

Literature Review of Covid-19 on Economy Area

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Abstract. This paper reviews literatures of the impact of Covid-19 on economy. It is divided the influence into three sections which are macro-economy, stock market and firm-level. All article indicates that Covid-19 pandemic led negative impact on global economy. However, government response action, no matter monetary, fiscal and social policy, can mitigate the negative effects. In addition, companies also have abnormal behavior after Covid-19 outbreak because of uncertainty, but it does not represent their negative expectation of future.

Keywords: Covid-19, economy, literature review.

1. Introduction

With Covid-19 outbreak in 2020, it significantly influences the world. It is important to analyze Covid-19-related problems as it can accelerate the process of solving current predicament and provide theory foundation for future similar problem. Therefore, many researchers did investigate on Covid-19-related area and issue their paper on Covid-19 of various areas, which includes medical, biology, education, etc. This paper will focus on the economy area to review relevant literatures and is divided into three aspect which are macro-economy, capital market and firm-level.

2. Macro-economy Analysis

The section will focus on the literatures that investigate macro-economic Covid-19 problems. when predicting and evaluating Covid-19 pandemic effect, most articles mention the uncertainty of global economy.

In Jena et al [1] research, they forecast the impact of Covid-19 of eight countries by applying a multilayer artificial neural network model. The reason they apply artificial neural network (ANN) is previous studies proved that ANN models is more accurate than econometric models when forecasting countries GDP. In addition, they employ eight countries historical quarterly GDP data to training and testing their model in order to calibrate it. Finally, they forecast the quarterly growth rate (April-June, 2020) of eight countries, and all outcomes are negative. The outcome indicates that economic might sharply decrease because Covid-19, the lockdown policies implemented by governments, and increase unemployment. Furthermore, authors also mention that the decline pattern already existed before Covid-19. In this article, authors employ ANNs to build a model to forecast country's GDP with the short-term influence of Covid-19. It considers many factors include policy that has significant influence on economic but hard to be quantified in liner models, which make it model accurate. In addition, Caggiano et al [2] evaluate a VAR to forecast the word wide uncertainty that led by Covid-19. The components of VAR are "a proxy for global uncertainty (the VIX)", "the global financial cycle index (GFC)", and "the word industrial production index (WIP)". The reason literature employs the VIS is it can reflect the real time changes. Furthermore, the WIP index is the weight average of OECD countries plus Brazil, China, India, etc. The range of sample is between 01/1990 and 04/2019. In result, the article assumes 90% of uncertainty is leaded by Covid-19 as at least 90% of articles include it. In addition, both the reaction of GFC and WIP is negative. Furthermore, the paper estimates the total uncertainty led by Covid-19 is -14%. However, this article does not consider the effect of US monetary policy and oil supply. Both Jena et al and Caggiano et al focus on forecasting shortage economic effect, and their outcomes are similar, which are that Covid-19 will lead to negative result on global economy.

Jena et al mentioned unemployment and credit crunch problems which contributed by government policy, and it believe there are no liner relationship between Covid-19 and these problems.

de la Fuente-Mella et al [3] also mention the government policies which includes restriction and lockdown that result in market illiquidity and volatility, whereas it believes the relationship between Covid-19 and these factors can be explained by econometric model. In addition, they also mention other factors also contribute the effect of countries economy. In de la Fuente-Mella et al article, they identify dependent variables as the GDP growth percentage, and Covid-19 relevant factors, which include Covid-19 infection cases per million residents, the global health security index, country default spreads, belongingness of OECD members and the GDP per capita, to build an econometric method. In their results, except Covid-19 infection cases per million residents, other independent variables do not have impact on the GDP variation as their P-value is large than significant value, which is 0.10. This research might prove the correlation between Covid-19 infection cases and the GDP variation, which is for every additional one case per million inhabitants, the GDP growth percentage decreases by 0.0026% on average, holding other variables constant.

