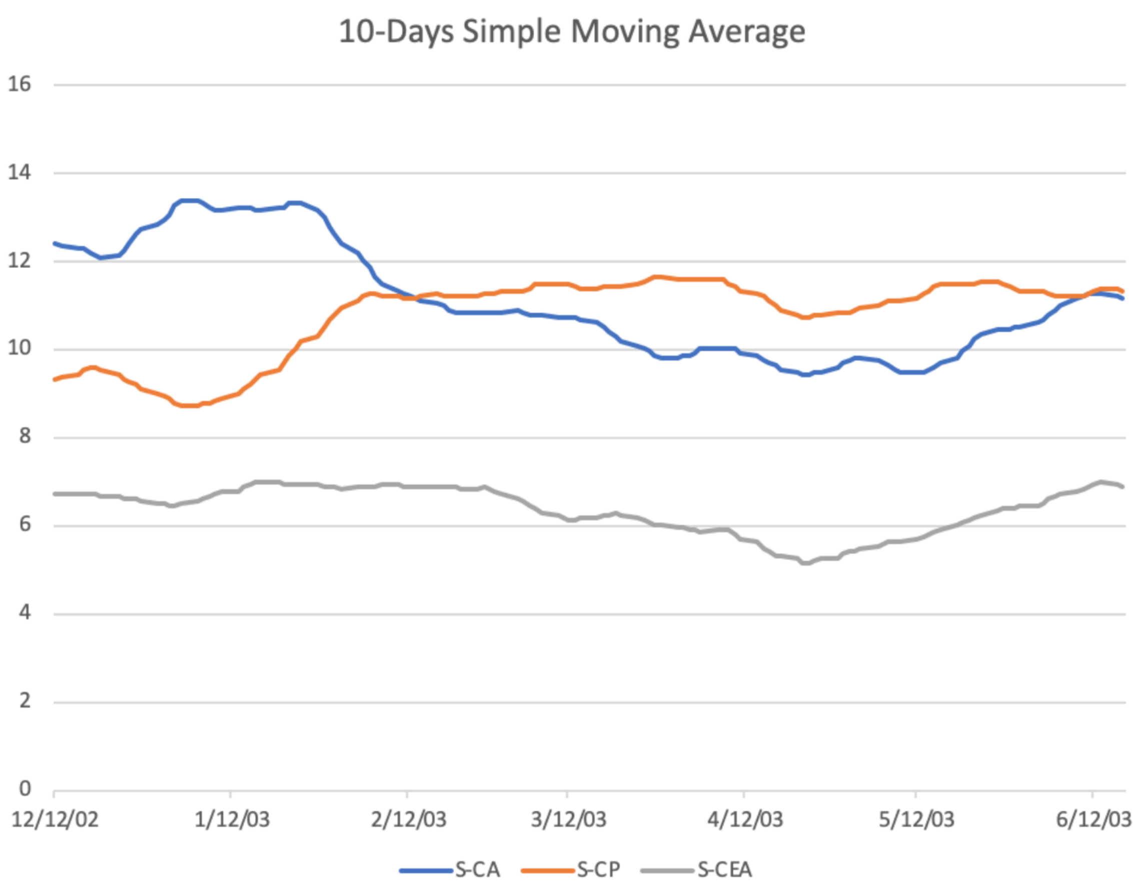


Exhibit 9 - Return for travel-related industry from 2/21 to 5/1

| Airline | 21-Feb | 1-May | Return Rate |
|---|---|---|---|
| Delta Air Lines, Inc.(DAL) | $ 57.87 | $ 24.20 | 58.18% |
| United Airlines Holdings Inc(UAL) | $ 78.01 | $ 26.62 | 65.88% |
| Hawaiian Holdings, Inc.(HA) | $ 26.81 | $ 12.97 | 51.62% |
| American Airlines Group Inc(AAL) | $ 27.82 | $ 10.64 | 61.75% |
| **Online Travel Agency** | | | |
| Tripadvisor Inc Common Stock(TRIP) | $ 28.29 | $ 18.37 | 35.07% |
| Expedia Group Inc (EXPE) | $ 120.12 | $ 67.29 | 43.98% |
| Booking Holding Inc (BKNG) | $1,928.72 | $1,448.79 | 24.88% |
| **Hotel** | | | |
| Marriott International Inc(MAR) | $ 143.24 | $ 84.75 | 40.83% |
| Hilton Grand Vacations Inc(HGV) | $ 31.50 | $ 19.00 | 39.68% |
| **Cruise** | | | |
| Carnival Corp (CCL) | $ 41.69 | $ 13.93 | 66.59% |
| Royal Caribbean Cruises Ltd (RCL) | $ 106.11 | $ 38.03 | 64.16% |

