

The World Economy and Covid-19: Analyze the Phenomena that can Affect the World Economic Market by the GLM Model

Qiyang Guan,
qiyanguan0@gmail.com

De Anza college in cupertino, San jose, California, the USA.

Abstract—Covid-19 is a highly contagious and destructive global coronavirus. Starting from January 21st, many countries have realized the dangers of this coronavirus, closed their borders, and even implemented quarantines in various places of the country. Public areas like shopping malls and cinemas were all shut down. Wearing a mask outdoors became mandatory. This is also the first time that most people learn what "social distancing" means. Although by doing this the infection rate was greatly reduced, the world economy has experienced a significant decline. Unemployment, the meltdown of the industrial chain and the massive demand for medical supplies have caused a lot of trouble, whether for a developed or developing country. The global stock market was turbulent. Countries have successively adopted measures such as transportation control and restrictions on population movement, which will make the global economic and trade environment more severe and bring further impact to world trade. In this research, theoretical analysis and literature review have been used. The research method focuses on extracting information and data collected from the cited materials, from the relationship between the increase in the number of cases and the unemployment rate, the supply & demand of market medical products and the policies adopted by each country. The research finally can draw a conclusion that most of the countries suffered from an economic crisis, later the government has published policies or measures to save the market economy, such as investment funds to aid enterprises or individuals. Therefore, it is very important to find out how the pandemic affected the world economy and what measures different countries should adopt to recover the economy.

Keywords-World economy; Phenomena; World economic market; Covid-19; International trade

1 INTRODUCTION

As of July 2021, according to data from the World Health Organization, the number of COVID-19 infections worldwide has reached nearly 200 million, and the death toll has exceeded 4 million. There is no doubt that this virus will become a major disaster affecting the development of science, technology and economy in history. Obviously, most governments in the world underestimate the risk of the rapid spread of COVID-19 and are mostly passive in crisis response. COVID-19 is not only a global pandemic and public health crisis; it has also severely affected the global economy and financial markets. Many countries implemented disease mitigation measures, which have resulted in significant reductions in income, rising unemployment, and disruptions in transportation, services, and manufacturing. If divided by regions, in Asian regions, such as

South Korea and Japan, took prompt countermeasures. China, where COVID-19 firstly exploded, has also blocked outdoor activity and closed the border in February 2020. The pandemic was well controlled in a self-disciplined environment. However, the emergence of vaccines caused another wave of infections, since after injection people ignore the fact that the virus still exists, causing the infection rate to rebound. The situation in Europe and the United States is even worse. Take the United States as an example. The pandemic that broke out in January seems not to have attracted the attention of the government. Many experts and government departments mistakenly believe that this is just a flu outbreak in China, which will disappear after a period of time. But the fact is that Covid still exists after the outbreak for a year.

In this paper, the research direction is mainly on the market phenomena that affect the economies of various countries and the possible positive or negative effects of government regulation during the pandemic. The method of research is to review the literature and establish a model based on the existing data under the epidemic situation to analyze how the economy is affected and how the economic recovery policy can drive the economy to rebound. The research gap is that the data types are huge, and the data collection may not be completely accurate, so a certain range of errors and analysis bias may occur. As the Covid-19 still exists, the future trend of this virus is immeasurable. To prevent the occurrence of a sluggish economy, this paper aims to analyze the disadvantages of the past and what possible countries can do to keep their economy stable or grow if the virus hits hard again.

2 ANALYSIS:

2.1 The initial stage of the pandemic: unemployment and inflation, financial market under the pandemic

2020 is a difficult year. The pandemic of the virus forces people to stay home, but not every job can be done at home. This fact directly or indirectly led to large-scale unemployment. As seen in the figure below, the world unemployment rate reached 6.4% (Figure 1), which has reached the unrepresented highest level since 1995. In some middle-income countries, such as those in Africa and South America (Figure 2), the virus epidemic has more serious impacts in these places, and almost all government expenditures are occupied by the purchase of medical supplies and aid capital markets. Under such circumstances, government revenue has dropped significantly under the influence of the unemployment rate. In the developed and high-income countries, industries that rely heavily on the movement of people have been hit hard.

