EE406: Contemporary Economic Issues

The impacts of COVID-19 on the unemployment rate in the world

By the use of Google trend

Presented to

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i)Introduction

Covid-19 has been spreading since 2019 and it has affected people's lives dramatically. The virus has caused negative consequences to various business sectors and more importantly, the well-being of the people. It is a very infectious disease and has taken the whole world by storm at the impacts and danger it poses to people's wellbeing both financially and physically. Before the development of the Covid-19 vaccines, a lot of people have lost their lives. The spread of the virus has negatively impacted the whole world and it has a large impact on the global economy. It is now generally acknowledged that the pandemic caused the worst economic crisis since World War II (Oecd, 2020). A lot of adjustments are needed to be made in order to contain the spread of the virus as much as possible. Some of the general Covid-19 regulations enforced by every country are, for instance, wearing masks, social distancing, working remotely and keeping clean. With these regulations in place, a lot of workers have lost their jobs because businesses have to adjust to the pandemic. Furthermore, this paper is going to discuss the impact that Covid-19 has on the growth of the unemployment rate worldwide.

Social distancing is a vital measure to reduce the risks of getting infected with the virus. As a result of this, a lot of businesses have replaced human workers with robotic ones or as they are known as Artificial Intelligence. According to Semuels (2020), Robots were quickly deployed in reaction to the coronavirus and all of a sudden they could be seen in public such as taking people's temperatures and washing airport floors. The use of Artificial Intelligence has been increasing since the pandemic because they can work efficiently and they cannot spread the virus. Workers, especially people whose jobs are labor work, are the most affected because they can be easily replaced by robots or machines. Robots have become a marketable commodity as humans face massive job losses and economic uncertainty. Especially during the time of the pandemic, companies related to technology

have experienced a higher demand for their products during the pandemic. (Guardian News and Media, 2020).

Additionally, even without the replacement of robots, some people have still lost their jobs because many companies have closed down their businesses. During the pandemic, most people had to stay in isolation in their homes and shops, restaurants and other businesses lost a lot of customers. A lot of companies were not gaining any profit anymore so they decided to close down. With this, companies have no choice but to dismiss all their employees. The employees that have been dismissed are struggling to find jobs as it is incredibly challenging or nearly impossible to find a job during the pandemic.

In most cases, the rise of the unemployment rate has a lot of negative impacts on society. Poverty gets worse because people are not getting any more income therefore they cannot feed their families. The covid-19 situation is a virus that is very threatening to our health but some people cannot afford proper healthcare because they have lost their jobs. Moreover, crime rates are likely to go up because people are desperate for money or food. Furthermore, it affects the mental health of the people because they can become depressed, anxious or stressed.

Furthermore, it is important to acknowledge the difference in how quickly each country is able to combat the pandemic as this has an influence on how fast the economy will recover so that the unemployment rate will go down. The spread of the virus has negatively impacted the whole world. However, not every country is experiencing the same situations. For example, a developed country with a stable government is able to recover more quickly than a developing or underdeveloped country that is facing poverty and a corrupted government. The main factor concerning this issue, in my opinion, is how each government reacts to the situation. As stated in Ozkan (2021), evidence suggests that the United States,

South Korea, Japan and Germany are on the recovery path to the GDP per capita levels before the pandemic took place while South Africa and Argentina are likely to stay below the levels in 2019 until 2024. It has been two years since the spread of the Covid-19 virus. Some economies have improved as they are able to contain the infections while some economies are still struggling. This means that some people have been able to find jobs to work in but some people are still unemployed.

This paper aims to find out how much of an impact Covid-19 has on the loss of people's jobs and how it has affected the decline of the employment rate.

ii)Literature reviews

This research focuses on the impact that the Covid-19 pandemic has on the growth of the unemployment rate worldwide. The research is related to the factors concerning unemployment during the global pandemic as well as the discussion of how a lot of people have lost their jobs.

- Qian and Fan (2020) Shows the examination of economic situations of individuals during the virus outbreak and how their earnings are not the same prior to the pandemic. The data draws upon the situation in China in 2020. The research also shows the possibility of uneven economic vulnerability in COVID-19-related circumstances.

- Donthu and Gustafsson (2020) demonstrate that global pandemics can take place at any time and everyone should be prepared about the effects it will have. The research also focuses on economic impacts worldwide. Not only that, the pandemic results in significant changes in how businesses and consumers behave. This research

examines 13 different business sectors such as retail and tourism businesses and how they have been affected. For example, changes in employment.

❖Abuselidze and Mamaladze (2021) address the context of pandemic limitations in various areas of the economy, the study addresses the use and rising importance of artificial intelligence as well as its position in the post-pandemic period. Artificial intelligence's continuous establishment and scope of use in the global innovative technology market grows by the day. The goal of this study is to look into its impact on business globally and specifically in Georgia.