Exhibit 10 - Tesla's quarterly revenue versus profit/loss

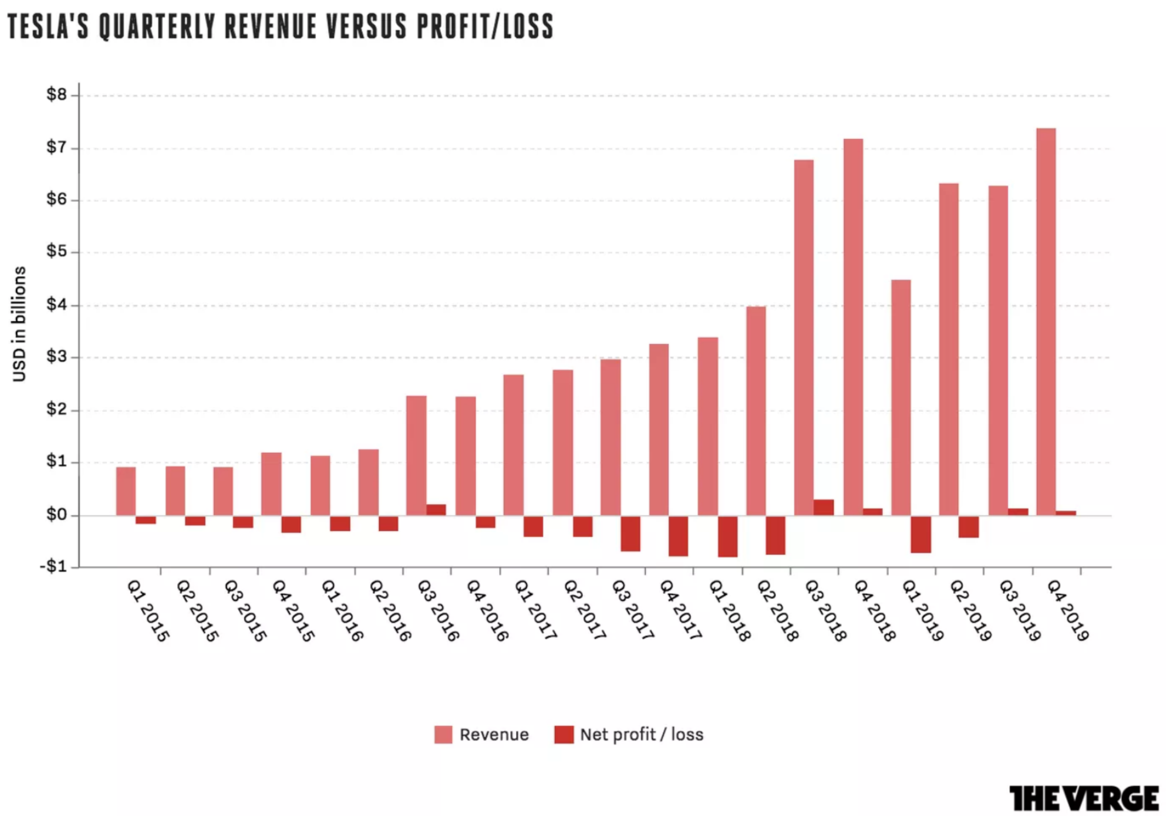


Exhibit 11 - Year on year production output from China for all sectors

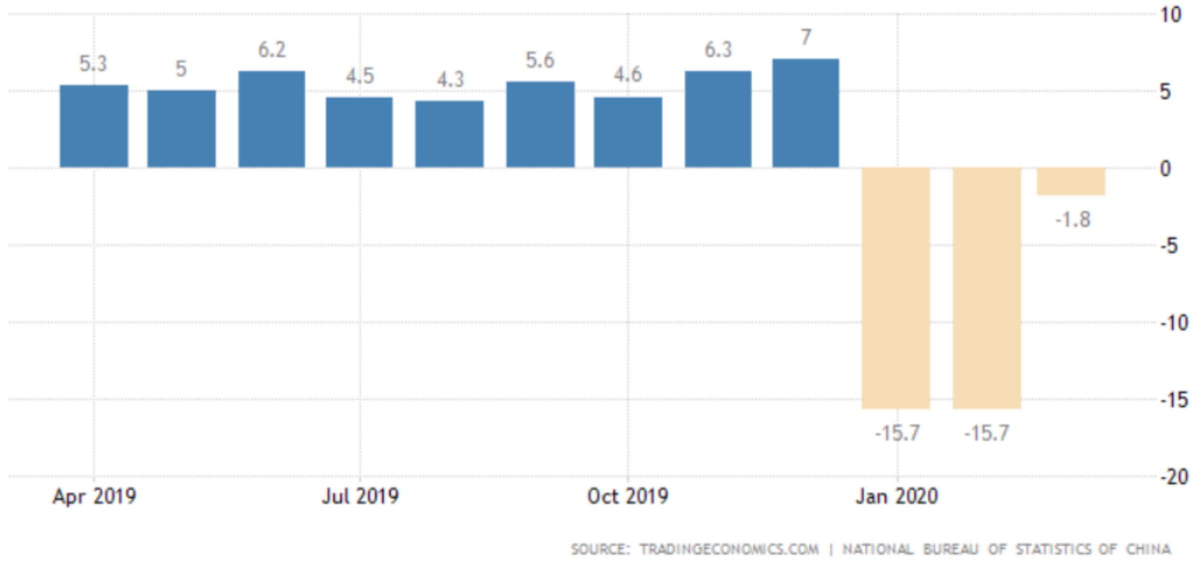



Exhibit 12 - Year on year production output from the United States for all sectors

