April 16, 2020
COVID-19 RESEARCH SERIES (INDONESIA) | Vol. 1

Virus Outbreaks Cause More Than Human Illness

Topic: COVID-19

Focus: Historical Virus Outbreak and Possible Scenarios

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There have been many cases of virus outbreak that happened in the world. The infamous 2003 SARS outbreak, Ebola, Swine Flu and Avian Flu are some of the heavy cases that the world has experienced. These outbreaks were originated from different places but one thing that they share in common; beside public health, virus outbreaks take a toll on the economy. However, today we are facing a different level of "beast"; the notorious Covid-19, that has been declared as a pandemic and has been spreading globally for almost 2 months.

The economy showed similar reaction yet different magnitude for every outbreak happened in the past. However, the magnitude of the economic impact might vary between countries depends on wideness of the virus spread area and the duration until the outbreak can be tackled. Travel and tourism industry have always been the first sector to be affected once people became aware of the virus outbreak. People tend to avoid places that has been contaminated with the virus and most certainly, the government around the world would announce some travel restrictions to contain the virus to further spread. The next thing that would happen might distinct depends on the characteristic of the virus. For instance, the poultry industry was badly hit during the avian flu outbreak. The characteristics of a country also define how the virus can impact the economy. Country that rely on export/import of certain commodities might be differently affected compared to others. Disruption in either global or regional supply chain would also almost certain to happen every time there is a virus outbreak, which will worsen the economic performance. The virus outbreak could also expose the economy to wide corporate debt default which might indirectly affect the financial market, such as stock, bond, and currency market, to become more volatile.

Worse global economic condition is expected as the coronavirus has become global public enemies. Further drop in economic figures is expected until at least for the next several months considering global economic slowdown and supply chain disruption. Many institutions have predicted that the global economy would shrink under this pandemic situation. For instance, JPMorgan has predicted that global economy would shrink by -1.1% while The Economist Intelligence Unit predicted -2.2% shrink in economic growth.

We are entering the worst-case scenario of this virus outbreak. According to researches from several institutions, we are entering the worst-case scenario of the Covid-19 outbreaks. Covid-19 outbreak is believed to trigger some structural changes in the global economy and government stimulus is assumed to have no ability/ineffective to prevent it to happen.

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Historical Virus Outbreaks and Implication to Economic Condition

SARS origination, transmission and geographical distribution

SARS coronavirus (SARS-CoV) was first identified in 2003. It is thought to be an animal virus from an uncertain animal reservoir, perhaps bat, that spread to other animal and first infected humans in the Guangdong, China, in 2002. The symptoms of the disease are similar with influenza which includes, fever, malaise, myalgia, headache, diarrhea, and rigor. These symptoms are usually present during the early stage of the illness. The disease might evolve into more severe case such as respiratory distress which requires intensive care. SARS-CoV is transmitted, primarily, from person to person. The transmission of the disease mainly occurs during the peak of the virus excretion in respiratory secretions & stool and when the disease start to clinically deteriorate, which usually happen during the second week of the illness.

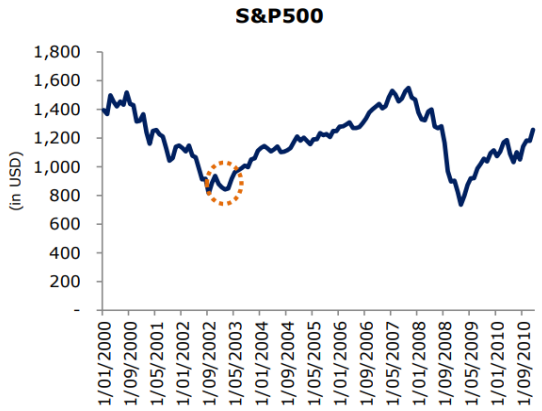
During the first appearance of SARS-CoV in 2002, the SARS virus travelled in humans to 30 areas of the world but it became deeply embedded in just six, which include Tor onto, Hong Kong, Taipei, Singapore and Hanoi. The SARS epidemic, which started in 2002, finally came to its end in May 2004.

The effect of SARS emergence in 2003 to the global market

The emergence of SARS diminished global economic growth between 2002 and 2003. It happened because the spread of SARS hit the travel industry stocks so hard. Both airline and hotel businesses as well as tourist destination suffered because of the SARS epidemic. Moreover, sales in China and Hong Kong were hampered because of the disease which led to lower company earnings.

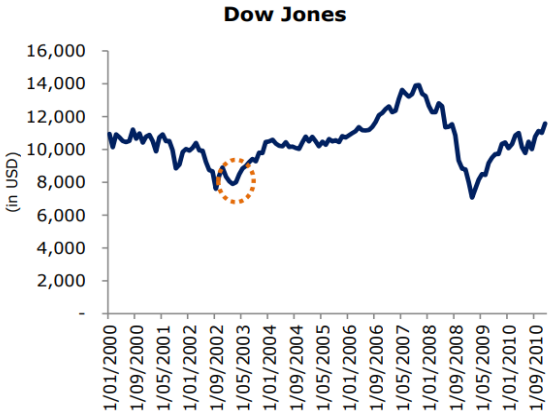
The global impact of the SARS epidemic during 2002-2003 can be seen in several countries affected by the virus. Stock market in several countries (Hong Kong, Taiwan and etc) experienced significant downturn during November 2002 and March 2003. For instance, in November 2002 the S&P 500 was trading 941.8. By March 2003, the S&P 500 declined by 16.2% to 788.9. Similarly, during the same period, the Dow also declined by ~17%.

