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The Economic Impact of Pandemic Covid-19 Outbreak: Comparative Analysis of Three Major Economic Groups

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Abstract The Pandemic Covid-19 outbreak cause a negative shock to the world economy, throwing many countries into economic uncertainty, facing an economic recession and if Covid-19 continuously actively spread possibly many countries face an economic depression. This study assessing the economic impact of Covid-19 by analyzing on the three main economic indicators which are GDP growth rate, inflation, and unemployment. This study using estimation proposed by Aditya and Acharyya (Aditya and Acharyya J. Int. Trade Econ. Dev. 22:959–992, 2013), applies generalized methods of moments (GMM) estimators. Data consist of 171 countries of the quarterly data set. The results of the study indicate that the most significant effect of the Covid-19 outbreak is on the GDP growth rate. However, the effect of the Covid-19 outbreak on inflation and unemployment is no exception. The findings suggest that the world economy can recovery or expand if policymakers and government focusing to stimulate investment through fiscal intervention which is likely to give a positive multiplier effect on economic activity.

Keywords Covid-19 · GDP growth · Inflation · Unemployment

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1 Introduction

In January 2021, the Pandemic Covid-19 outbreak has resulted in over 93.8 million confirmed cases and over 2.01 million deaths globally. Specifically, as report in Table 1, in developed countries is about 46.3% of world cases equal 4.5 million, and total deaths are 2% (the number of deaths relative to many cases) are reported, the transition countries account for only 6.9% cases (6,754,545) and 1.7% of deaths accounted in this region. For developing countries, Covid-19 had infected 40,284,802 people that accounted for 41.4% of world cases and around 2.5% of deaths. According to Asian Development Bank Report, as compared to the other Epidemic virus (i.e. Acute Respiratory Syndrome (SARS) outbreak in 2003 and the Middle East Respiratory Syndrome (MERS) outbreak in 2012), the total cases and deaths of Covid-19 has risen rapidly and quickly and far surpassed the total from the SARS, 2003.

On 30 January 2020, the Pandemic Covid-19 outbreak had been acknowledged by World Health Organization (WHO) as a global emergency. Due to this announcement, countries have enforced border shutdowns that cause human suffering and major economic disruption. In the early Covid-19 outbreak, OECD economics outlook had made projections from the 2019 database that World GDP growth in 2020 are set to remain week within 2019 world Gross Domestic Product (GDP) growth rate is at 2.9% and projection to drop to 2.4% in 2020, and in 2021 expected to increase to 3.3%. However, the real data indicated that the World GDP growth rate in 2020 is dropped by 4.179% that the decrease in value is greater than the projection to increase. Figure 1 illustrates the data of GDP growth rate for OECD countries and the World as a total for 2019 and 2020. The figure shows that in 2020 nine OECD countries faced a sharp decrease in GDP growth rate that above 8% (Austria, Colombia, France, Greece, Italy, Mexico, Portugal, Spain, and the United Kingdom), where Spain face the highest decline in GDP growth (11.63%) follow by United Kingdom (11.25%).
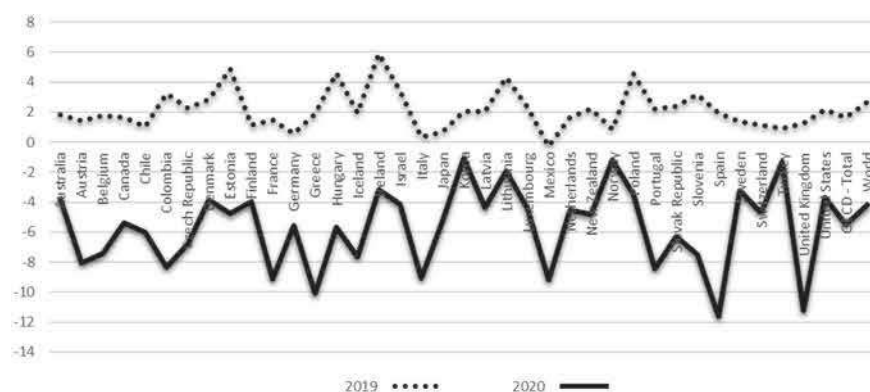

Fig. 1 The growth rate of Gross Domestic Product in OECD countries and the world (*Source* The author develops the figure based on data collected from OECD Database)