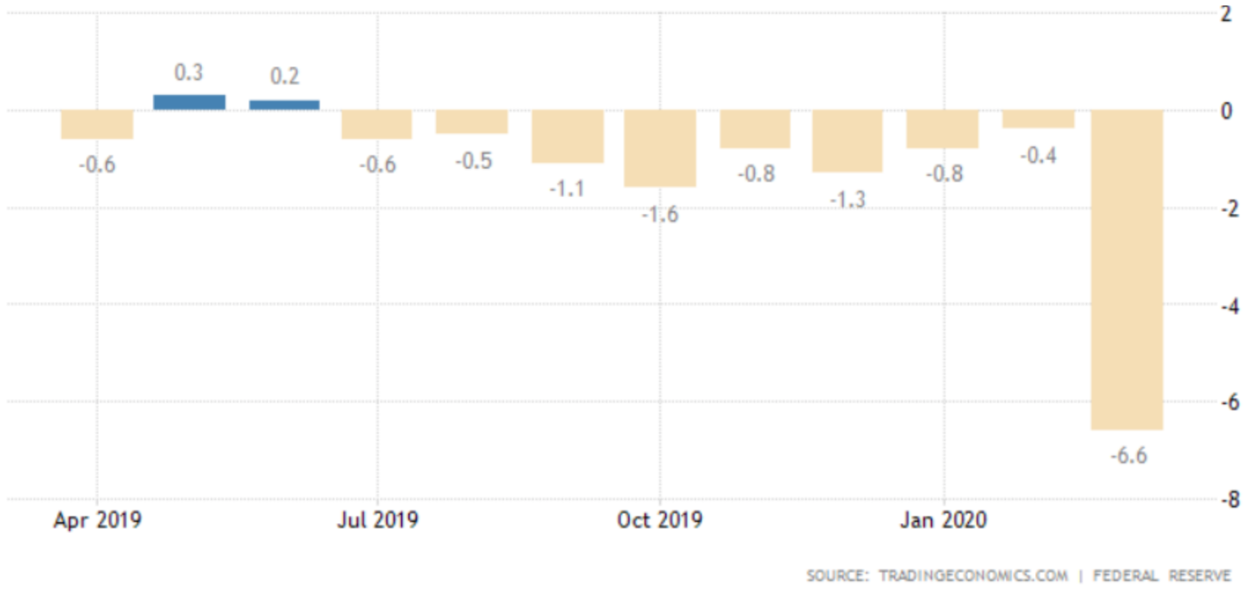


Exhibit 13 - Disney revenue by segment