❖Kim, et al. (2021) Shows that In the tourism business, robotics and artificial intelligence (AI) technologies are becoming more prevalent. Consumers nowadays have a variety of alternatives incorporating both human and robot interactions. A number of experiments were carried out which showed that, for example, when COVID-19 was prominent, consumers had a more favourable view toward robots compared to staff who are humans in hotels.

❖ Focuses on the estimation of unemployment rate over the period of a year. Moreover, the study uses an approach to predict that the employment rate will peak in May at around 16 percent, then gradually decrease to 7.5 percent by the end of the year. The US labor market is under severe stress as a result of the COVID-19 pandemic and related mitigation efforts, despite having had the longest growth in history. Many workers have quit working as a result of stay-at-home requests, the closures of businesses and concerns regarding health

❖Bangkok Post (2021) mentions the poll results carried out by Suan Dusit Rajabhat University or Suan Dusit Poll. The research focuses on how The Covid-19

pandemic has caused a substantial increase in unemployment in Thailand which results in financial distress for the citizens. Questions such as how unemployment had affected them and how they coped with the financial situations were asked. The results showed that people were heavily affected in many aspects of their lives.

❖Cho, et al (2020) Shows the evaluation of the effects that the pandemic has on employment losses across metropolitan area status and population size using individual-level data from the US Current Population Survey. In April 2020, job losses peaked, then rebounded partially in succeeding months. There were significant job losses in non-metropolitan and metropolitan communities of all sizes, although the effects were much greater in large metropolitan areas. The COVID-19 infection rate was initially greater in large urban regions, which explains the higher early employment rate.

❖Mueller (2021) shows how the pandemic has led to the replacement of human workers with technology in the United States. According to the World Economic Forum's Future of Jobs report, 43% of businesses expect to reduce their workers as a result of new technology. It also includes how this impacts both blue and white collar workers as it is noted that, though automation mostly impacts blue-collar workers in manufacturing and the food service industry, the rise of other technologies such as artificial intelligence threatens white-collar professions as well.

❖Hetrick (2021) mentions how employees whose jobs are easily replaceable by robots suffer the most, especially during the pandemic. According to a survey released Monday by the Federal Reserve Bank of Philadelphia, workers with jobs that can be automated experienced more layoffs per capita than those with jobs that are not as easily digitized. The majority of unemployment during the Covid-19 outbreak are

projected to be temporary but people who work as cashiers, hotel employees, parking attendants, and others may lose their jobs indefinitely if employers become pleased with using technology or if they are afraid of future pandemics which can persuade companies to continue with robots.

❖ Kalogiannidis (2020) carried out a study that focuses on how the pandemic is responsible for the closure of small businesses. The study includes how it has an impact on small businesses and how it leads to the effect on supply chain and global trade as a whole. Moreover, According to research, the pandemic's impact on small businesses and employees has influenced overall corporate strategies in the face of economic imbalance.

(iii)Data & Methodology

3.1) Data

The data utilized in this study is a times-series from secondary data ranging from January 1st, 2011 until January 1st, 2021 of an unemployment rate in all countries and an alternative indicator set of data. This paper tries to evaluate the dependent variable that affects the unemployment rate in the world during the COVID-19 situation. Note that this time-series data is a monthly data.

Table i) Source of Data

Data	Source of Data	Unit
Unemployment rate index	FRED	Standardized index
Keyword search	Google Trend	Number of words

3.2) Methodology

To accomplish the objective of this study, the methodologies used in this paper are the regression analysis and other alternative prediction of data sets. The process of analysis will be described in the following paragraph.

Firstly, the data are obtained from FRED, Google trend, and other secondary sources where all of the data came from reliable companies. The unemployment rate index and the keywords in Google trend will be exported into Microsoft Excel as conventional data and alternative indicators. Since the objective of this paper is to find the relationship between an unemployment rate and numbers by searching in Google, the graphs of each alternative indicator have been constructed in order to analyze the timeline and pattern in terms of the time-series data. Besides that, this term paper digs deep into numerical analysis by utilizing the theory of Ordinary Least Squares Regression (OLS regression). To clarify, OLS is a method of estimating unknown parameters and coefficients of the relationships expressed in the model. The purpose of this estimation method is trying to minimize the sum of square difference between the observed and predicted values of the dependent variable.