There are several ways that the Pandemic Covid-19 outbreak affects the economic activity in the world. Slow down and even negative economic growth rate, increase in the unemployment rate, discourage the foreign direct investment activity, negative effect on the stock market, reduce the trade activity is among the Pandemic Covid-19 consequences. Over the years, there are a lot of changes in the national investment policies as a means to promote sustained economic growth, especially in liberalize and promote investment rather than imposing restrictions and regulations. This situation is expected to accelerate the wake-up world economy due to the COVID-19 pandemic, which has been raising concerns in many countries that faced an economic downturns. As reported by UNCTAD, due to the Covid-19 outbreak, the FDI flows in 2020 indicated a significant decrease compared to 2019, where developed countries facing a 69% decrease that equal to $229 billion, transition economies show tremendously drop by 77% ($13 billion) and developing countries face 12% decrease in FDI in 2020, although the percentage indicates the smallest value as compared to the other groups, unfortunately in terms of monetary value, it shows that the decreasing value of FDI in developing countries is equal $616 billion, that is higher than the other two economies group. In total, world FDI faced a decrease by 46% in 2020 as compared to 2019 which shows the loss of FDI is equal to $858 billion, which resulted in the world GDP growth rate in 2020 drop by 4.2%. Besides that, as the government introduced the fiscal package, the inflation rate indicated an increase in value. Data from selected OECD countries shows a slight increase in inflation rate in 2020 compared to 2019, as illustrated in Fig. 2, but in the figure, this rate is still at an increasing rate that will harm the consumers.
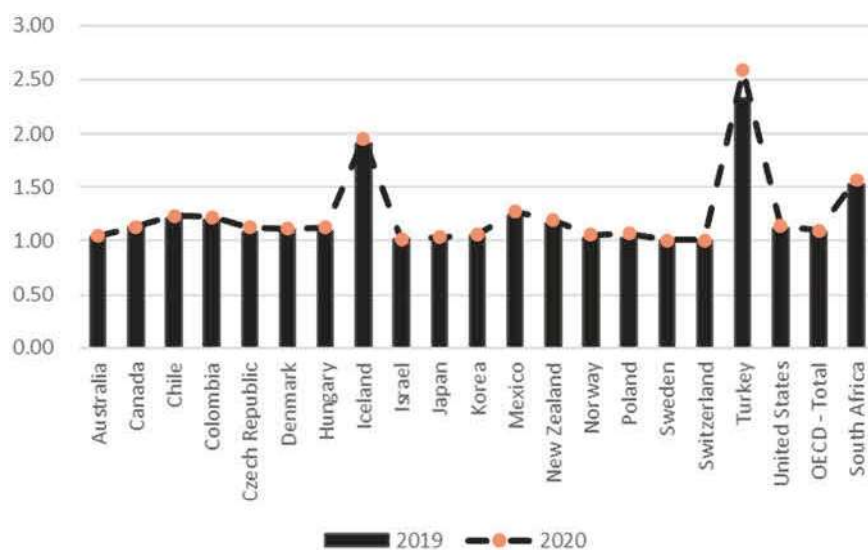

Fig. 2 Inflation rate in selected OECD countries in 2019 and 2020 (*Source* The author develops the figure based on data collected from OECD database)
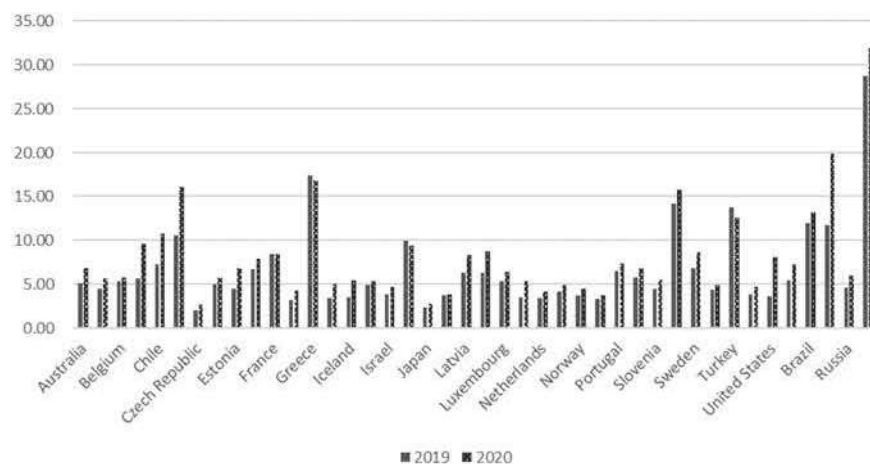
Fig. 3 The unemployment rate in selected OECD and non-OECD countries in 2019 and 2020 (*Source* The author develops the figure based on data collected from OECD database)

As illustrated in Fig. 3, as the Covid-19 spread and explodes globally and shut down the economy, the early and worst effect is on humans, that suffering from job loss. The figure shows that all the selected countries of OECD and non-OECD indicated a sharp increase in the unemployment rate. Where, there are three countries in OECD (Chile, Spain, and Turkey) that surpassed 10% of the unemployment rate, and for non-OECD countries South Africa with the highest the unemployment rate at 32%, Costa Rica 20%, and Brazil 13.2%.