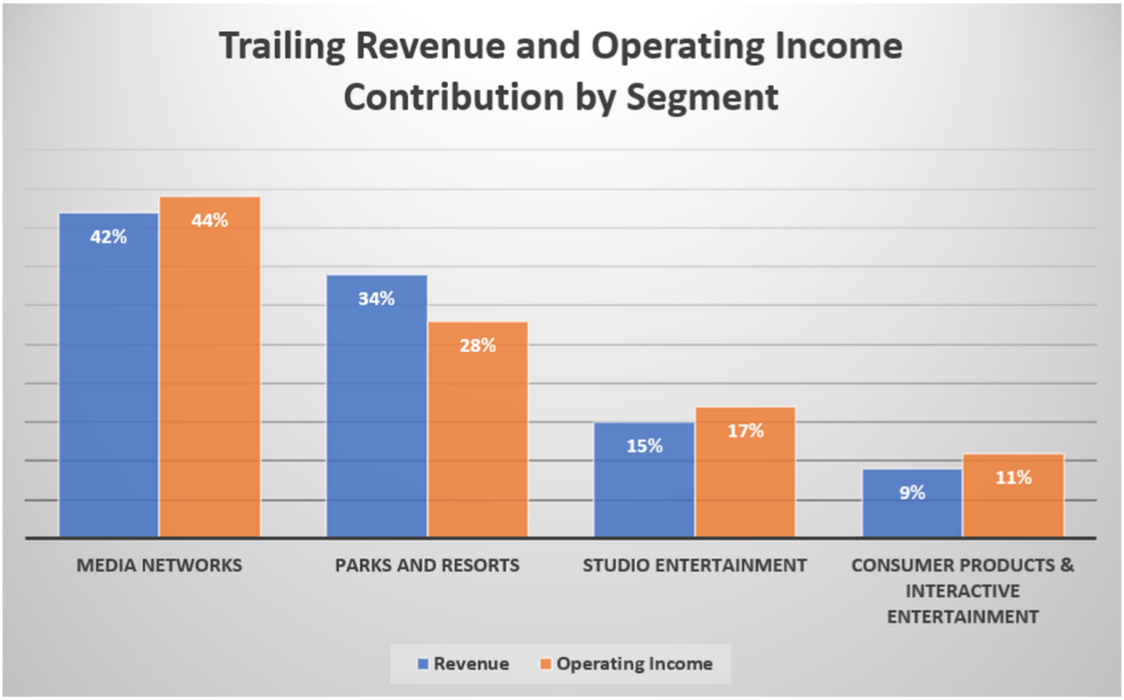
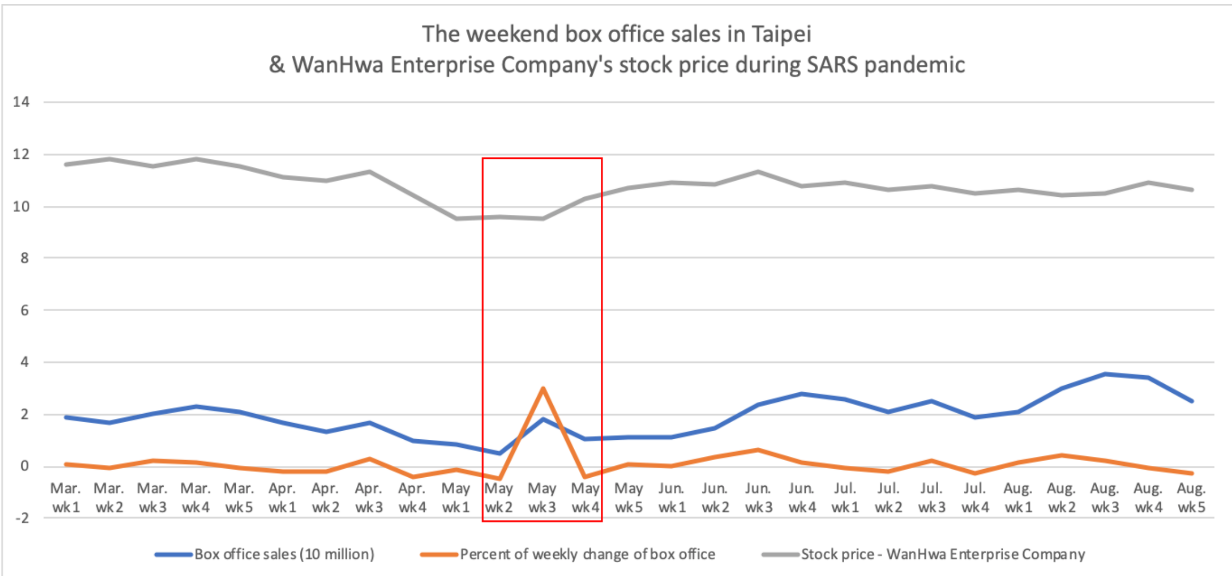