OLS regression function model: $Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots + \beta_n X_n + U_i$

Where Y_i = Dependent variable

α = Intercept term in the regression model

β = Coefficient of each independent variables

X = Independent variables

U_i = Error term of the regression model

Note that n is the independent variable and slope for each.

iv) Result Analysis

(Summary of the OLS regression, Table 1; Appendix 1)

From OLS regression analysis, data from 2011 to 2021, 121 numbers of observations, which are presented in appendix figure 1. It can be apparently seen that the overview result is satisfied with the overall F-test at 0.05 levels of significance. At the same time, this study digs deep into the individual factor ;namely X_1,X_2,X_3, X_4 are losing a job, extra work, applying work, and work from home, respectively, has an impact on the endogenous variable(y) ,namely Y is the unemployment rate.

On the other hand, the individual T-statistic of $X_2$and $X_4$are not significant at 0.05 level of significance. Therefore, the null hypothesis of these two variables are not rejected, in other words, these two factors have no impact on Y. However, the test whether there exists multicollinearity among x variables was used in order to find problems of $X_2$and X_4. As a result, it showed unbelievable T-statistics, so, the next process is to adjust T-statistics with VIF. Eventually, $X_4$is significant at 0.05 level of significance while X_2 is still not significant. This implies that the insignificant variable should drop and see whether the model can explain the population better than not drop or not. Since, the two models with and without X_2 are nested models. The next step is to compare the fit of goodness by using adjusted R-squared. It turns out that the model without the X_2 variable has a higher adjusted R-squared. Admittedly, it can be concluded that the variable X_2 should not be considered in the function to explain variable Y in this model.

Next, after getting the fitted model (model without X_2), let's take a closer look into each coefficient for each variable. It is obviously seen that $X_1$and X_4have a positive relationship with the Y variable. To put things differently, the intensity of people searching for X variable increases, the Y variable will also increase. Unlike the X3 variable, it has a negative relationship with the Y variable. Therefore, when people search x2 increase, the variable Y decreases instead.

v) Policy Recommendation

According to the information from FRED and many literature reviews, it cannot be denied that a dramatic increase in unemployment rate during the first quarter of 2020 came from the reason of COVID-19 pandemic.

One of the key solutions for avoiding unemployment is to have an expansive monetary policy. The Federal Reserve should pursue an expansive monetary policy because it is rapid, effective, and powerful. Lesser interest rates allow people to borrow money for things like cars, consumer goods, and other things at a lower cost. As a result, interest rates are lower, allowing businesses to borrow money at reduced rates, providing them with resources to recruit personnel to meet increased demand. These are some of the factors that must be addressed in collaboration with the people and the government in order to eliminate unemployment. When properly planned and managed, the unemployment rate in the world can be reduced.

If the recession from COVID-19 pandemic is really severe, monetary policy alone may not be sufficient. This is when fiscal policy comes into an important role. To boost the economy, the government can either reduce taxes or increase expenditure. When compared to monetary policy, fiscal policy takes longer to get going. Getting Congress and the president to agree on the next steps takes time. However, once implemented, it can be more effective. It also instills much-needed faith in the government's ability to turn things around. It takes a lot of confidence to persuade people to invest today for a prosperous future.

vi) Conclusion

Turning back to the starting point of this paper, the first question came up into the writer's mind: “ Does COVID-19 pandemic affect the unemployment rate in the world?”.

After reviewing many literature and articles, the information of an unemployment rate index from FRED and google trend were selected as the main indicators. The methodology used in this term paper is the OLS regression model. As a result, the alternative indicators of numbers of searching in google trends that consist of; losing a job, extra work, applying for work, and work from home, can explain the world’s unemployment at approximately 28.38 percent and the overall results are significant at 0.05 level of confidence with the positive relationship. However, the individual T-test of the variable of extra work is not significant. After discussion and analysis, it is better to drop the extra work’s variable since it can generate higher adjusted R-square. To put things differently, the other indicators can explain the unemployment rate better when dropping the extra work’s variable.

On the whole, this paper only focuses on the information from FRED, google trend, and literatures as shown below in the bibliography. Therefore, readers should not rely only on this study since there exists some limitations such as numbers of observations and availability of the data. Nonetheless, this paper has already obtained the suggestions for further research where all readers can enhance their knowledge.

vii) Suggestions for further research

1. This term paper research does not consider other factors such as political situation, financial crisis, and etc. In the other words, there are some different factors in all countries that lead to the unemployment rate. Therefore, if this study concludes those all factors mentioned above for further research, it will be more realistic in terms of analysis.
2. According to the OLS regression result, it showed pretty low R-squared meaning that the alternative indicators above are not well explained. So, for further research, if there are more alternative indicators added, it could be more reliable.
3. Due to the limitation of time and data, 121 numbers of observations, there will be some bias in result. If further studies have more approachable information, the result will be more accurate.
4. Last but not least, this paper only uses one main alternative indicator which is from Google trend. For further research, it would be highly recommended to evaluate other alternatives data sets.