The pandemic Covid-19 outbreak cause a major impact on the world economy. Therefore, it is essential to determine the impact of this health crisis on the economic indicators in ensuring that further action and designing policies can be prepared to ensure stable economic growth for the subsequent years. The rest of the article is organized as follows: In the following section is summarize of past studies. Then, an explanation of methodology and data employed in this study and follows by discussion and results and the last section is a conclusion.

2   Literature Review

The Covid-19 outbreak caused much of an impact on the economy. The main impact is on humans, that they suffer loss in jobs that cause a sharp rise in the unemployment rate as a result of the economy being closed. As such, the government has taken action by introducing fiscal and financial packages. A recent study by Bianchi et al. (2020) supports this government's role, by suggesting that implementing a fiscal package, can stimulate increased aggregate spending, reduce the interest rate, but the

nation will face an increase in the inflation rate, which, this action been supported by Auerbach et al. (2020) in their study.

A recent study on the impact of Covid-19 on the job loss that causes an increase in the unemployment rate had been explored by many researchers (Adams-Prassl et al. 2020; Béland et al. 2020; Coibion et al. 2020a; Kahn et al. 2020). A study by Coibion et al. 2020a, find that there is a sharp decrease in the number of employees with a number equal to 20 million in the early Covid-19 crisis. In short term, about 50% of the population that is categorized as labor force might not able to find a job due to the economic recessionary situation (Gourinchas 2020), which is the most significant impact of the Covid-19 crisis, where the World GDP growth rate faced a decline by 4.179%. The labor market is one of the main sources that contributed to economic growth as explained in the endogenous growth theory.

The model predicted that the rate of total factor productivity influences economic growth which is one of the factors that generate higher total factor productivity in the labor market. Whereas, in the endogenous growth model, the AK model developed by Romer (1986, 1990), Lucas (1988), and Robelo (1991) in the first wave of which focuses on human capital accumulations. The essence of this theory is reflected in equation $Y = AK$, where A is the expression factor that affects technology and K is capital (i.e. physical and human capital). According to the AK model from the accumulation of capital created technological progress and since this theory assumes no diminishing returns to capital, an increase in investment in physical or human capital could sustain economic growth. The importance of the accumulation of capital has been proved by empirical literature (see for example Caballe and Santos 1993 and Tallman and Wang 1994).

Bonadio et al. (2020) stated in their study that, a decline in global GDP is a major reduction in world economic activity with a major interruption in the world supply chain. When the economy has to shut down, it will affect the labor productivity that directly causes a decline in the firm revenue (Elenev et al. 2020), that been supported by Cespedes et al. (2020) with their finding indicated that the Covid-19 outbreak leads to loss of productivity. Based on the real business cycle model, Baker et al. (2020), the Covid-19 outbreak lead to an economic uncertainty that causes a contraction of GDP. This situation had been studied by Barua (2020), which she had shown that the economic impact of the Covid-19 outbreak can be categorized into five waves. The first wave is known as short-term effects that caused initial production shock, initial demand shock, distortion to the supply chain, and cause an interruption of capital flows. In the second wave of the impact Covid-19, Barua stated impact internationalized that cause distortion to trade flows and interruptions of capital flows, this second wave is called short term to medium term impact. Continuously, in the third wave, this health crisis causes a negative macroeconomic impact that will influence aggregate supply, aggregate demand, cause a price level shock, loss of employment and income, exchange rate volatility, and rise in financial risk and instability. For fourth wave and fifth wave, is categorize in long term impact, wherein the fourth wave cause a reduction in economic growth and finally bring the economy from recession to depression and also shift in international cooperation.