Korneta and Rostek [4] also measures the effect of Covid-19 on GDP, and apply GDP variation as dependent variables and Covid-19 case rate as independent variable which is same as de la Fuente-Mella et al article. However, Korneta and Rostek employs Covid-19 fatality as independent variables and do not consider other factors. They evaluate the relationship between GDP and Covid-19 by employing multi-segment piecewise-linear approximation with Teil-Sen trend lines. The sample is from 179 countries between 02/2020 and 12/2020. The dependent variable is GDP growth rate, and the independent variables is Covid-19 cases rate (CCR) and Covid-19 fatality rate (CFR) separately. In addition, this paper employed moving average and quartiles on sample data, and kendall tau-b coefficients are utilized for measuring whether sample data have monotonic relationship or not. This paper mentions two hypotheses, which are the relationship between Covid-19 development and GDP growth rate is negative and there is no linear correlation between dependent and independent variables. The result shows there is a threshold in the relationships. If CCR is smaller than 7, CCR and GDP growth are negative correlation. The scope is -0.1274, and the P-value is smaller than significant value. however, if CCR is larger than 7, there no significant relationship between them as P-value is larger than significant level. The threshold of CFR is 0.2, when CFR is smaller than 0.2, the scope is -12.9928; and, when CFR is larger than 0.2, the scope is -1.3475. In discussion, this article stated both of their hypothesis are corroborated. In addition, it explains the reason of the threshold is governments policies effect the pandemic development and economy adapt Covid-19's negative effect.

Moreover, Szczygielski et al [7] assess the various effect of Covid-19 on different industries. This paper employs SRCH/GARCH model to evaluate the Covid-19 pandemic and company's return. The sample includes 68 industries based on MSCI's Global Industry Classification standard. The period of sample is between 01/01/2019 and 22/03/2020, and the article sets 01/12/2019 as Covid-19 outbreak day. In addition, to assess the uncertainty leaded by Covid-19, Google Trends search data is employed. In the result, this article states that Covid-19 pandemic has significantly negative effects on all industry. However, different industries suffer various level of effects. The energy, equipment and services industries experience more negative impact. Whereas the food, staples relating and regulated industries experience less negative effect. There are three reason this article stated for the difference, which are the production of theses industry are necessities, there are no substitute goods in the market, and the demand of production is inelastic.

However, although Covid-19 pandemic leads significant negative effects on global economy, Yoo and Managi [5] research shows that the protective action is necessary to prevent further loss. Yoo and Managi assess the Covid-19 effect in an unusual view. This paper investigates the global mortality benefits, which is the value that the decreased number of mortalities be monetized, by quantitative the value of life. The period of sample is between 01/2020 and 09/2020, and it include worldwide data. In research stage, it hypothesizes two scenarios, which are the scenario that countries implement four actions, which are social distancing, home quarantine, etc, and the scenario that countries did not

implement these four actions. Next, this paper employs country-level data by establish a model to forecast daily Covid-19 confirmed cases and fatalities, and it also divided the data in nine groups by age. It measured the global mortality benefit by employing the value of a statistical life. Then, it calculates the difference between action scenario's benefit and no-action scenario's benefit. In the result, this article states that the global mortality benefits are USD 40.76 trillion. Social distance is the most useful action which can save USD 14.79 trillion, that occupy 55% of total benefit. In addition, 60 to 69 age group take most benefit that is 21.70%. Moreover, this article indicates that most mortality benefits are occupied by develop countries, such as US, Japan and China experience 40% of total global benefits. Whereas African countries experience less benefits.