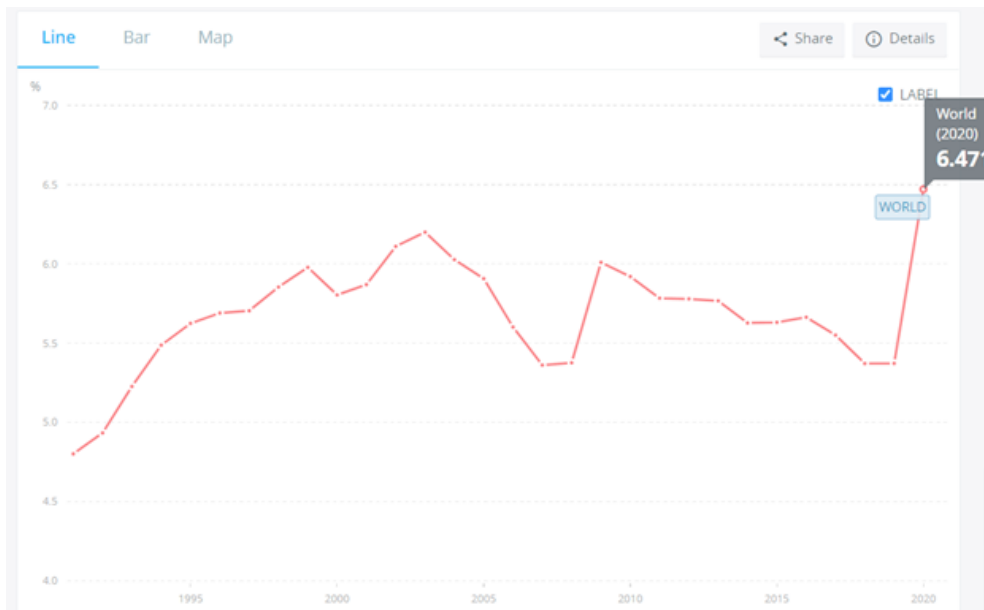


Figure 1 the World unemployment rate

According to Front. Public Health’s article Economic Consequences of the COVID-19 Outbreak: the Need for Epidemic Preparedness, "Service industries such as tourism, hospitality, and transportation have suffered significant losses due to reduction in travel. "The results of these phenomena are also mentioned in the latter part of this article: "For example, office workers are more likely to transition to flexible working arrangements during the restrictions, while many industrial, tourism, retail, and transport workers will suffer a significant reduction in work due to community restrictions and low demand for their goods and services.” [1]

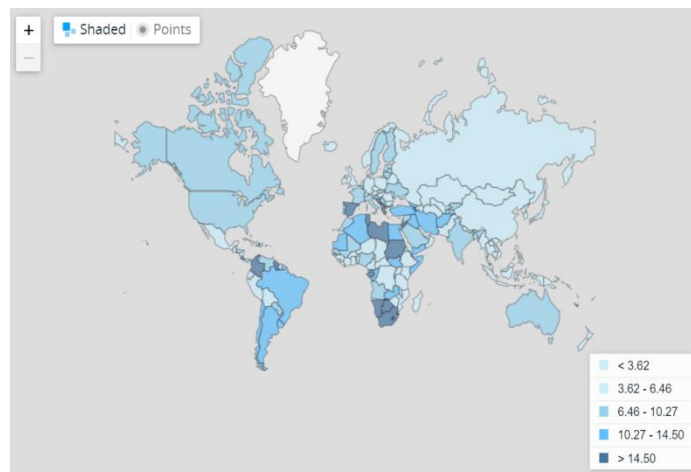


Figure 2 A map showing the world unemployment

From figure 2, it's all known that most areas of South Africa and South America have been greatly affected, while North America and Asia are relatively less affected. And it's clear that most countries in Asia, Europe and North America are developing or developed countries. South America and Africa are developing and backward countries. This shows that the country's unemployment rate is related to the country's degree of development

In addition, the closure of public places does not only involve unemployment, but also the inflation caused by it. Because of the closure of restaurants and other food and beverage industries, and people do not know how long the epidemic will last, many rumors are claiming that covid-19 will last for several years, and the panic makes household food suddenly short. Grocery stores continue to acquire these products to supply them to customers. Although restaurants continued to cut prices and continue their business through takeaway, the reason why people don't choose restaurant takeaways is that they want to stock up on food, rather than simply solving a meal. For a time, a large amount of money was put into the market, the demand for food was still very large, and the price continued to rise. The data analysis here does not only use countries with high unemployment rates like southern Africa, because even if these countries are not affected by the Covid-19, but the unemployment rate is still a great number--this is related to the country's national conditions and systems. Therefore, here the data focus on some developing and developed countries, which have significant growth of unemployment. The data obtained in this way is more accurate and representative.