A study by Carlsson-Szlezak et al. (2020) explained that there are three channels through the Covid-19 outbreak that affect the economy, which are direct effect, indirect effect, and supply-side disruptions. The first channel of direct impact is, the economy will face a reduction in consumption of goods and services that as Barua (2020) explained in the first wave. Due to economic shutdown, job loss, lockdown had caused the consumer to cut the expenses on goods and services. The Pandemic Covid-19 effect indirectly on the economy which influences the financial market that gives a high impact on the real economy. Financial institutions offer to defer payment of loans (moratorium) that cause bank losses in the income generated. The third channel is supply-side disruption as explain by Barua (2020) in the third wave that happens in the medium-term period. This channel indicated that the reduction in the production, negative impact on supply chain, distortion demand of labor, increase the unemployment rate and increase the inflation rate. Generally, the Covid-19 already harm individuals' economies, firms, nations, and the world, which has triggered a massive spike of economic uncertainty where the Pandemic Covid-19 outbreak had been labeled by media as a black swan event and likened to the economic scene of World War Two.

3 Methodology

3.1 Model Specification

The indicator of covid-19 is an estimate based on residual. Because we rely on the quarterly data of Covid-19. We estimate the model starting 1 January 2020 through 31 December 2020. In the first stage, the Covid-19 data estimate in the following form:

$$\Delta C19_i = \alpha_i + \emptyset C19_{i,t-1} + \beta_{i1}\Delta GC19_t + \beta_{i2}\Delta RC19_t + e_{it}$$
$$Jan\,1,\,2020 \leq t \geq December\,31,\,2020 \tag{1}$$

The variable is a daily change of Covid-19 spread of country i. On the right of the model (1), the lagged dependent variable regress with the two indicators, $\Delta GC19_t$ is the Global value of Covid-19 and $RC19_t$ is the regional (country classification group) factor. Whereas the global factor is measure as the cross-sectional average of daily log Covid-19 change over the sample noncountry group (i.e.: if country i is a developed country, thus the global factor were from countries from the economies in transition and developing countries). The regional factor is measured similarly with the global factor from the number of developed countries used in the analysis, the number of regional factors is excluding country i.

The second stage is getting the residual of Covid-19. The Covid-19 residual is calculated as follows:

$$\Delta COV_{it} = \Delta C19_{it} - \left[\hat{\alpha}_i + \hat{\emptyset}C19_{i,t-1} + \hat{\beta}_{i1}\Delta GC19_t + \hat{\beta}_{i2}\Delta RC19_t \right] \quad (2)$$

By using the residual, the estimation of the model of study is as follows. The model used to test the impact of Covid-19 is based on a similar model developed by Zeren and Hizarci (2020) that studies the impact of Covid-19 on the stock market. Among many other researchers Ayittey et al. (2020) and Estrada et al. 2020 used this estimation procedure to explain the possible effects of Covid-19 on the economy, that also follow by Luo and Tsang (2020).

$$\Delta COV_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 INF_{it} + \beta_3 UMP_{it} + \mu_{it} + \varepsilon_{it} \quad (3)$$

where ΔCOV is a residual of Covid-19, GDP is a rate of growth of real GDP, INF is a consumer price inflation, UMP is unemployment rates.

3.2 Data Sources

The data for a sample of 171 countries that includes developed countries, economies in transition, and developing countries, has been collected from the Trading economics database, World Health Organization database, and World Economic Situation and Prospect 2020 report. The sample covers 36 developed countries, 16 countries in transition and, 119 developing countries for the year 2020.

The data of Covid-19 cases from 1 January 2020 through 31 December 2020 were extracted from World Health Organization Database, rate of growth of real GDP, consumer price inflation and unemployment rate (developed countries) were collected from World Economic Situation and Prospect 2020 report, and unemployment data of economies in transition and developing countries were extracted from Trading economies database. Estimation is based on balance panel data analysis, which is the period is based on quarterly (t = 4) with four indicators, and a sample of 171 countries (i = 171), with our total observations, is equal to 2736.

3.3 Estimation Procedure

To estimate panel data analysis, this study follows estimation proposed by Aditya and Acharyya (2013), with applies generalized methods of moments (GMM) estimators proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). It uses GMM estimator because of three reasons: (1) to control autocorrelation, the inclusion of lagged dependent variables are included; (2) the country-specific effect can be controlled by using GMM that cannot be done using country-specific dummy because of the dynamic structure of the regression equation

and (3) due to some variable may be endogenous, the GMM able to control this simultaneity bias.