Figure 1. S&P500 2000-2010



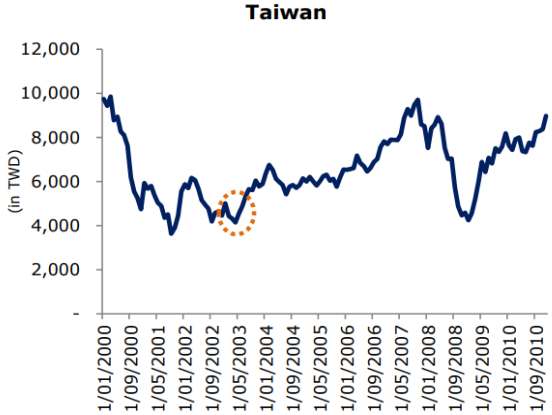
Source: Bloomberg, Author's Research

Figure 2. Dow Jones 2000-2010



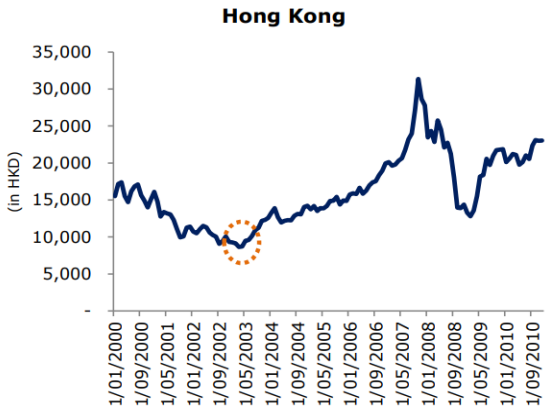
Source: Bloomberg, Author's Research

Figure 3. TWSE 2000-2010



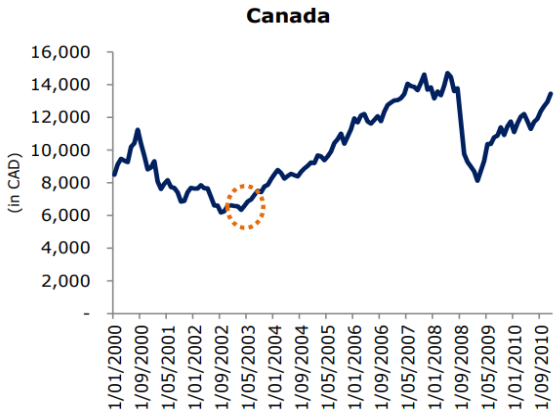
Source: Bloomberg, Author's Research

Figure 4. HSI 2000-2010



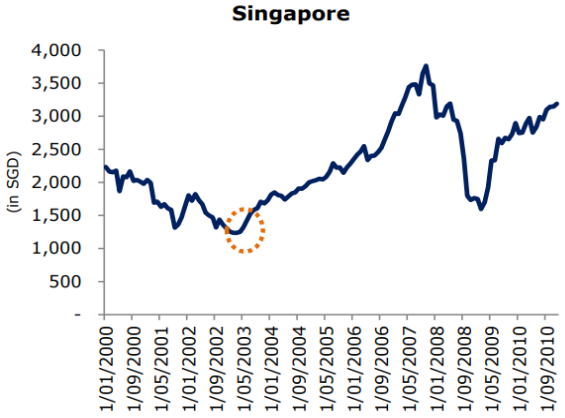
Source: Bloomberg, Author's Research

Figure 5. SPTSX 2000-2010



Source: Bloomberg, Author's Research

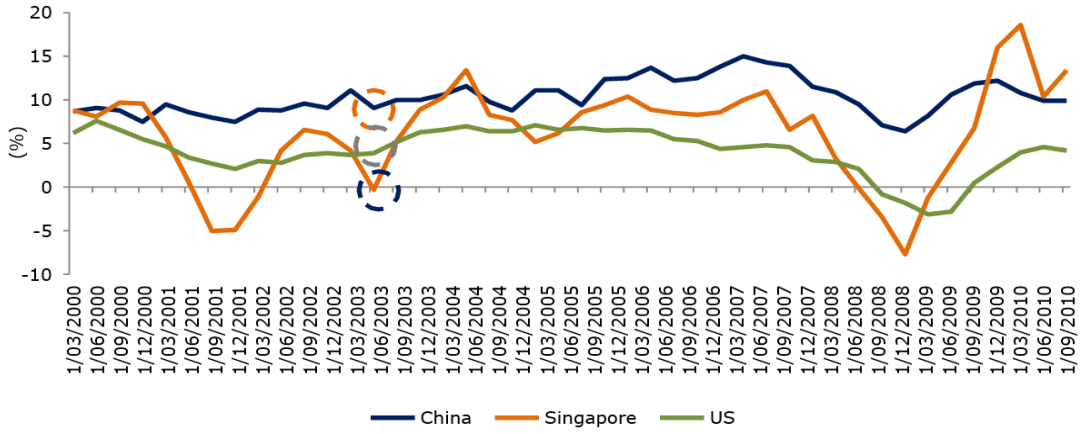
Figure 6. STI 2000-2010



Source: Bloomberg, Author's Research

Not only the stock market of these countries, SARS spread out during 2003 also hit the GDP growth of these countries hard, especially during the first and second quarter of 2003, when the virus started to widely spread. This is due to slower economic activities during that period which was caused by shifting in behavior of individuals in Hong Kong, Singapore and certainly China. These slower economic activities resulted sharp fell in consumption expenditure both goods and services.

