Does COVID-19 Pandemic Matter for Economic Policy Uncertainty? Evidence from selected OECD Countries

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***Abstract*—The unending posture of the COVD 19 pandemic is given rise to the concern of policymakers around the globe, of which several studies have been conducted investigating the challenges of the pandemic. Meanwhile, studies suggested the need for more investigation on the implications of the COVID 19 pandemic on macroeconomic indicators which has not been exhaustively investigated. Thus, this study attempt to investigate the impact of COVID is pandemic and other variables on Economic Policy Uncertainty in some selected OECD countries using monthly data from January 2020 to August 2021 and employed GMM estimation techniques for the data analysis. The results revealed that the number of COVI 19 cases trigger the Economic Policy Uncertainty in the selected OECD countries, while inflation was found to have a negative influence on economic policy uncertainty during the pandemic period. Finally, the implications of the findings for policymakers in the selected countries and similar countries in nature were presented in the study.**

***Keywords*— Economic Policy Uncertainty; COVID 19 pandemic; Policy measures; OECD countries; Generalized Method of Moment (GMM)**

I. Introduction

The implication of COVID-19 is not only a concern for public health, but its devastating effect on the socio-economic situation around the world is apparent (Chakraborty & Maity, 2020; Habib et al. 2020; Raza et al. 2020). For instance, Sharma et al. (2020) observed that the emerging countries that are already bedeviled with slow growth rate, poor health infrastructure, and huge population where majority of them lives in extreme poverty are greatly dealt with by the pandemic. COVID-19 and other similar pandemic are known to severely impact the human capital of the nation invaded (Odugbesan & Rjoub, 2020; Odugbesan et al. 2020; Shahzad et al. 2020). Hence, the total expenditure on healthcare becomes increasing (Odugbesan & Rjoub, 2019; 2020). Differently from the impact on human life, Nakada & Urban (2020) and Shehzad et al. (2020) opined that COVID-19 pandemic also impacted economic and social life, which gives room for the increase in the uncertainty in daily life (Caggiano, Castelnuovo, and Kima, 2020). Meanwhile, in reference to Caggiano, Castelnuovo, & Kima (2020), there is an unanswered issues surround the increase uncertainty, like the uncertainty of the pandemic duration and other factors that could affect the policies uncertainty during this pandemic period. Al-Thaqeb, Algharabali, & Alabdulghafour (2020) observed that in the previous decades, economic policies have been increasingly uncertain owing to several other factors like anti-globalization, populist movement before the global financial crises.

The present pandemic (COVID-19) is identified as one of means through which uncertain economic policies distorted the vision for the economy, has impact on the market participants, and illustrate the global economy's interconnections (Al-Thaqeb, Algharabali, & Alabdulghafour, 2020). In addition, some studies opined that the pandemic has a significant influence on the world's supply and demand at both macro and micro levels (Ma et al. 2020; Shi et al. 2020), which resulted to business closures, government-imposed quarantines, ban on travels, curfews, that have put the world in a "Great Lockdown" with attendant effect on every sector. In addition, Coibon, Gorodnichenko, and Weber (2020) observed that labor market has drastically reduced and the effect is evident on the outputs of goods and services. In view of these, having a useful investigation on the economy level of uncertainty is important to ascertain how the COVID -19 pandemic and other variables like stock market and inflation can influence the policies uncertainty and the consequence on the entire economy.

The impact of COVID-19 on the "Economic Policy Uncertainty" (EPU) was investigated in this study. Eighteen (18) countries that comprises of both developed and emerging economies were considered owing to the availability of data on EPU indexes and other variables considered in this study. The countries namely: Belgium, Brazil, Canada, China, France, Germany, Hong Kong, India, Italy, Japan, Netherlands, Pakistan, Singapore, South Korea, Spain, Sweden, UK, and USA are countries that recorded the highest number of COVID-19 cases and deaths (WHO, 2021). Aside the prevalence of COVID-19 in these countries, some of the

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countries like China, South Korea and Singapore according to Iyke (2020a) and Iyke & Ho (2020) are becoming the global economic powerhouse, while country like India is expected to experience the next wave of industrialization coming after China (Iyke, 2020a). In addition, majority of manufacturing activities are domiciled in these countries, hence the possibility of increasing uncertainties in these countries would not only affect the economic activities in these countries, but the spill-over effect will be felt in the rest part of the world through the ever-interconnected global supply chains. For instance, Shih (2020) observed that the supply shock experienced in China in 2020 second month triggered a worldwide demand shock owing to the "shutdown policies" in response to the pandemic outbreak which underscored the frailties of the world global production and supply chains. Moreover, substantial decrease in trade interconnectedness around the world was experienced as a result of COVID-19 outbreak, and this clearly indicates a negative shock to global trade.