Inflation and unemployment dynamics observed for the UK between January 2016 and May 2020: (Figure 3)

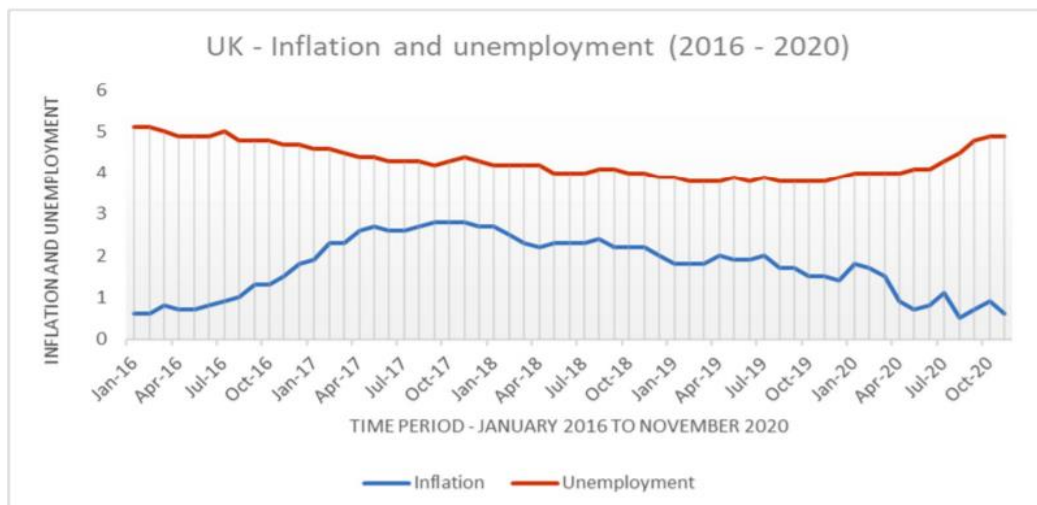


Figure 3 The pandemic's Influence on U.S. Inflation

“Below we replicated his figure “U.S. COVID inflation (all-items, 12-month change).” There are two lines. The solid orange line represents year-over-year CPI-based inflation while the blue dashed line represents the same, but for the COVID CPI measure.” [2]

2.2 Figure model

Next is the GLM (Generalised Linear Model) model of the relationship between inflation and unemployment, from a study called Inflation–Unemployment Comparison between the UK and India.

Similarly, this calculus model is also applicable to the relationship between unemployment rate and inflation discussed in this article.

General GLM (Generalised Linear Model) can be specified as:

$$Y = g(b_0 + b_1 X_1 + \dots + b_m X_m) \quad (1)$$

where $g(\dots)$ is a function. The inverse of $g(\dots)$, which can be given as $gi(\dots)$, is the link function. Thus, Equation (1) can be formulated as:

$$gi(\mu Y) = (b_0 + b_1 X_1 + \dots + b_m X_m) \quad (2)$$

The expected value of the dependent variable Y here is $E(Y) = \mu = gi(\mu Y)$. The idea of the additive models with generalized linear model could be associated to obtain a model as follows:

$$gi(\mu Y) = \sum_i (f_i(X_i)) \quad (3)$$

The model for this study, based on the general function, could be specified as:

$$g(E(\text{inflation}_t | \cdot)) = b_0 + s(\text{Unemployment}_t) \quad (4)$$

Inflation is the Inflation rate at time period t, Unemployment is the unemployment rate at time period t and $g(\cdot)$ is the link function.