There are two types of estimation approaches using GMM estimator namely, difference GMM and system GMM. The former method proposes an instrumental variable estimation in the first-difference specification, where the lagged differences dependent variable and other predetermined or endogenous variables are instrumented by their earlier values in levels and by other strictly exogenous or additionally specified instruments (Arellano and Bond 1991). The S-GMM methodology by Arellano and Bover (1995) and Blundell and Bond (1998) propose a similar method in which level equations are combined with level equations. The specification in levels uses the lagged value of first-difference as an instrument. Estimation in one-step and two-step procedures are applied in difference GMM and System GMM. Whereas, in one-step estimators, the independent variable is estimated by using weighting matrices, whereas the two-step GMM estimators, will be estimated using optimal weighting matrices, where the moment conditions are weighted by a consistent estimate of their covariance matrix. Thus, based on the specific procedure conducted in two-step estimators, it makes the two-step estimators' results are more efficient as compared to the one-step estimators.

Although the difference GMM estimator can control for country-specific effects and simultaneity bias, it still has one major weakness. As shown in Blundell and Bond (1997), the results become weak for regression, which leads to small sample estimators are biased, if the estimation indicates persistence over time of a lagged dependent and the explanatory variables. Thus, system GMM is proposed by Arrelano and Bover (1995) as an alternative method that estimates the regression in differences jointly with the regression. This estimator has been shown to perform much better (i.e. less bias and more precision), especially when the series is persistent or the autoregressive process is too persistent which is the first difference that might be weakly correlated with its lagged levels. Arrelano and Bover (1995) and Blundell and Bond (1998), proposed using additional moments conditions in which lagged differences of the dependent variable are orthogonal to the levels of the disturbance/errors.

To get the best estimation result from GMM, the estimation model depend on the specification test proposed by Arellano and Bond (1991), which is the Sargan test. This specification test will examine the validity of all variables in the estimation that as Baltagi (2005) explained in the article, the Sargan test will analyze the sample based on moment conditions. In the Sargan test, the variable will be test base on the hypothesis of does variables are interrelated with the residual. If the results indicated to accept the hypothesis, with the results indicated the statistically significant, thus the researchers may conclude that the variables used in the estimation are exogenous and the model estimation passed the Sargan test. The more highly significant result of the Sargan test indicated that the model is firm and not misleading (Table 1).

Table 1 Percentage of Covid-19 cases and deaths

	Percentage of cases	Cumulative percentage cases of total per 1 million population	Percentage of total deaths	Cumulative percentage total deaths per 1 million population
Developed countries	46.3	33.0	2.0	38.7
Economic In transition	6.9	12.6	1.7	13.2
Developing countries	41.4	28.4	2.3	29.6

(*Source* World Health Organization database)

4 Results and Discussion

4.1 Preliminary Analysis

As a preliminary analysis, a summary of statistics for all variables used in this analysis are presented in Table 2: Covid-19 residual (COV), GDP growth rate (GDP), inflation (INF), and unemployment rate (UNM). The statistics presented in the table are based on 171 selected global countries. The main indicator of these statistics is that there is considerable variation in the Covid-19 across countries, ranging from 0 in Vanuatu to 7.4 in the United States. The range for GDP growth is between 0.1 in Sudan and 16 in Liberia. Meanwhile, the range for the inflation indicator is between 0.1 (Central Africa Republic) and 44.3 (Argentina). The minimum value of unemployment is 0.1 represent by Oman and Angola indicates the maximum value at 34.

Table 3 presents the correlation analysis for all variables. It is worth to note that the correlations of all variables with Covid-19 are consistent with theoretical predictions which indicate negative correlations with Covid-19 residual.

Figures 4, 5 and 6 displays the Covid-19 residual plotted against the GDP growth rate. The fitted line shows negative relationships between the Covid-19 and GDP growth rate for the three groups of countries. Developed countries ($R^2 = 0.8138$), economies in transition ($R^2 = 0.7188$), and developing countries ($R^2 = 0.8109$).

Table 2 Summary of descriptive statistics

Variables	Mean	Std. Dev.	Minimum	Maximum
COV	4.6	0.08	0	7.4
GDP	3.4	0.16	0.1	16
INF	5.0	0.7	0.1	44.3
UNM	7.9	0.4	0.1	34

Notes The variables are defined as follows: COV = Covid-19 residual, GDP = GDP growth rate, INF = inflation, UNM = unemployment rate