In response to these challenges, several policies were put in place across the globe (Iyke, 2020b; Sharma et al. 2021). Meanwhile, there is huge uncertainty surrounding these policy responses because both the policymakers and economic agents are not sure of the temporal or permanent status of the policies responses, and to what level will the interventions influence investment and consumption activities, and how long it will take the economy to recover, among other issue (Altig et al. 2020). The observation of the economic policies uncertainty across the countries in our panel reveals the uneven pattern of the EPU. For instance, during the period under observation (2020M1 – 2021M1), while some of the countries in the panel maintains moderate level of EPU, others shows a significant upward and downward movement of their EPU.

The challenge of COVID-19 pandemic has given rise to the attention of scholars and policymakers to ascertain the devastating implications of the pandemic on several facets of economies. The review of extant literature shows that several studies have been conducted in this regards to determine the impact of COVID-19 on several facet of economies like liquidity and cash holdings, stock markets, oil markets, foreign exchange markets, global political, global trade and insurance market, among others (Apergis and Apergis, 2020; Devpura and Narayan, 2020; Fu and Shen, 2020; Haroon and Rizvi, 2020; Iyke, 2020b; Narayan, 2020; Salisu and Sikiru, 2020; Vidya and Prabheesh, 2020; Wang et al. 2020). However, our study is distinct from these studies, because we investigate the effect of COVID-19 using the number of cases on EPU and other variables like stock price and inflation to show the influence of the variables also on EPU during the pandemic period. Though, the studies of Altig et al. (2020) and Iyke (2020) are similar, but while the study of Altig et al. (2020) concentrate on UK and US, the study of Iyke (2020) focus on the effect of COVID-19 on EPU in Asian economies using regression analysis. Thus, the novelty of our study lies in the investigation of the COVID-19 pandemic, stock market and inflation on the EPU using data that covers the period of the pandemic (2020M1 – 2021M1) and includes both emerging and developed economies countries in the panel with the application of Generalized Method of Moment (GMM) approach for the analysis.

II. Materials and Methods

This study aim is to investigate the impact of COVID 19 pandemic and other variables on the Economic Policy Uncertainty during pandemic period in some selected OECD countries covered the period from January 2020 to January 2021. This study utilized COVID 19 number of cases as a proxy for COVID 19 pandemic which is in congruent with some studies (Albulescu, 2020; Iyke, 2020; Ma et al. 2020; Nakada & Urban, 2020). The volatility inflation variable was proxy using consumer price index (CPI) as suggested in the literature (Bacon, 1991; Curry & Weiss, 2000; Warr, 2008). Other variables employed are Economic Policy Uncertainty and stock price. The COVID cases data was sourced from (Our World in Data, 2021), CPI and exchange rate data were sourced from International Financial Statistics. The overall EPU index used is in reference to Baker et al. (2016), while it was sourced from "Economic Policy Uncertainty" database. All the variables used in the model are in logarithm. This study used the monthly data of 18 selected OECD countries from January 2020 to January 2021.

In respect to the method of estimation, first, the tests that are necessary before estimating the model are explained, then the model and the estimation techniques were described. The first step in the empirical analysis is performing unit root tests. For this reason, we used test such as Maddala and Wu (1999) and Pesaran (2007) panel unit root tests (CIPS) for panel unit root test. The choice of these tests is based on the assumption of MW test that is based on a simple average of the individual "Augmented Dickey-Fuller (ADF) t-statistics" of individual cross-section, while CIPS test assumes cross-section dependence which is in form of a single unobserved common factor. For the data analysis, the generalized method of moment estimator (GMM) was employed for investigating the COVID-19 impact on Economic Policy Uncertainty. The GMM is used where the specific unobservable effects of every section and lags of the dependent variables as explanatory variables are the fundamental problems in estimating the models.

According to theoretical and experimental studies such as Assenmacher and Gerlach (2008), Edwards (1989), and Jalili (2014), the empirical model is as follows:

$$EPU_{it} = \alpha + \beta EPU_{it-1} + \theta coidcase_{it} + \lambda X_{it} + \varepsilon_t + \delta_i \quad (1)$$

where :

$covase_{it}$: total covid cases for country i in period t

epu_{it}: Economic Policy Uncertainty for country i in period t

X_{it}:Vector of regressors and control variables, such stock price and volatility inflation.