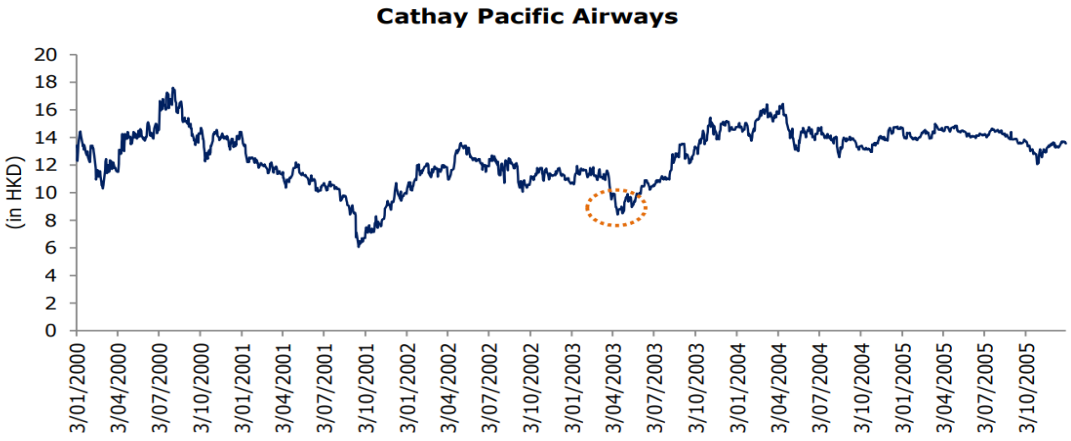
Figure 7. GDP growth 2000-2010



Source: Bloomberg, Author's Research

As mentioned before, the outbreak of the virus in 2003 results in lower business performance of airline and hotel businesses significantly since people scaled back on travelling activities, both vacation and business travel, to avoid being infected by the virus. Back in 2003, one of the biggest airlines in Hong Kong, Cathay Pacific Airways, was experiencing one of its biggest downturns. The share price of the company declined by ~30% in 4 months, from December 2002 to April 2003. During the first half of 2003, SARS pushed Hong Kong's economy into recession.

Figure 8. Cathay Pacific Chart 2000-2005



Source: Bloomberg, Trimegah's Research

Swine influenza (H1N1) pandemic origination, transmission and geographical distribution

The H1N1 virus that causes the swine influenza pandemic in 2009 was different compared to the seasonal H1N1 viruses that have been generally circulating among people since 1977. This new H1N1 is originated from animal influenza. Antigenic analysis has shown that antibodies to the seasonal H1N1 do not protect against the pandemic H1N1 virus. The early outbreaks of the disease happened in Mexico and the US in April 2009. It spread rapidly around the world since then. In June 2009, the WHO declared a global pandemic that was caused by the virus. A total of 74 countries and territories had reported infections. Similar with the seasonal influenza virus, this virus is also transmitted from person-to-person. It is transmitted as easily as the normal flu and can be passed to other people by simply being exposed to cough or sneeze from the infected individual.

The effect of H1N1 pandemic in 2009 to the global market

It is hard to quantify the economic losses during this virus spread out period since the whole globe was experiencing recession caused by the 2008 global economic crisis. However, similarly with the other virus breakout cases, the initial economic adjustment, caused by this virus breakout, occurred through falls in equity markets in affected countries especially for the most affected industries such as tourism and travel.

Avian influenza (H7N9) origination, transmission and geographical distribution

Avian influenza (H7N9) was first reported to have infected humans in March 2013, in China. The symptoms of the disease are similar to the common bird flu, which caused by H5N1 virus, including fever, cough and shortness of breath, which may lead to severe pneumonia. This virus has the possibility to evolve to more severe disease such as cytokine storm, blood poisoning and organ failure.

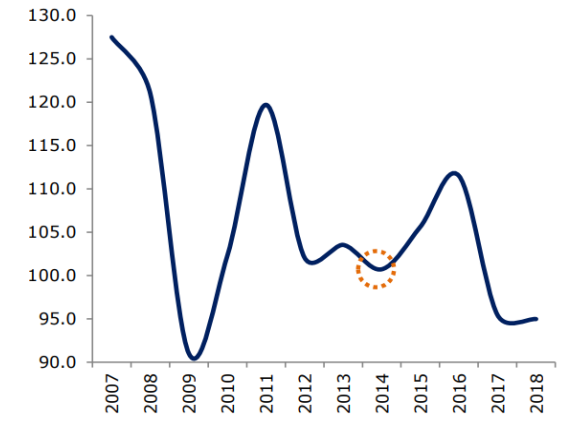
According to a study which released in 2014, ~75% of the virus sufferer had previously been exposed to domestic poultry. In 2013, scientists in China found that the virus can be transmitted from human to human. As a matter of fact, this virus could transmit more easily from human to human compared to H5N1 virus. Moreover, there was a great concern because H7N9 does not cause visible disease in poultry, which makes surveillance, prevention and control of the virus become extremely difficult. Responding to this critical situation, the Ministry of Agriculture of the People's Republic of China, asked the director general of the OIE to send experts to assess the situation. These experts later made the hypothesis that people could be infected through exposure to infected birds in markets or to a contaminated environment such as live poultry markets where the virus is present. Unlike SARS-CoV, H7N9 did not spread globally since the government provide better control efforts compared to the previous situation.

The effect of H7N9 emergence in 2013 to the global market

The emergence of this virus during the 1Q13 has a very little to no economic impact in the global market. However, it certainly affected China's poultry industry during those times. The retail price index of poultry meat in China declined from 103.5 in 2013 to 100.7 in 2014 as people consumed less poultry products back then to avoid the virus infection. As a result, ~RMB40bn of loss should be bear by China's poultry industry. It also led to many places closed their live poultry trading which resulted in economic losses to farmers. KFC, one of the largest chicken fast-food chains, was also the sufferer of the disease circulation; reported a loss of RMB50mn in China during that period.