2.3 The decline of the economies of various countries and the stagnation of international trade

Just as mentioned above, a large number of laborers lost their jobs, and restrictions on transportation and people entering and leaving the country greatly reduced consumer demand. According to a Chinese document by KPMG, the author analyzes the impact of the epidemic on the international economy from the four aspects of the capital market, trade, industrial chain and transnational investment, "The epidemic brought a significant impact on the economic development of various countries. Consumer confidence declined. Consumers may reduce spending to cope with the possibility of future income decline and even unemployment. American Airlines has said that it will cut 75% of global flights to cope with the lack of demand." [3] The study found that the severe contraction of business activities will further reduce people's consumer demand. In this regard, the World Trade Organization has made a similar statement, reporting the reduction in global production and consumption. Under the situation of the pandemic, many economic and trade frictions have occurred between different major economies, international trade barriers have increased, and global trade growth has stagnated.



Figure 4 COVID-19 and international trade: Issues and actions

This is a graph showing various countries' decreasing rate of international trade. Unlike the previous unemployment rate, this chart shows that the international trade of European countries has dropped substantially. Unlike Africa and the Americas, closed borders have undoubtedly the greatest impact on Europe and Asia, isolating direct trade and commerce between countries.

2.4 The labor force of medical staff and the lack of medical supplies

For an average of millions of COVID-19 patients, in underdeveloped countries, without medical insurance, patients cannot be treated in time, and medical staff is simply not enough. This took even longer to control the case number and the death rate was still rising. However, in developed countries, even with well-developed medical facilities and a sound medical system, the number of patients still exceeds the range that medical staff can help. Just as Jaime Caldwell, president of the South Florida Hospital and Healthcare Association said in the ABC news report on May 21st, 2021, "Staffing, especially nurse staffing, has been an issue for as many years as I can remember. But the pandemic made it worse." [4] (See figure 5 as the world demand for masks).

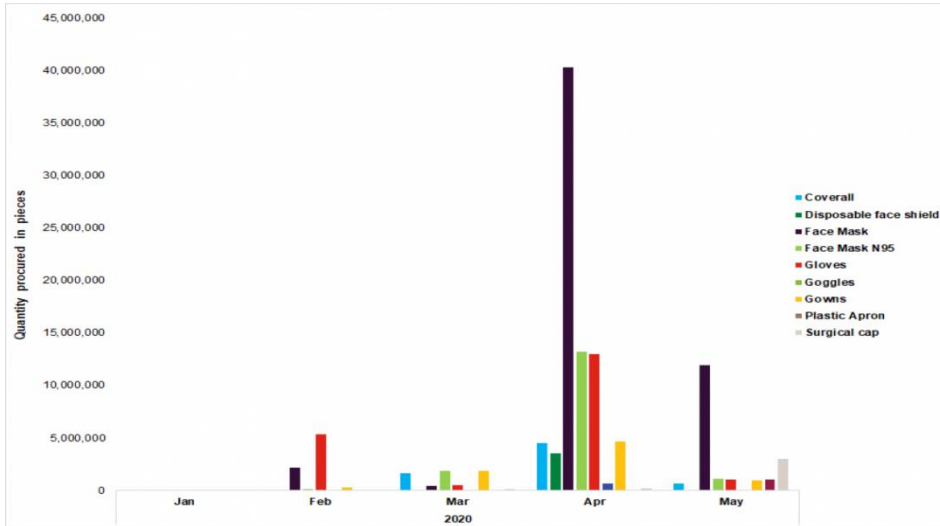


Figure 5: Supply contracted through UNICEF (January-May 2020)

In order to solve this problem, China has established a hospital in Wuhan to isolate patients, and the United States has established a special medical department in New York, where the epidemic was relatively severe in the early stage. Even so, after the United States surpassed China becoming the country with the most cases of infection, the shortage of medical supplies was exposed. The inventory of masks in the United States is quite tight, because a considerable part of them was imported into China in February and March 2020. US President Donald Trump also declared the shortage of masks. He called out that individuals should reduce the purchase and use of face masks and give those medical products priority to the medical staff. The usual inconspicuous masks were wiped out in the grocery store, and the price soared to an outrageous level of \$40 for 10 masks. At the same time, the prices of many vehicles, such as Tesla and Porsche, have dropped a lot, because people do not need vehicles to commute at all, as well as the gasoline industry and vehicle insurance companies are affected.