Table 3 Correlation matrix

	COV	GDP	INF
COV			
GDP	− 0.2467		
INF	− 0.0152	0.0117	
UNM	− 0.1009	− 0.1365	0.0934

Notes The variables are defined as follows: COV = Covid-19 residual, GDP = GDP growth rate, INF = inflation, UNM = unemployment rate
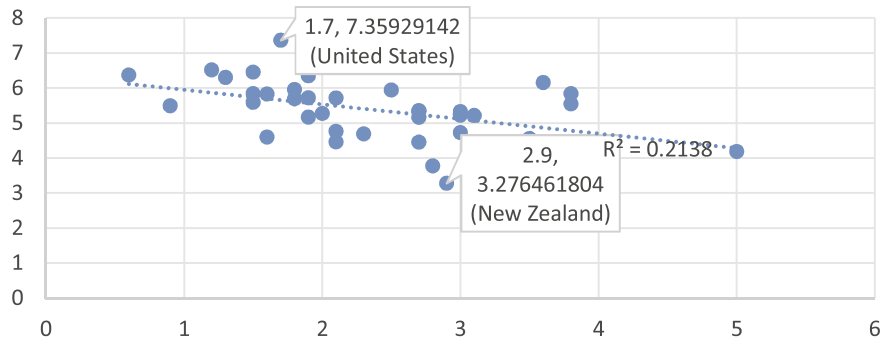

Fig. 4 Scatter plots of Covid-19 residual vs GDP growth rate in developed countries
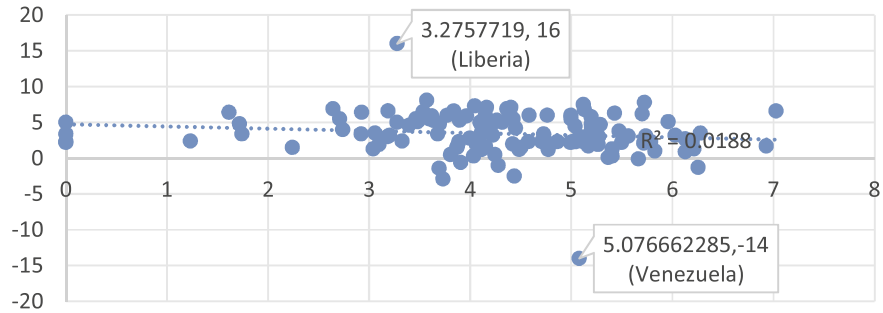

Fig. 5 Scatter plots of Covid-19 residual vs GDP growth rate in developing countries

The estimation and figures indicate that developed countries face the larger effect of Covid-19 on the GDP growth rate. These results indicate that, one of the giant economies (the United State) in developed countries had faced the highest rate of recession (−10) which had been never experienced by the US since 1947, (Routley 2020; Elali 2021; Ahmed 2020).
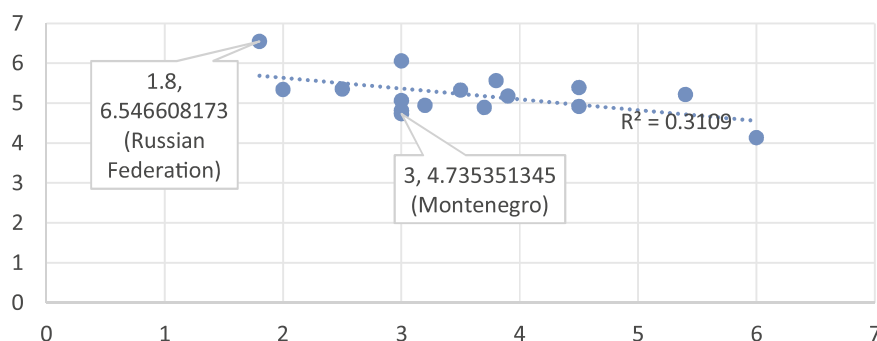
Fig. 6 Scatter plots of Covid-19 residual vs GDP growth rate in transition economies

The first step of our analysis is to estimate a simple linear model as shown in Eq. (3). Results are reported in Table 4. At this stage, we estimate the model to the world economy, and specific to the developed countries, economies in transition, and developing countries. The results indicate that as global, when the pandemic Covid-19 increase by 1%, it causes a decrease in world GDP growth by 0.1228% which is consistent with finding by Gourinchas (2020) and Maital and Barzani (2020). The result shows that the unemployment rate is increased by 0.0118% as a Covid-19 increase, which is a similar finding by Bauer and Weber (2021), and the impact on the inflation rate is slightly lower than unemployment rate (0.0014%), Seiler (2020) indicate that due to the lockdown the inflation rate becomes higher. In the specific analysis on country economy groups, developed countries faced a major impact on GDP growth rate that causes a decrease by 0.55% as compared to the other economies groups. For the second economic indicator, developed countries also have to face a significant increase in consumer price or inflation with 0.52%. However, results indicated that developing countries have the highest percentage in