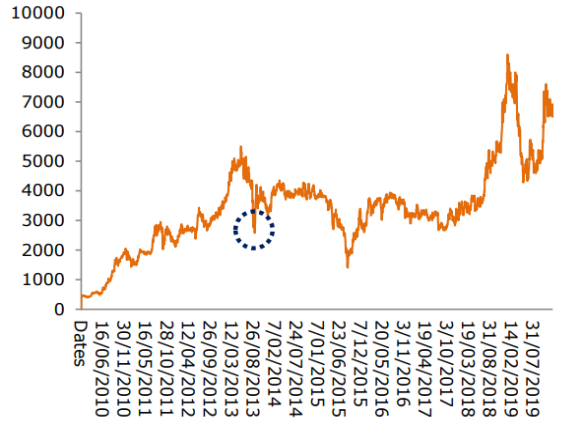
In addition, the direct medical costs of hospitalization of a patient with H7N9 were estimated at RMB71,060, which is more than a year income for a person in a rich province in China. While it may cause the poultry and, possibly, the whole consumer industry to shrink during the moment, there was a positive impact to the healthcare sector since during this kind of period, healthcare might become very critical.

Figure 9. Retail Price Index Poultry in China



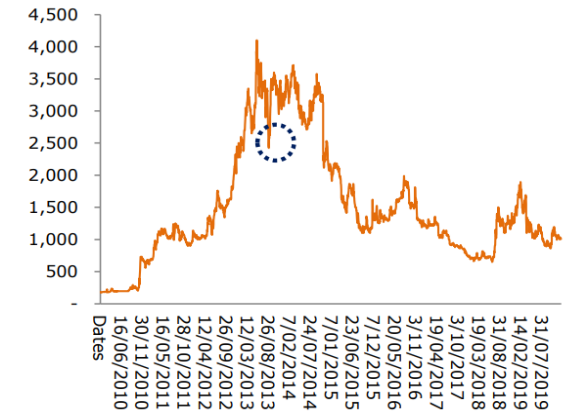
Source: CEIC, Author's Research

Figure 10. CPIN Share Price



Source: Bloomberg, Author's Research

Figure 11. MAIN Share Price



Source: Bloomberg, Author's Research

Figure 12. JPFA Share Price

Source: Bloomberg, Author's Research

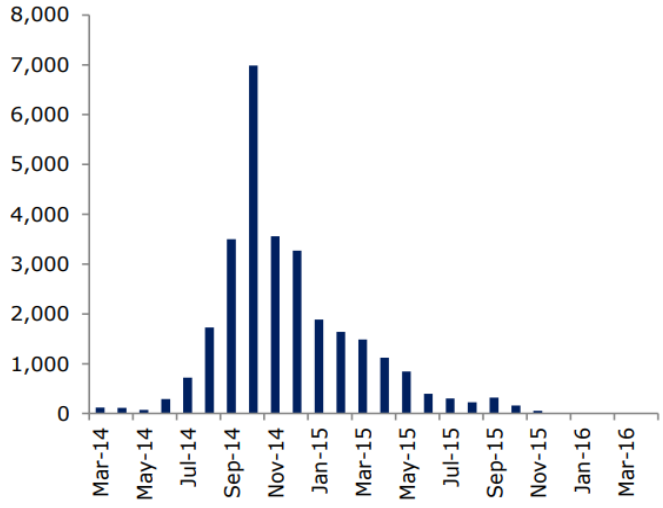
The H7N9 virus turned out affected Indonesia's poultry industry. Shown in figure 10-12, the share price of the "big three" of Indonesia's poultry companies were nosediving. The flyways of birds from China, which cross Indonesia's area, posed a risk of H7N9 entrance to Indonesia. According to the WHO, migratory birds were first implicated in H7N9 transmission thus the virus may spread into other regions or countries given the widespread bird migratory patterns.

Ebola (EVD) epidemic origination, transmission and geographical distribution

The Western African Ebola virus epidemic was the most widespread outbreak of Ebola virus disease in history. The symptoms of the illness may appear anywhere from 2-21 days after infected by the virus with average appearance of the symptoms during the 8-10 days. Several primary signs and symptoms of Ebola include fever, headache, muscle and joint pain, abdominal pain, weakness and fatigue, gastrointestinal distress (diarrhoea and vomiting), and unexplained haemorrhaging (bleeding or bruising). Other symptoms may include red eyes, skin rash and hiccups (late stage). The virus spread through direct contact (such as through broken skin or mucous membranes in the eyes, nose, or mouth) with: blood or body fluids (urine, saliva, sweat, feces, vomit, breast milk, and semen) of a person who is sick with or has died from Ebola virus disease (EVD), objects (such as clothes, bedding, needles, and medical equipment) contaminated with body fluids from a person who is sick with or has died from EVD, infected fruit bats or nonhuman primates (such as apes and monkeys), semen from a man who recovered from EVD (through oral, vaginal, or anal sex). The virus can remain in certain body fluids (including semen) of a patient who has recovered from EVD, even if they no longer have symptoms of severe illness. There is no evidence that Ebola can be spread through sex or other contact with vaginal fluids from a woman who has had Ebola.

It affected several countries in Africa, mostly those on the Western part of the continent. The major sufferers of this epidemic were Liberia, Sierra Leone and Guinea with a total of 10,675; 14,124; and 3,811 cases, respectively. Fortunately, the virus did not widely transmitted to other countries located in other continents. Only 4 cases were found in the US and 1 case was found in Italy, UK and Spain during the breakout.