ε_t: Errors terms Special effects for sections (random or fixed)

δ_i: Special effects for sections (random or fixed)

Dynamics in the model has been shown as the lag of dependent variable with EPU_{it-1}

III. Results

Before estimating the model, it is necessary to conduct stationary tests for the variables. If the variables are non-stationary, spurious regression might occur. For this reason, we used tests such as Fisher-ADF tests of Maddala and Wu (1999) and IPS test of Pesaran (2007). These unit root analyses indicate the null hypothesis to be the presence of a unit root against the alternative of mean reversion. Two modes are employed for the unit root tests in levels and first differences by specification with trend and without trend. The results as presented in Table 1 indicate that under the Maddala and Wu test with trend, all the variables except volatility consumer price index which becomes stationary after first difference are stationary at level, while the result under CIPS with trend and without trend shows that all the variables are stationary at level except stock price which is found not to be stationary at both level and first difference. In summary, all the variables in this study were integrated on I(0) and I(1), and none of them is I(2), which implies that they are good for further analysis.

Table I. The Results of Stationary Tests for Variables in Levels and First Difference

	Specification without trend				Specification with trend			
Test variables	Maddala & Wu Level	Maddala & Wu D(1)	Pesaran Level	Pesaran D(1)	Maddala & Wu Level	Maddala & Wu D(1)	Pesaran Level	Pesaran D(1)
lepu	107.061*	172.854*	-3.336*	1.321	59.038*	240.905*	-2.098**	0.630
lcovidcases	395.968*	547.846*	-6.675*	-0.721	175.342*	129.081*	-1.679**	4.417
lstockprice	34.204	35.543	-1.234	3.951	49.595**	35.318	-0.668	3.714
lscpi	73.517*	136.524*	-1.311***	1.247	43.534	203.038*	-2.317**	-1.564***

* significant at 1%, ** significant at 5%, *** significant at 10%

In reference to Equation (1), this study examines the effects of COVID cases on the Economic Policy Uncertainty for some selected OECD countries . In this model, inflation and stock price are used as control variables for the analysis. The lag of Economic Policy Uncertainty that reflects the dynamics of the model and is used in GMM method is inserted as an explanatory variable in the model. The results of the model's estimation using the generalized method of moments are presented in Table 4.

Table IV. The Results of GMM Estimation

EPU : Dependent variable				
Variable	**coefficients**	**Std. Error**	**t-Statistic**	**Probability**
Lepu(-1)	0.39535	0.11336	3.49	0.000
lcovidcases	0.03783	0.01505	2.51	0.012
lscpi	-0.32096	0.19328	-1.66	0.097
Lscpi(-1)	0.75691	0.27176	2.79	0.005
lstockprice	0.00812	0.20782	0.39	0.696
cons	2.57695	0.53663	4.80	0.000
Number of instruments		**11**		
Test		**Value**		**Probability**
Arellano- Band test for	AR(1)	-3.00		0.003
autocorrelation	AR(2)	-0.86		0.388
Saragan test		2.41		0.879
Hansen test		3.48		0.747

From the results presented in Table 4, we found lcov to have a positive and significant impact on the volatility of EPU. This is an indication that a percentage change in number of COVID-19 cases holding all other variables constant will significantly increase the volatility of EPU by 0.038% at less than 1% confidence level. This implies that COVID-19

changed Economic Policy Uncertainty patterns during the pandemic. Meanwhile, our analysis shows lscpi and first lag of lcpi have a consequently negative but less significant and positive and high significant impact on EPU. The result as presented in Table 4 indicate that a percentage increase in first lag of CPI increase EPU in the selected OECD countries holding all other variables constant by 0.76% at 1% confidence level. Moreover, lstockprice has positive effect but insignificant effect on EPU. Subsequent to the analysis, some tests were observed to ensure that estimates from the analysis are devoid of bias. As presented in Table 4, Sargan test shows that the assumption of the presence of any correlation between the instrumental variables and residuals is rejected. Based on this test, instrumental variables used in the model are valid. To ensure the absence of serial autocorrelation of first-order difference in residuals, the first and second order serial autocorrelation test proposed by Arellano and Bond (1991, 1995) is used. The null hypothesis of this test is the absence of serial autocorrelation which should be greater than 5% in the second order and less than 5% in the first order. Based on the AR tests results presented in Table 4, the null hypothesis, no second-order serial autocorrelation in residuals of first order difference, is not rejected. Therefore, the method of estimation is suitable for this model. Additionally, the first order autocorrelation probability is less than 5% and the null hypothesis of the test is rejected. The results of the observations are compatible with the research of Arellano and Bond (1991). According to the results in Table 4, as we expected, the lag of Economic Policy Uncertainty to have a positive and significant effect on the lag of Economic Policy Uncertainty; this result implies the dynamics of the EPU over time, so volatility of Economic Policy Uncertainty in the current period will be extended to the next period. This means that increase of the Economic Policy Uncertainty in the previous period increases the Economic Policy Uncertainty in the current period.

To check the robustness of our results we used fixed OLS and random OLS estimation. The coefficient estimates in GMM seem to be fairly robust across different estimation techniques of fixed and random effect in terms of signs and statistical significance. This findings indicate the robustness of our estimates from GMM estimation technique.