Table 4 Linear estimation result

	World	Developed countries	Economies in transition	Developing countries
Constant	4.99*** (24.45)	5.56*** (8.83)	6.11*** (11.59)	4.27*** (16.24)
GDP	− 0.1228 (−3.15)**	− 0.55 (−3.56)***	− 0.27 (−2.3)**	− 0.05 (−1.1)*
INF	0.0014 (0.15)*	0.52 (1.9)*	0.02 (0.4)*	0.008 (0.8)*
UNM	0.0118 (0.89)**	0.02 (0.44)*	− 0.002 (−0.10)	0.04 (−1.8)**

Notes The variables are defined as follows: COV = Covid-19 residual, GDP = GDP growth rate, INF = inflation, UNM = unemployment rate. Figures in bracket is the value of t-statistics. The symbol of ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively. All variables are in logarithmic form

the unemployment rate (0.04) compare to the others. Overall, the Pandemic Covid-19 outbreak shows a significant impact on economic indicators with a decrease in GDP growth rate and increase the inflation and unemployment rate is consistent with Coibion et al. (2020b).

4.2   Generalized Methods of Moment

To examine the impact of Covid-19 on economic indicators, Eq. (3) is estimated using both difference GMM and system GMM estimators. The results are reported in Table 5. The result of the diagnostic test reveals that difference GMM at one-step estimators failed to pass the Sargan test and therefore the result is unreliable. For the difference GMM estimation, the result shows that the lagged dependent variable is statistically significant and this indicates that previous cases of Covid-19 affect the economic situation, which has been supported by the estimation in the two-step System GMM. Based on System GMM, the results indicate that the coefficients of all variables tested are statistically significant at the usual levels. GDP growth ($\beta = -0.1445$, $p < 0.01$) indicate the negative effects on the Covid-19 residual, which is similar with Maital and Barzani (2020), however inflation rate ($\beta = 0.2643$, $p < 0.1$) and unemployment rate; ($\beta = 0.3252$, $p < 0.05$) indicated positive effects on the Covid-19 residual. These results suggest that 1 percentage point increase Covid-19 will decrease GDP growth, by 0.1445, and increase inflation and unemployment rate by 0.2643 and 0.3252 percentage points, respectively, which is explained by Coibion

Table 5 GMM estimation of the world

	Difference GMM	System GMM
Constant	4.7097 (1.46)***	4.2392 (1.69)***
COV (Lagged)	0.1457 (13.48)***	0.1670 (12.76)***
GDP	− 0.1418 (5.76)***	− 0.1445 (−2.71)***
INF	0.1653 (3.82)***	0.2643 (6.48)*
UNM	0.2185 (−2.71)**	0.3252 (6.04)**
Sargan test	10.5440 (0.0090)	15.7830 (0.1670)

Notes The variables are defined as follows: COV = Covid-19 residual, GDP = GDP growth rate, INF = inflation, UNM = unemployment rate. Figures in bracket are the value of t-statistics, s, except for the Sargan test which is the p-values. The symbol of ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively. All variables are in logarithmic form

et al. (2020b). The p-value for the Sargan test 0.1670 suggests that over-identification restriction cannot be rejected. Therefore, the instruments used in estimation are valid.

4.3 Sensitivity Analysis

This study conducts two sensitivity tests to ensure that the estimation results are robust. First, we assess the potential impact of outliers on the results. Secondly, the sensitivity analysis is conducted by excluding a potential outlier United States from the estimation.

In the first estimation of sensitivity analysis, the researcher assesses whether outliers may have affected the results obtained in the previous analysis. To detect outlier observations, this study follows the strategy advocated by Besley et al. (1980) using the DFITS statistics. This statistic is used to identify countries with a high combination of residuals and leverage statistics. Following Besley et al. (1980), an observation may be considered an outlier if the DFITS $> 2/\sqrt{k/n}$ where k is the number of explanatory variables and n is the number of countries. The test suggests that United States, New Zealand, Liberia, Venezuela, Russian, and Montenegro are potential outliers in the estimation.