Figure 13. Number of cases per month in Guinea, Liberia and Sierra Leone



Source: CDC, Author's Research

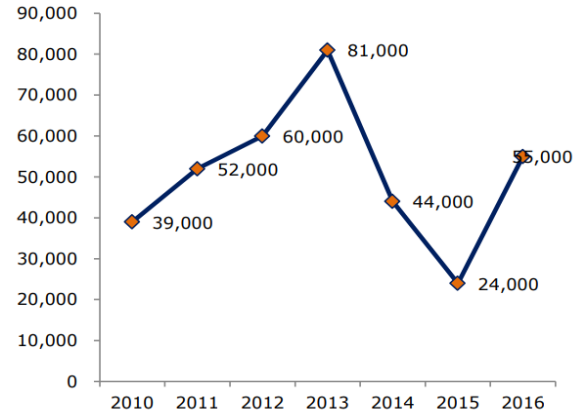
The effect of EVD epidemic in 2013-2016 to the global market

Similar with the other virus outbreaks that happened in the past; during the EVD breakout, the priority was to contain the virus and prevent it to spread across areas. Preventive actions were necessary to be carried out in order to keep a widespread outbreak from happening. For every action taken, there should be costs to be bear, and in this case the steps needed to control and contain the virus to prevent it being widely spread takes a toll on the economy. During the Ebola epidemic, household incomes went down and poverty grew in those countries that are hit by the virus.

This virus outbreak led to restrictions on trade and transportation to prevent transmission of the virus. The restrictions were limiting the movement of people and goods between countries. Sierra Leone, one of the countries that are badly hit by the virus, was locked down for three days in order to prevent this virus to spread wider. Another instance was when the country implemented quarantine restrictions for several months in some areas that are considered to have high risk. These kinds of situation harmed the economy in a way that it decreased the household income and increase the poverty rate in the country since 43% of Africa's population rely on informal cross-border trade as their source of income.

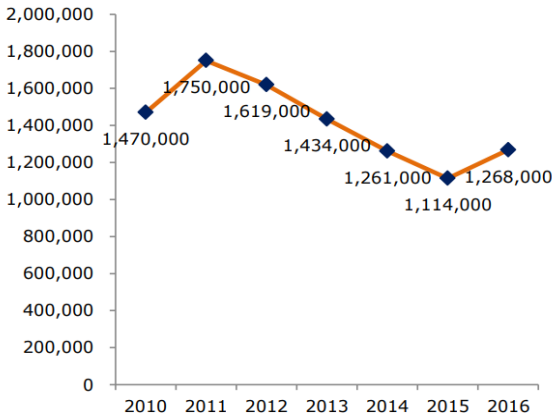
The tourism sector of the African countries was greatly damaged because of the breakout. According to the World Bank, receipts from tourism sector in 2012 added up to ~USD36bn and contributed 2.8% of the GDP in the sub-Saharan African region. During the breakout, borders were closed and airlines were stopped, which led to lower tourist arrivals. In fact, from 2013-2014, the number of tourist arrival in Africa went down by half. Although only several countries were affected by the virus breakout, tourist saw that the entire continent as a risk. It can be seen from the significant decrease in Kenya's tourism sector despite being located thousands of miles from the Ebola zone.

Figure 14. Sierra Leone Tourist Arrivals



Source: CEIC, Author's Research

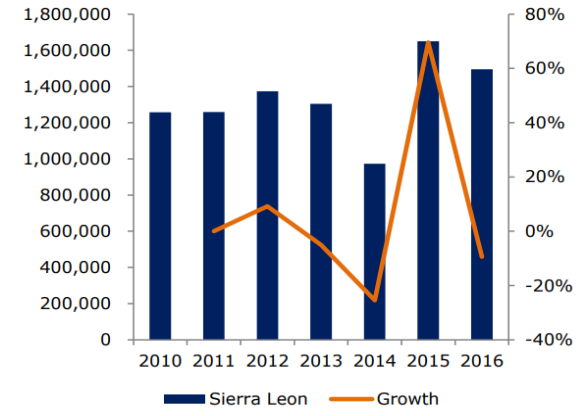
Figure 15. Kenya Tourist Arrivals



Source: CEIC, Author's Research

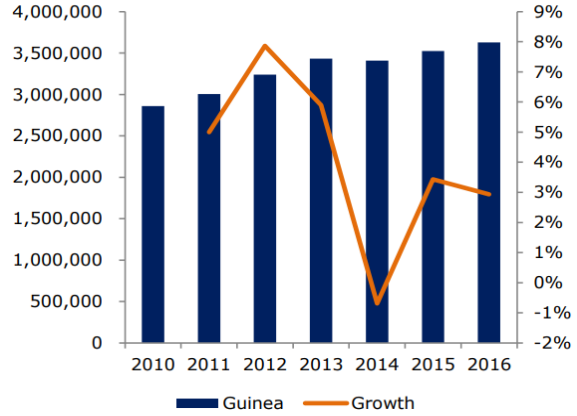
The epidemic had adverse effects on agricultural market chains in the three West African countries, which rely on agricultural sector as the main source of income. It mostly impacted the logistic part of the agricultural market; the transportation system of agricultural goods to consumption areas was disrupted back then. The disruption happened because the workers were afraid to travel to the contaminated areas and the number of traders decreased by 20% during the height of the epidemic. As a result, shortage of the food took place in Africa and thus higher food prices.

Figure 16. Sierra Leone Cereal Production



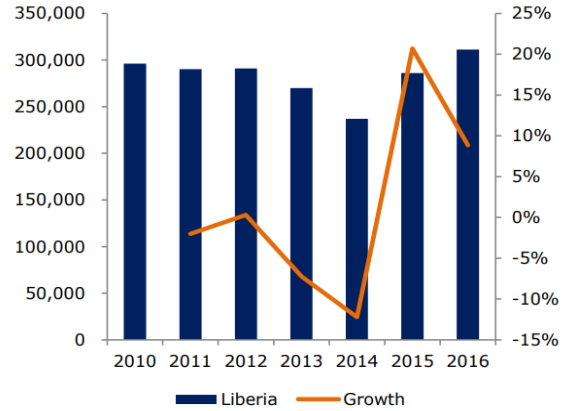
Source: CEIC, Author's Research

Figure 17. Guinea Cereal Production



Source: CEIC, Author's Research

Figure 18. Liberia Cereal Production



Source: CEIC, Author's Research

Economic activities went down during the Ebola breakout. It reduced revenue from taxes and tariffs in those affected countries in West Africa. The deficits were estimated at ~8.5%of GDP in Liberia, ~4.8% in Sierra Leone and ~9.4% in Guinea.