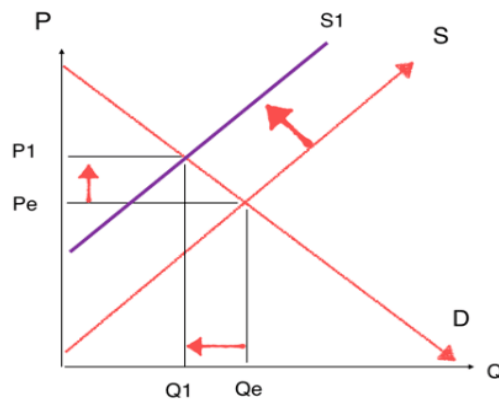


Figure 6 as the Aggregate supply curve of masks during Covid

Under normal circumstances, an increase in price will reduce the demand for a commodity. However, in the case of Covid, people will be willing to purchase any kind of mask at a higher price. That means the purchase volume and mask demand won't drop with the increase in price. Therefore, it is difficult to alleviate the shortage of supply, which leads to greater economic problems.

2.5 Economic recovery policies in di countries and overall GDP changes

In order to recover the national economic situation and GDP, also to alleviate the negative impacts caused by the pandemic, various countries have adopted different monetary and fiscal policies.

2.5.1 The Monetary policies

2.5.1.1 The U.S.

Federal Reserve directly lowered the target range of the federal funds rate to 0% to 0.25% through two emergency rate cuts of 50 basis points and 100 basis points on March 3 and 16, respectively, and launched a \$700 billion quantitative easing program to support the finance market.

2.5.1.2 South Korea

On March 16, the Bank of Korea cut interest rates by 50 basis points to 0.75%, and the benchmark interest rate fell below 1% for the first time.

2.5.1.3 Japan

On March 16, the Bank of Japan held a regular monetary policy meeting in advance and decided to further increase monetary policy easing by expanding the asset purchase plan. Specific measures include expanding the purchases scale of transactional open-end index funds (ETF) and real estate investment trust funds (REITs), while continuing to actively purchase treasury bonds, purchasing more commercial paper, and corporate bonds by the end of September this year.

2.5.1.4 The UK

On March 11, the Bank of England lowered its benchmark interest rate by 50 basis points to 0.25%, and on March 19 it further cut interest rates to 0.1%.

2.5.1.5 European Union

On March 12, the European Central Bank decided to maintain the euro area's dominant interest rate unchanged, but stated that it will implement more temporary long-term refinancing operations before launching a new round of targeted long-term refinancing operations in June to inject liquidity into the euro area's financial system. In addition, the European Central Bank has decided to expand quantitative easing, adding an additional 120 billion euro asset purchase plan by the end of this year, focusing on ensuring the purchase of private sector bonds. Based on this information, this research can be used to sort out the economic effects of the direct economic recovery measures adopted by these countries. These data are directly reflected by the market, and the methods and results are clear at a glance.

2.5.2 The Fiscal policies

The U.S. Treasury Department will launch an economic stimulus plan of about 1 trillion dollars.

Canada will provide about 10 billion Canadian dollars in additional financial support to companies through a new credit support program to stimulate the economy

The European Commission proposed to use 37 billion euros in the fight against the epidemic, to give member states flexibility in budget and state assistance, and to help 100,000 small and medium-sized enterprises obtain approximately 8 billion euros in financing.

Through research, it is concluded that the most common method for many countries to face the epidemic is a series of fiscal support policies including tax cuts, investment and refinancing. The government allocates fiscal expenditure to stimulate the economy more commonly. However, the economic recovery does not mean just throwing money into the market, but targeted spending. For example, under the influence of the epidemic, the main expenditures are medical supplies, salaries of medical staff, and rental costs of public shopping malls. The reason for funding these industries is that in the current epidemic, the operations of the industries have dropped significantly.

Jason Furman, [5] a professor at the Department of Economics at Harvard University, showed a graph of recovery in sales in his research. Other than that, a real GDP growth rate for different countries from 2019 to 2021 is shown and that tells what happened in the past year. In the very beginning, different countries did suffer considerable economic losses. After timely government intervention and economic policies were adopted, GDP had renewed growth.