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Appendix

Figure 1.) Summary of the regression model

```
. reg y x1 x2 x3 x4
```

Source	SS	df	MS	Number of obs	=	121
				F(4, 116)	=	11.49
Model	157.310306	4	39.3275766	Prob > F	=	0.0000
Residual	397.049711	116	3.42284234	R-squared	=	0.2838
				Adj R-squared	=	0.2591
Total	554.360017	120	4.61966681	Root MSE	=	1.8501

y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1	.1709382	.0337169	5.07	0.000	.1041577	.2377188
x2	.0634613	.0743685	0.85	0.395	-.0838349	.2107575
x3	-.1352646	.0280619	-4.82	0.000	-.1908448	-.0796844
x4	.0726055	.0426486	1.70	0.091	-.0118655	.1570764
_cons	8.071101	1.053531	7.66	0.000	5.98445	10.15775

```
. corr y x1 x2 x3 x4
(obs=121)
```

	y	x1	x2	x3	x4
y	1.0000				
x1	0.3125	1.0000			
x2	-0.0079	0.5168	1.0000		
x3	-0.1394	0.5873	0.7693	1.0000	
x4	0.0777	0.6420	0.7008	0.7977	1.0000

```
. vif
```

Variable	VIF	1/VIF
x3	3.66	0.272885
x4	3.27	0.305613
x2	2.59	0.386359
x1	1.75	0.570888
Mean VIF	2.82	

```
. reg y x1 x3 x4
```

Source	SS	df	MS	Number of obs	=	121
				F(3, 117)	=	15.11
Model	154.817853	3	51.605951	Prob > F	=	0.0000
Residual	399.542164	117	3.41489029	R-squared	=	0.2793
				Adj R-squared	=	0.2608
Total	554.360017	120	4.61966681	Root MSE	=	1.8479

y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1	.1723688	.033636	5.12	0.000	.1057544	.2389832
x3	-.1237973	.0246064	-5.03	0.000	-.172529	-.0750655
x4	.0797256	.0417758	1.91	0.059	-.0030093	.1624604
_cons	8.497225	.9265879	9.17	0.000	6.662166	10.33228

Figure 2.) Indicators from google trend

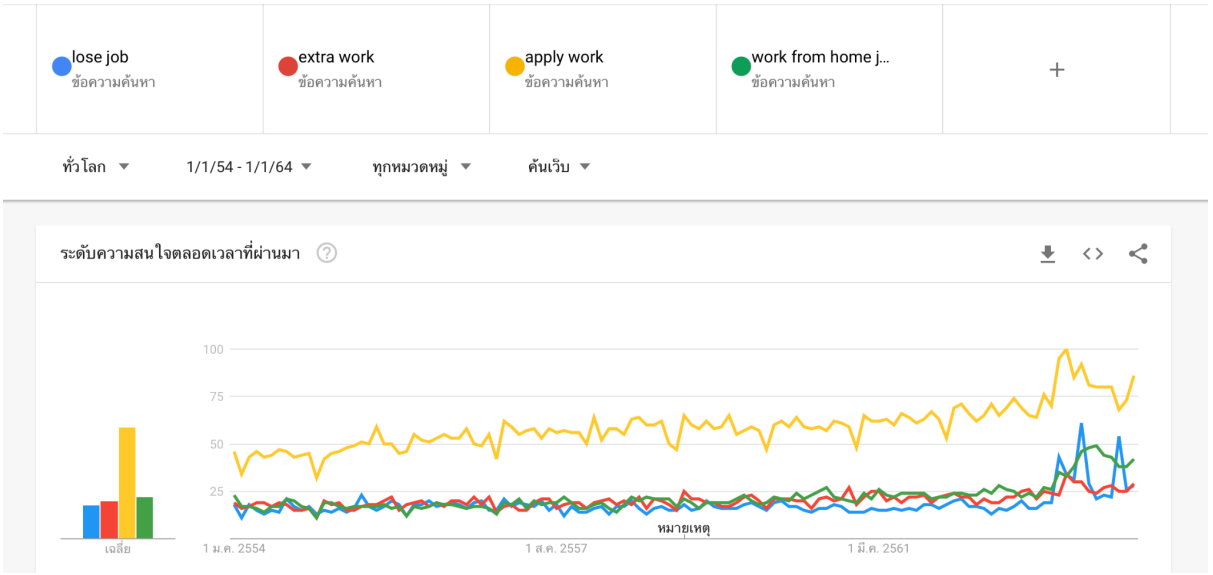

Figure 3.) An unemployment rate in all countries