What is COVID-19? And How Severe is This Virus?

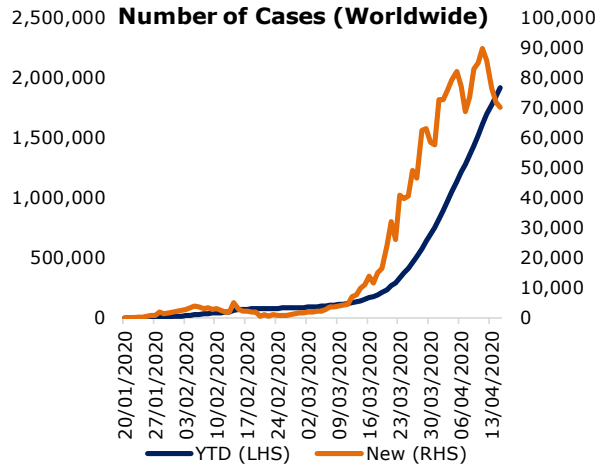
Covid-19 origination and transmission

The Coronavirus Disease 2019 (Covid-19) is a highly infectious disease that is caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2). The earliest confirmed case was found in Wuhan, China, in November 2019, weeks before this virus was identified by the government. According to several medical researches that has been conducted around the world, SARS-Cov-2, which responsible for the Covid-19 outbreak, shares ~80% of its genome with coronavirus that triggered SARS outbreak in 2003. Both viruses cause similar symptoms and classified as zoonotic diseases (transmitted from animal to humans). The symptoms of this virus include fever, cough, fatigue, shortness of breath, body aches and pain, diarrhea, etc. Despite the high level of similarity, the Covid-19 is considered more contagious since the virus appears to transmit more easily than SARS. Note that, the virus can even be transmitted from human without symptoms, who acts as the virus carrier.

Current Condition of The Pandemic and Impacts to the Economy

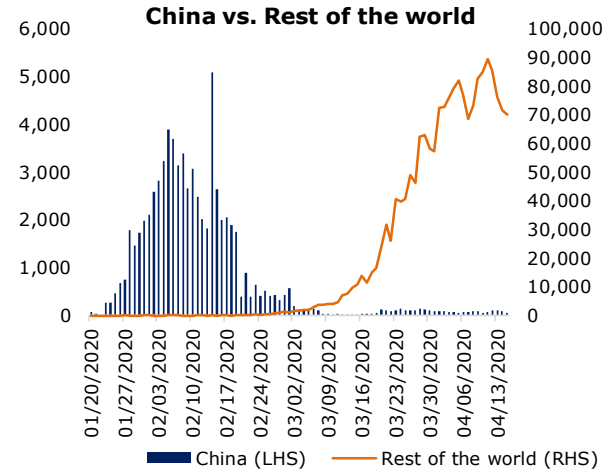
On March 12, 2020, the World Health Organization (WHO) declared Covid-19 outbreak as a pandemic with more than 120,000 confirmed cases around the globe. As of today, the number of new cases in China, the origin of the outbreak, has significantly dropped while the number of new cases outside China has been significantly increasing with the US standing on the top position in terms of total confirmed cases of 578,268. The fatality rate of the Covid-19 is recently reported at ~7%, lower compared to SARS and MERS which have fatality rates of 10% and 34%, respectively.

Figure 19. Number of Covid-19 Cases



Source: WHO, Author's Research

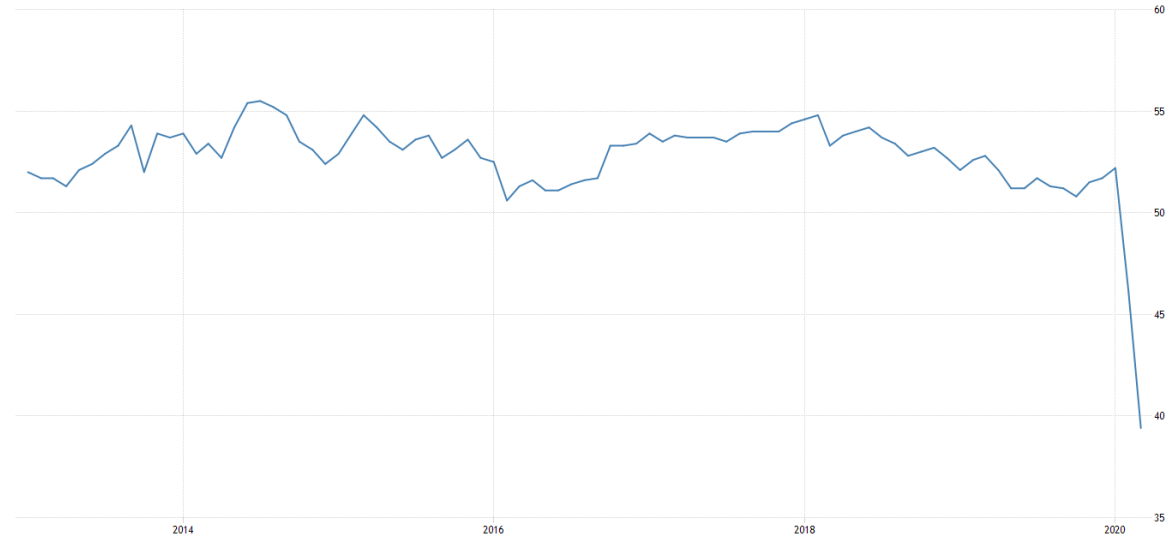
Figure 20. New Covid-19 Cases Daily



Source: WHO, Author's Research

Similar with the other virus outbreak that happened in the past, disruption in economic activities is inevitable. The real sector is deteriorating during this pandemic as reflected in the global PMI that significantly dropped during the past months. This is due to shifting in economic behavior and supply shocks that happened globally. Certainly, as mentioned before, there are consequences for every action taken. Several countries, including China, are freezing the regular activities (lockdown) and implementing travel restrictions to prevent the virus to further spread and it leads to worse economic condition. On top of that, many institutions believe that the world is entering the global recession period. JPMorgan has predicted that global economy would shrink by -1.1% while The Economist Intelligence Unit predicted -2.2% economy growth.