TABLE VA, RANDOM EFFECT REGRESSION RESULT

lcovidcases	lstockprice	lstockprice(-1)	lscpi	CONS
0.06470*	-0.37563**	0.80345**	-0.12491***	1.06921*
Table 5b, fixed effect regression result				
lcovidcases	lstockprice	lstockprice(-1)	lscpi	CONS
0.06187*	-0.54227**	0.61083*	-0.10935***	4.54178*
Hausman test Efficient estimator		FE-RE		
χ^2 (Prob > χ^2)		1.82(0.0032)		

However, in order to obtain a single voice in terms of price elasticity, the Hausman test is employed to ascertain the preferred estimator. Under the null hypothesis (H0) of the Hausman test, there is no systematic difference between the designated efficient estimator and the designated consistent estimator. Non rejection of H0 implies that the designated consistent estimator is consistent but the designated efficient estimator is both efficient and consistent and thus is the preferred estimator. Rejection of H0 however implies that the designated efficient estimator is inconsistent which makes the consistent estimator the preferred estimator. From Table 5 it can be inferred that the RE-OLS estimator is preferred to the FE-OLS estimator.

IV. DISCUSSIONS AND POLICY RECOMMENDATIONS

The issue of COVID-19 pandemic remains an endemic global issue that attracts greater attention from every stakeholder owing to its impact on every sector of the economy. Given the challenges posed by the COVID-19 pandemic, various scholars have attempted to investigate both the antecedents and outcomes of the pandemic. Meanwhile, in the period of pandemic, there is possibility that the pandemic trigger the economic uncertainty owing to the various pandemic containment meausres that are being put in place to reduce the impact of the pandemic on both the people, environment and economy. However, the implication of the pandemic on economic policy uncertainty has not been exaustively investigated, expecially in the context of OECD countries. Thus, the aim of this present study to fill the gap. This present study aimed at addressing the gaps in the literature by using the monthly data) January 2020 – January 2021) of 18 selected OECD countries based on the data availability. In order to ensure the robustness of our estimates,

GMM technique was employed for the data analysis and complement it with fixed and random effect techniques for robustness check.

The results from the estimations revealed the significant influence of COVID-19 pandemic on the economic policy uncertainty. The result shows that a percentage in the COVID-19 number of cases, it will trigger a 0.04% increase in the EPU of the selected countries. This finding is consistent with the position of some previous studies who opined that some uncertainty events like COVID-19 pandemic has potential of trigger an economic policy uncertainty (Altig et al. 2020a; Bloom, 2014; Chu & Fang, 2020; Gabor-Toth & Georgarakos, 2019; Iyke, 2020; Jurado et al. 2015; Ludvigson et al. 2015). This result indicates that COVID-19 pandemic significantly increase the economic policy policy uncertainty in the selected countries during this period with the antendant effects on either organization’s incentives which result to delaying their investment and hiring (Bloom, 2014), or according to Fernadez-Villaverde et al. (2011) triggers a cautious response from the public who are cautious of their savings and thus dampens their consumption. In order words, the COVID-19 pandemic would cause econimic fluctuations in these countries owing to several measures like fiscal, political, regulatory and monetary policies that being put in place to address the pandemic.

Moreover, the estimate from the analysis on the impact of inflation on economic policy uncertainty shows a negative and significant coefficient at 10% significance level. The result indicate that a percentage change in inflation will reduce the economic policy uncertainty by 0.32% during the pandemic period. Meanwhile, this study could not establih a significant relationship between stock price and EPU during the pandemic period. This finding is in contrast to some studies who conducted study before the pandemic and founc a negative relationship between the two variables (Pastor & Veronesi, 2012, 2013; Bijsterbosch & Gueri, 2013; Ko & Lee, 2015).

Based on the findings from this present study, it becomes imperative to point out that investigating economic uncertainty which is useful in explaining economic development is essential to guide the policy makers in addressing likely firm-level and household level risks that would accompany any economic fluctuations (Christiano et al. 2014), which could be liken to the present pandemic period. Hence, the level of uncertainty as a result of the pandemic is not bode well for the selected countries, especially in relation to the full and rapid economic recovery. This high economic uncertainty will makes some organizations and consumers cautious, retarding investment, hiring and expenditure on consumer durables.

Though, this present study address a significant gap in the literature and contributes significantly to the literature on COVID-19 pandemic, especially as demonstrated as one of the significant determinants of economic policy uncertainty, this study is not devoid of limitation. Specifically, the limitation lies in the non-availability of data on the variables employed for some OECD countries. In addition, it will be interesting to employ other proxies like COVID-19 number of cases, COVID-19 containment and health index, and so on for COVID-19 pandemic, and other determinants of economic policy uncertainty which this present study authors believes would address possible variable omitting error that could arise from this study.

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