Furthermore, recent research indicates government can resume conventional monetary policy as some problem already caused by the implement of monetary and fiscal policy after Covid-19 outbreak. Wang et al [6] assess time-frequency volatility during Covid-19 pandemic. It measures volatility spillovers and its frequency dynamics. The sample includes give market capitalization, and the period is between 01/01/2007 and 31/12/2020 which include the period before and after Covid-19 outbreak. In result, the paper claims that the peak of spillovers is ate late 03/2020. In addition, during the pandemic situation, the only net spillover senders are US and UK, other countries are net spillovers recipients. Moreover, this paper indicates that government's monetary response mitigates the financial market crash, whereas it not solve the problem of unemployment and mitigate the pandemic. Therefore, this paper suggests government return to conventional monetary policy.

3. Stock Market Analysis

The section will focus on the literatures that assess Covid-19 induced effect on stock markets.

Liu et al [8] evaluate the relationship between Covid-19 outbreak and stock market. It employs event study methodology to calculate abnormal return (AR) of 21 leading stock market. The data of sample is from 21/02/2019 and 18/03/2020, and 20/01/2020 is the event day. And its include 21 leading stock markets which includes Asia and not Asia areas. The period after event day is divided in five windows equally. Then, this paper build OLS with expected return of index as dependent variable and market return on day as independent variable. In addition, the difference between expected return and real return is AR. The result shows that average return decreases and the standard deviation increase after the event day, which means Covid-19 has negative influence on stock market by reducing the return and rising the volatility no matter Asian market or not. After calculating AR, OLS is utilized for assessing the correlation between AR and global Covid-19 confirmed cases. It's control variables include Dow Jones Global daily returns, daily return of each index and belongness of Asian area. In result, the correlation between AR and Covid-19 case is significant negative. And the belongness of Asian area also has negative relationship with AR, which indicates Asian area suffered greater negative influence than other areas. Finally, this paper identifies the channel of Covid-19 outbreak and stock market is S&P 500 volatility index by building regression model. Liu et al prove that Covid-19 pandemic has negative influence on stock market. However, Yilmazkuday [9] mentioned that different government action can mitigate the negative effect in different level. Yilmazkuday investigate the correlation between Covid-19 and countries' monetary policy, especially focuses on the different outcome between advanced markets with zero bounds on interest rate and emerging markets without zero bounds. First, this article employs regression model to build model of monetary policy reaction. The dependent variable is the change of policy rate in each country, and the independent variables include the percentage change of economic activity, the percentage change of currency exchange rate (depreciation rate) and Covid-19 cases which is represented by 0 before the Covid-19 cases is below 100, and represented by 1 when Covid-19 cases exceeded 100. In addition, the first regression equation also be modified by introduce the variables of with and without zero bounds of interest rate which is represent by 1 if the markets have zero bounds, and represented by 2 if there are not. The sample data id from 28 development economics and 32 emerging markets. And the period of sample is between 15/02/2020 and 02/05/2020. In result,

both the change of economic activities and currency exchange rate have positive relationship with policy rate. Furthermore, compared with advanced market, the emerging economics without zero bounds are more successful on reacting the negative influence lead by Covid-19. However, advanced economics can implement unconventional monetary or fiscal policies instead of manipulate interest rate. In addition, Kizys et al [10] further investigate the correlation between government's action and herding behaviour in stock market. Kizys et al investigate whether there is investor herding behaviour in stock market which due to Covid-19 or not and whether government policies mitigate this behaviour. This article states three hypothesizes, which are there is investor herding behaviour in stock market after Covid-19 outbreak, government policies can mitigate herding behaviour, and European short-selling reaction also mitigate herding behaviour. The sample data includes 72 stock market indices, and the period is between 01/01/2020 and 31/03/2020. First, this article measured investor by employed cross-sectional standard deviation (CSSD) and cross-sectional absolute deviation (CSAD). CSSD and CSAD measure the standard deviation of stock market return. Therefore, the lower CSSD and CSAD value means the strong investor herding behaviour. second, this paper measures country response by establishing Stringency index that is measured by 11 actions that government might implement, such as school closures, workplace closures, public event cancellation. Finally, this article investigates the correlation between short-selling reaction by establish two dummy variables which are ESMAN and ESMAB. Then, this article establishes three methods, which are empirical methodology, quantile regressions and two stage least squares regressions. In result, this paper states that there is investor herding behaviour after Covid-19 outbreak. In addition, government's action can alleviate the herding behaviour as it might indicates positive future. However, travel control results in adverse consequence. In addition, there is no significant correlation between short-selling reaction and herding behaviour even it is positive.