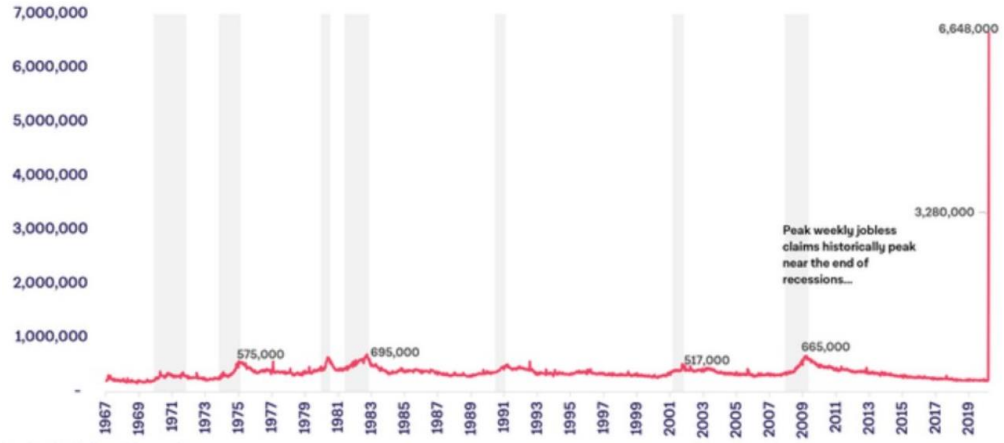
Figure 21. JPM Global PMI



Source: Trading Economics

Moreover, the deterioration in economy due to virus outbreak is followed by deterioration in labor market resulting hike in unemployment rate. For instance, on April 2, 2020, the US recorded skyrocketed number of unemployment insurance claim amid Covid-19 outbreak. According to The Labor Department figure, the number of unemployment benefit claims rose to 6.6mn from 211,000 in the week ending March 7th. The figure is the highest ever reported, beating the great recession number in 2009 of 665,000 as well as previous peak of 695,000 in October 1982. The disruption in labor market is a very serious matter to be taken care of since it will directly affect the economy. Higher unemployment rate implies lower purchasing power which is bad for the economy amid this current condition.

Figure 22. Initial Unemployment Insurance Claims in the US

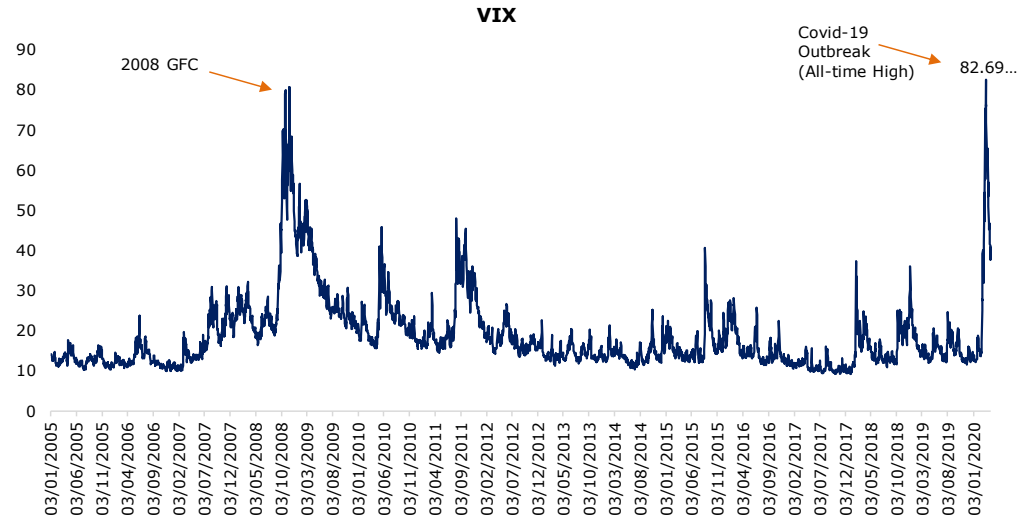


Source: The Block, FRED

Due to lower performance of companies in real sector, investors are losing their trust in the stock market due to high uncertainty, which was reflected in the volatility index that reached its all-time high in March 16, 2020. Most of these investors shift their investment to the safe-haven assets (higher risk perception) such as the US t-bills and gold since these kinds of investment are perceived relatively safer compared to other financial assets such as stocks, corporate

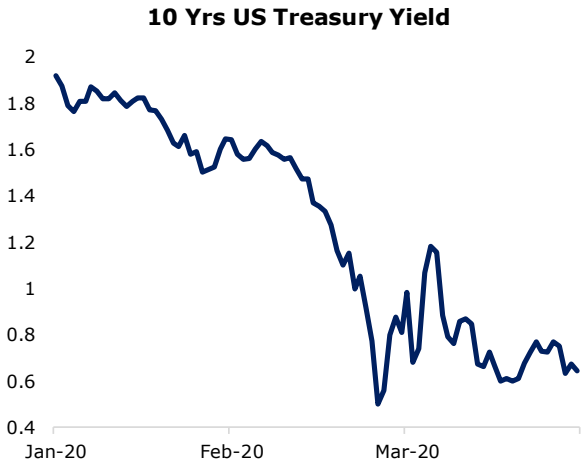
bonds and other govt. bonds. Then, what happened to the financial market? Stock markets around the world deeply plunge since the beginning of 2020 and weaker currencies exchange rate toward USD due to dollar rush. Moreover, the spread between the US govt. bonds and other countries govt. bonds yield become extremely wider implying undervalued govt bonds outside the US. Corporate bonds are also experiencing significant yield jump due to current investors' risk perception.