Exhibit 14 - The weekend box office sales in Taipei  WanHwa Enterprise Company's stock price during SARS pandemic




Resource:

https://web.archive.org/web/20090412193621/http://www.taipeibo.com/top
https://www.twse.com.tw/zh/page/trading/exchange/STOCK_DAY_AVG.html

Exhibit 15 - Returns for DIS and UVV from 2/21 to 5/1

| Entertainment Company | 21-Feb | 1-May | Return Rate |
|---|---|---|---|
| The Walt Disney Company (DIS) | $ 138.97 | $ 105.50 | 24.08% |
| Universal Corporation (UVV) | $ 50.83 | $ 45.89 | 9.72% |

Exhibit 16 - Gold prices during SARS pandemic

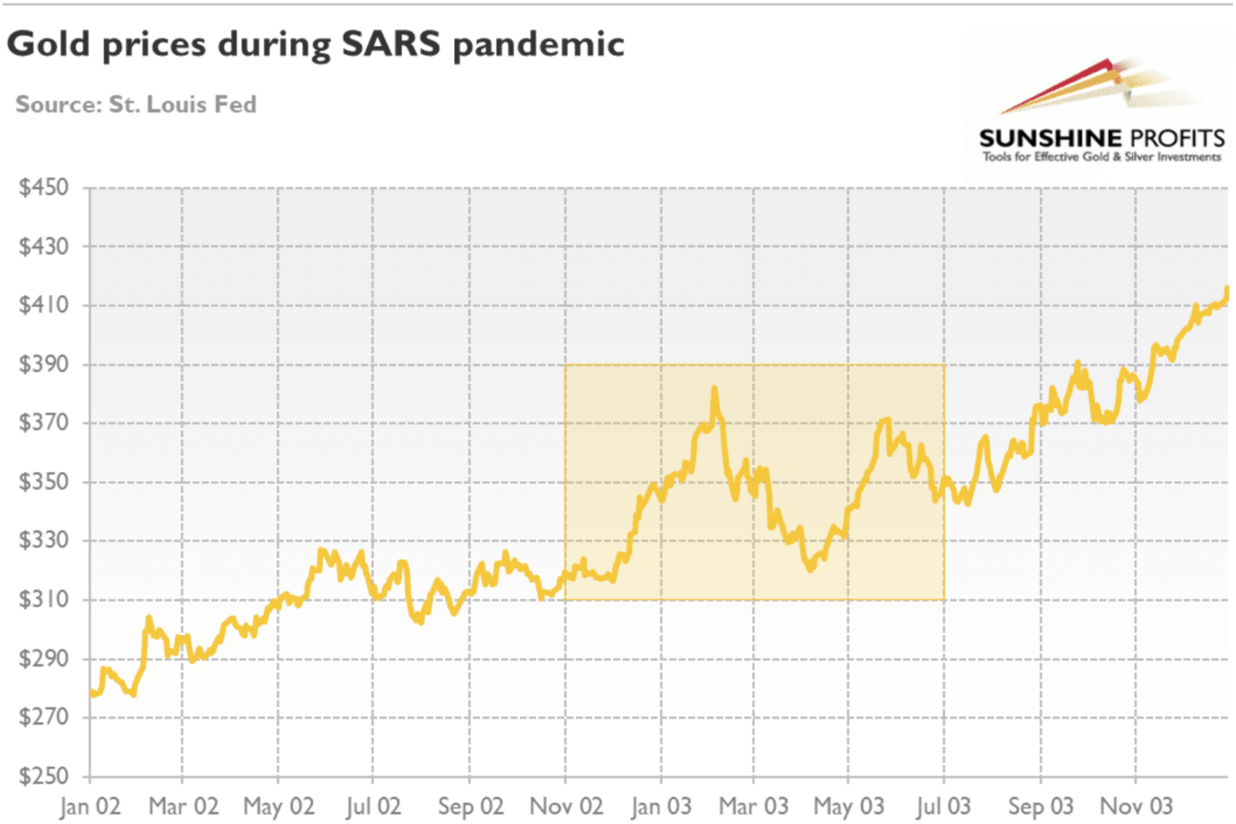
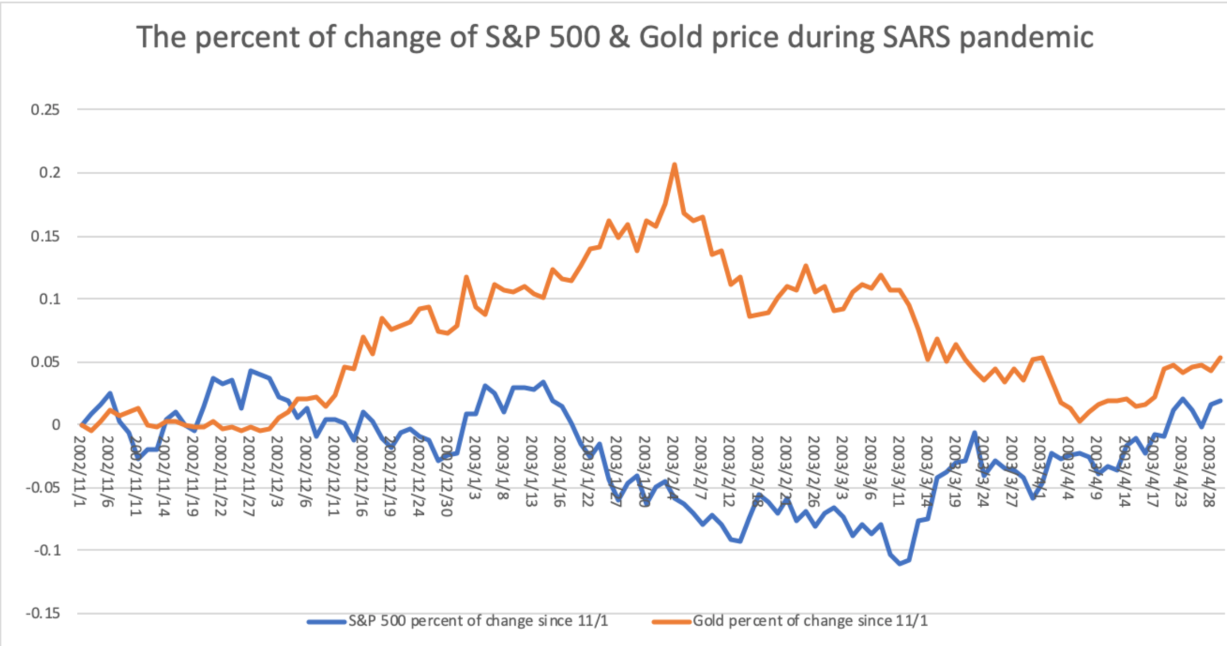