4. Firm-level Analysis

The section will focus on the literatures that assess Covid-19 induced effect on firm-level.

Due to the uncertainty that foresee and ensure by previous papers, Hope et al [11] state that may affect company's behaviour. Hope et al investigate the correlation between Covid-19 outbreak and company's behaviour of withdrawing guidance by establishing regression model. It mentions two hypothesizes, which are Covid-19 outbreak and the uncertainty leads to withdrawing behaviour, which is not represent future poor behaviour of company, and when company has higher litigation risk, the company will experience more Covid-19 effects and more likely to withdraw guidance. Based on the hypothesizes, this article builds the regression model. The dependent variable is the withdraw behaviour, which is represented by 1 if company withdraw its guidance and represented by 0 if company not. The independent variables include the frequency of Covid-19-related words appeared in last conference call, the volatility of company's stock price, return on assets (ROA) and other control variables which includes industry-level variation that is divided into cyclical industries, labour intensity industries and high R&D intensity industries. The sample includes 272 companies that withdraw their guidance and 457 control companies who did not withdraw their guidance on 03/2020. In result, the paper claims that the withdraw behaviour has significantly positive relationship with the frequency of Covid-19 related words and the volatility of stock price, but not has correlation with ROA and other variables. In addition, the correlation with cyclical and labour intensity industries is positive, whereas the correlation with high R&D intensity industries is negative, which means that cyclical and labour intensity industries suffer more uncertainty because they need to adopt government's protectively policies, such as remote work. Furthermore, this article concludes that there is no herding behaviour of withdrawing guidance. In addition, there are positive correlation between withdraw behaviour and high litigation risk. Furthermore, this article event study method to assess the withdraw behaviour's correlation of abnormal trading volumes and abnormal stock returns.

Except withdrawing guidance, Wan and Tian discussed the effect on company's information disclosure. They assume that managers cannot provide accuracy and credible forecast as it is hard to

comprehensive understand the uncertainty situation leaded by Covid-19 pandemic. Therefore, managers willingness and frequency of prediction will decrease. To confirm the assumption, the paper establishes the regression model with management forecast (MF) as dependent variable. MF is divided into tendency and characteristic. First, the tendency of MF is measured by whether company issued quarter forecast or not and the number of forecasts in one quarter. In addition, the characteristics of MF is represented by the length of period that management forecast and the difference between issue date of forecast and quarterly paper addition one. Moreover, the independent variables include Covid-19 situation and other control variables. The sample contains 19,583 firm-quarter forecasts, and the period is between 2019 and 2020. In result, this article indicates that the tendency and characteristic of disclosure has negative relationship with Covid-19 outbreak. After result, this article also did DiD robustness tests and parallel trend test in order to further conformed and support their result.

5. Conclusion

Even though Covid-19 pandemic significant influence the global economy, government response action can alleviate the negative impact and the firm-level indicators did not show negative forecast of future. In macro-economic level, all articles state Covid-19 leads to negative effect on global economy, whereas some literatures government actions, such as lockdown and isolation, is necessary as these actions can bring global benefits. In stock market, Covid-19 also led volatility and uncertainty on global stock market, whereas government can mitigate the negative effects by implementing monetary and fiscal policies. In firm-level, Covid-19 pandemic made companies withdrawing their guidance, reduce forecast tendency and change the prediction characteristic, whereas these actions did not indicate the negative forecast of company's future. In conclusion, the Covid-19-related research shows its negative effect on economy. However, that do not mean negative prediction of future performance.

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