The results which exclude outliers are reported in Table 6. Based on the estimation in two-step estimation, interestingly, the exclusion of outliers has slightly decreased the magnitude of the impact of Covid-19 residual on global GDP growth rate with 0.1246 compare with the previous value global GDP growth rate with outliers is

Table 6 Sensitivity analysis by excluding outliers

Variable	Difference GMM	System GMM
Constant	4.6844*** (1.07)	4.2543 (2.26)***
COV (Lagged)	0.1385*** (7.56)	0.1816 (7.89)**
GDP	− 0.1087*** (8.17)	− 0.1246*** (7.93)
INF	0.0419*** (3.04)	0.0363*** (6.01)
UNM	0.3634*** (5.11)	0.3100*** (2.83)
Sargan test	19.3441 (0.2989)	21.7273 (0.4809)

Notes The variables are defined as follows: COV = Covid-19 residual, GDP = GDP growth rate, INF = inflation, UNM = unemployment rate. Figures in bracket are the value of t-statistics, s, except for the Sargan test which is the p-values. The symbol of ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively. All variables are in logarithmic form

408 N. Nordin et al.

0.1445. More importantly, these sensitivity analyses indicate that the new estimation GMM is adequately specified and the results are not driven by the simultaneity bias. Therefore, the previous interpretation on the impact of pandemic Covid-19 causes a negative effect on the GDP growth rate is unchanged. Other indicators are also a statistically significant indication that, as an increase in Covid-19, the inflation rate and unemployment rate will increase. Thus, the result is robust and not driven by outliers.

Finally, the United States is excluded from the estimation as the United States is viewed as a potential outlier because of the highest cases of Covid-19. The results of excluding the United States from the estimation are reported in Table 7. Based on the system GMM at two-step estimation, the results suggest the effect of Covid-19 on the global economy remains intact although the coefficient on GDP growth rate is slightly lower ($\beta = -0.0793$), inflation rate $\beta = 0.0291$) and unemployment rate ($\beta = 0.2556$). The results indicate that as the number of Covid-19 increases by 1%, GDP growth will decrease by 0.0793% and increase inflation and unemployment rate by 0.0291 and 0.2556. However, unemployment indicated the highest affected from Covid-19 due to action taken by the government in implementing a lockdown economy. This finding is similar to Ashraf (2020) stated that lockdown had affected job losses and income loss for more than 10 million people, Kawohl and Nordth (2020) stated that the outbreak of the Covid-19 pandemic had caused an increased worldwide unemployment rate. Hensher (2020) stated that, although many governments had taken many actions to protect workers during the outbreak of Covid-19, the unemployment rate is at increasing value.

Table 7 Sensitivity analysis by excluding United States

Variable	Difference GMM	System GMM
Constant	5.5270 (3.7934)	5.0106 (4.6501)***
COV (Lagged)	0.1362 (8.1374)***	0.1124 (7.2007)***
GDP	− 0.0984 (−1.1789)**	− 0.0793 (−0.9015)
INF	0.0393 (3.7375)***	0.0291 (3.2252)**
UNM	0.2430 (5.4730)***	0.2556 (2.1394)**
Sargan test	11.0078 (0.6851)	16.3146 (0.5100)

Notes The variables are defined as follows: COV = Covid-19 residual, GDP = GDP growth rate, INF = inflation, UNM = unemployment rate. Figures in bracket are the value of t-statistics, s, except for the Sargan test which is the p-values. The symbol of ***, *,*, and * indicate statistical significance at the 1, 5, and 10% levels, respectively. All variables are in logarithmic form

5 Conclusion

This study provides an empirical assessment of the impact of the Covid-19 outbreak on the economy globally. It analyses several important factors namely GDP growth rate, inflation rate, and the unemployment rate as a main economic indicator using quarterly data for the year 2020. There are two major contributions associated with this study. This paper it is found that the most significant impact of Covid-19 is on GDP growth. The most affected economic group is developed countries. Developing countries face a slightly higher unemployment rate as compared to developed and transition economies. The finding also indicates that the pandemic Covid-19 outbreak has caused an increase in the inflation rate. The result from GMM estimation shows that the outbreak of the Covid-19 outbreak had caused the unemployment rate to increase drastically worldwide. In conclusion, the effect of Pandemic Covid-19 is already in the fourth wave as stated by Barua (2020). As many governments take action in the implementation of fiscal package, it hopes that will stimulate the world economy. To stimulate economic growth, policymaker and government should weigh on encourage foreign direct investment through fiscal interventions which are able to stimulate more investment activity, which is likely to give a progressive multiplier effect on economic activity to bring the economy out of the slump.

One of the limitations of this study is availability of data to estimate the long run effect for empirical analysis. This study adopts quarterly data analysis for the year 2020. It is suggested that for future research to examine for cross sectional analysis and extend the empirical analysis on a country specific basis to ascertain more precise implications at country specific level.

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