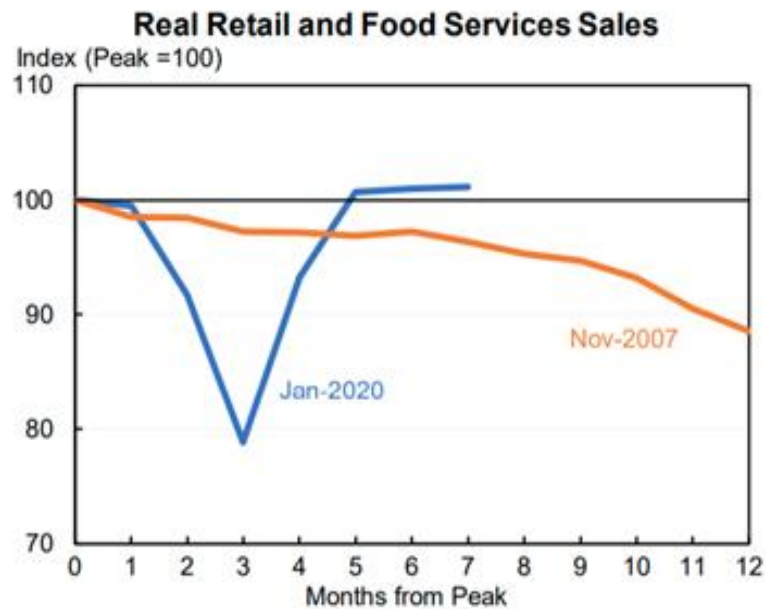


Figure 7 V-shaped recovery in retail sales [5]

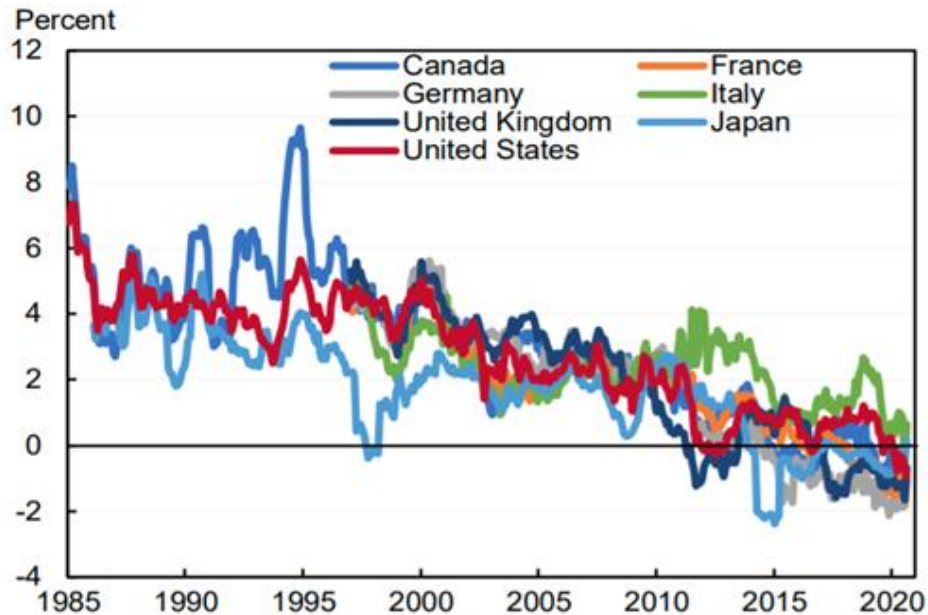


Figure 8 Real Ten Year Benchmark Rate [5]

3 CONCLUSION

According to the result of the study, the main reasons for the economic downturn under the situation of pandemics are restrictions on population movements and trade between countries, lower consumer demands for consumption, and instability of financial markets. In addition to placing a heavy burden on the healthcare system, COVID-19 also had significant economic consequences for the affected countries. Due to premature deaths, workplace absenteeism and reduced productivity, the COVID-19 pandemic had a direct impact on income and caused a negative supply shock. Global supply chain disruptions and factory closures have slowed manufacturing production activities. Great changes have taken place in the supply and demand of food and luxury goods, which has caused investors to reduce the willingness and frequency of investment due to instability. According to the March report of the United Nations Conference on Trade and Development (UNCTAD), among the world's top 100 multinational companies, 41 companies have issued statements stating that their profits may be reduced due to declining sales or supply chain disruption. [6] The branch said it would slow down investment in the areas affected by the epidemic. Since the spread of the virus may continue to disrupt economic activities and have a negative impact on the manufacturing and service industries, especially in developed countries, timely detection and control of the epidemic are one of the best ways to promote economic recovery.

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