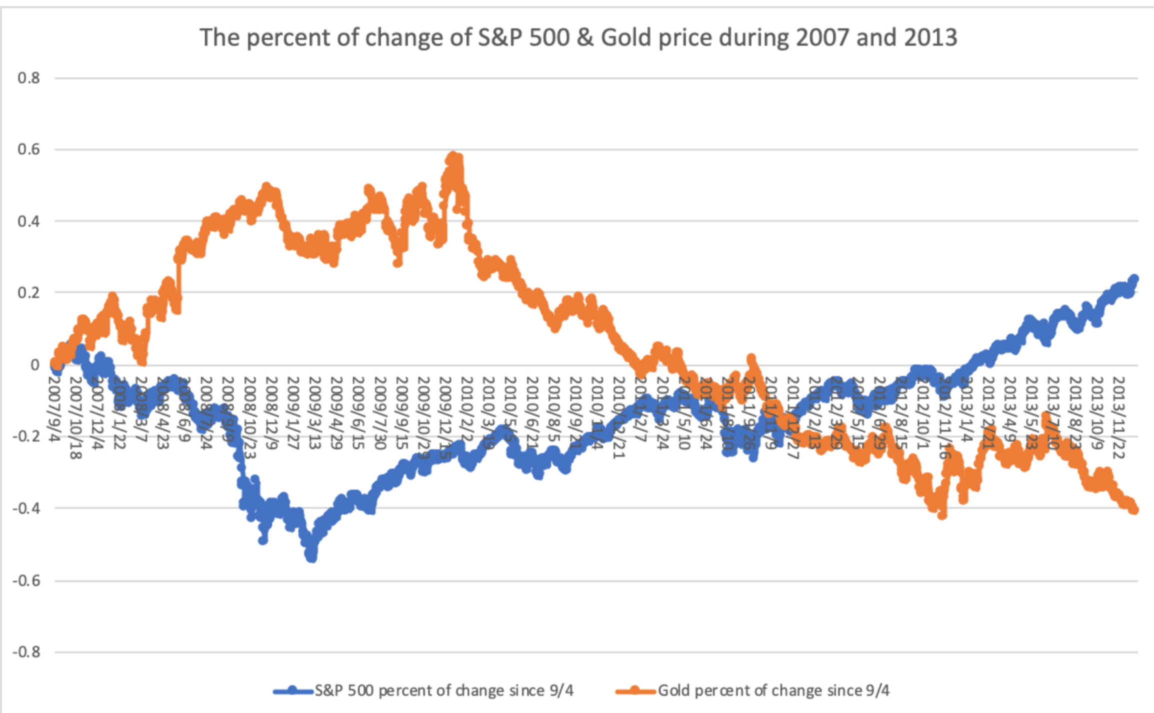
Exhibit 17 - The percent of change of SP 500  Gold price during SARS pandemic




Resource:

https://www.quandl.com/data/LBMA/GOLD-Gold-Price-London-Fixing
https://finance.yahoo.com/quote/%5EGSPC/history?p=%5EGSPC

Exhibit 18 - The percent of change of SP 500  Gold price during 2007 and 2013




Resource:

https://www.quandl.com/data/LBMA/GOLD-Gold-Price-London-Fixing
https://finance.yahoo.com/quote/%5EGSPC/history?p=%5EGSPC

Exhibit 19 - Returns for Gold ETFs from 2/21 to 5/1

| Gold ETF | 21-Feb | 1-May | Return Rate |
|---|---|---|---|
| SPDR Gold Shares (GLD) | $ 154.70 | $ 159.78 | 3.28% |
| Ishares Gold Trust (IAU) | $ 15.71 | $ 16.22 | 3.25% |

Exhibit 20 - Gold price from Feb 21 to Mar 1