Figure 23. Volatility Index (VIX)



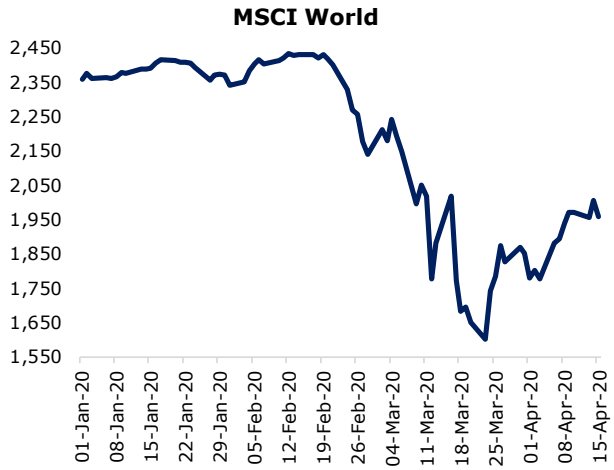
Source: Bloomberg, Author's Research

Figure 24. 10 Years US T-Bills Yield



Source: Bloomberg, Author's Research

Figure 25. MCSI World Chart (YTD)



Source: Investing, Author's Research

Table 26. Global Stock Markets (YTD)

Country	Major Stock Index	YTD Changes
US	INDU Index	-16.14%
China	SHCOMP Index	-6.94%
Indonesia	JCI Index	26.43%
UK	FTSE 100 Index	-23.53%
Australia	AS51 Index	17.90%
Singapore	STI Index	18.87%
Malaysia	FBMKLCI Index	-11.42%
Japan	Nikkei Index	-15.89%
Hong Kong	HSI Index	-13.51%
South Korea	KOSPI Index	-12.88%
Italy	FTSE MIB Index	-27.08%

Source: Bloomberg, Author's Research

As of now, countries that were badly infected by the virus such as China and South Korea has started their recovery phase. However, like other countries that are still fighting the virus, the economic impact has yet can be precisely quantified. Countries around the world are providing both monetary and fiscal stimuli as the buffer against worsening economic condition. The next things that needs to be carefully watched is how the government strategize to minimize the impact of Covid-19 to the economy. The implementation of the strategy will be as critical as the strategy itself.

Possible Scenarios for Covid-19 Pandemic

Table 27 provides explanation on how the scenarios of Covid-19 can evolve. According to the table below, we are entering the 3rd scenario/worst case scenario where there is continuous growth on case count until 3rd week of Q2 with Covid-19 fatality rate that has reached ~7%, much higher compared to the seasonal flu (< 1%). McKinsey believes that under this scenario, China will completely recover from this pandemic by Q3, as the daily case count in the country has been significantly decreasing. However, as shown in figure 19, the global case count is still increasing. It might lead to global recession as the world will face global economic slowdown in the following quarters. Note that, I believe that performance in Q1 might not as bad as the rest of the 2020, unless for China, since the virus started to globally spread around the end of Q1. Under this condition, China will have worse economic figures compared to other countries in 1Q20 and have better economic figures in the following quarters relative to others. It might happen because the virus has started to infect China from the end of 2019. Today, China is expecting to see the end of the outbreak in its area very soon. Moreover, the government has ended the lockdown and allowed Wuhan city to resume its economic activities. On top of that, on this worst scenario, covid-19 outbreak is believed to trigger some structural changes in the global economy and government stimulus is assumed to have no ability to prevent it to happen.

Table 27. Covid-19 Scenarios

	What you have to believe	How the scenario could evolve
Quick Recovery	1. Public health response effectively similar to China's response 2. Virus is Seasonal 3. Fatality ratio similar to that of the flu (or an existing therapy proves effective) 4. Localized socioeconomic reactions 5. Powerful public reaction - peak of demand drop comes quickly. 6. Working population change some daily habits	1. Large portion of recovery in China, including Hubei completed by early Q2 2. Fast rebound after extreme drop in consumer demand 3. US and Europe experience economic slowdown until the end of Q1 4. Other regions experience varied impacts - Middle East slowdown until Q2 and some disruption in Africa and Latin America
Global Slowdown	1. Public health response less effectively compared to China 2. Virus is seasonal 3. Fatality ratio is slightly higher than that of the flu 4. Impact largely localized in Europe and US, minor spread in other 5. Greater shift in daily behaviours	1. Large portion of recovery in China, including Hubei completed by early Q2 2. US and Europe sees economic slowdown untul mid Q2 3. Other regions experience varied impacts - Middle East more impacted; Africa and Latin America more insulated 4. Certain sectors such as airlines businesses and travel & tourism businesses deeply hit - summer season will be missed 5. Other sectors see extreme initial drop that will recover at the end of Q2
Global Pandemic and Recession	1. Public health response less effectively compared to China 2. Virus is not seasonal 3. Fatality ratio is higher than that of the flu 4. Continuous growth on case count in Q2 and Q3 5. Reaction is generalized	1. China recovery completed by Q3 2. US and Europe see generalized reaction 3. Global recession - Worldwide economic slowdown 4. No recovery on consumer confidence until Q3

Source: McKinsey Research