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RESEARCH PAPER

The Double Blow of the COVID-19 Pandemic and the Oil Price Shock on Economic Policy Uncertainty in the US, UK, and Brazil

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Abstract

The study aimed to examine the impact of COVID-19 and oil prices on economic policy uncertainty in the US, UK, and Brazil for the period March 16, 2020, to April 16, 2020, by using the panel-ARDL approach. The results show that Economic policy uncertainty is positively correlated with COVID-19, this indicates that an increase in COVID-19 can enhance economic policy uncertainty, Meaning that an increase in the new cases raises the uncertainty of economic policy in the US and UK in the short-run and long-run. The results also show that the Economic policy uncertainty is negatively correlated with the oil prices.
Keywords: Brazil, COVID-19, Economic Policy Uncertainty, Oil Prices, Panel-ARDL, US, UK.
JEL Classification: E52, F62, G01.

1. Introduction

On March 11, 2020, the World Health Organization (WHO) officially declared the novel coronavirus (COVID-19) outbreak a global pandemic. This spread pandemic has significantly dampened global economic activity and has also wreaked havoc on the financial markets' volatility, and impact on the world's supply and demand on both macro and micro levels. Also forced closures of business and government-imposed quarantines, curfews, and travel bans have placed the world in a “Great Lockdown” that has impacted every sector. The COVID-19 pandemic is one example of how uncertain economic policies distorted the vision of the economy, affected all market participants, and illustrated the global economy's interconnections. Baker and Terry (2020) provide evidence that current uncertainty levels are much higher than those during the 2008–2009 Great Recession, and are closer to the level of the Great Depression in the United States. They also claim that most of the current economic slowdown is a product of the extremely high uncertainty due to the COVID-19 outbreak (Albulescu, 2020); they also observe that daily announcements regarding the number of infected and deaths positively

affect the levels of Economic policy uncertainty. These findings strengthen the hypothesis that the Economic policy uncertainty caused by COVID-19 has caused lower economic growth, above-average bankruptcy rates, and high unemployment rates. The disease has not caused these effects, but rather, the Economic policy uncertainty, has significantly complicated the decision-making process for executives in all sectors, whether private, public, or non-profit.

In addition, a combination of a collapse in oil prices and the global pandemic has sent shockwaves through the oil markets, where the price volatility is continuously increasing. According to (IEA, 2020) projects that oil and gas revenues for several key producers will fall by between 50 to 85% in 2020, compared with 2019, Saudi Arabia started an oil price war on March 09, 2020, and flooded the market with oil. In one single day, the crude oil price plunged by more than 20%. Against this background, the purpose of this paper is to investigate the impact of COVID-19 and oil prices on economic policy uncertainty in the US, UK, and Brazil from March 16, 2020, to April 16, 2020, by using the panel-ARDL approach for cointegration to test the long-run relationship between the variables subject of study.

The rest of the paper is organized as follows. Section 2 provides a brief review of the literature. Section 3 explains the model specification, data, and methodology. Section 4 discusses the empirical results. Section 5 concludes the paper.

2. Literature Review

The empirical studies (Arshian et al., 2020; Saud et al., 2020; Altig et al., 2020) demonstrate that the significantly negative correlation between EPU and stock market crash risk, indicating the aggravation of EPU increases the crash risk. Moreover, the COVID-19 risk is perceived differently over the short and the long run and may firstly view as an economic crisis. Also, the negative correlation gets stronger after the global COVID-19 outbreak, which shows the crash risk of the stock market will be more affected by EPU during the epidemic.

According to (Bernard, 2020), the Regression Analysis to investigate the impact of COVID-19 numbers on economic policy uncertainty (EPU) in five leading Asian economies (China, India, Japan, Korea, and Singapore). Our Regression estimation shows that the COVID-19 outbreak has a positive and statistically significant impact on EPU in China and Korea and these high EPU levels have implications for the Asian economies in terms of their policy initiatives and implementations. Consumers and firms may be less optimistic, and this will show reductions in consumption, investment, employment, and production. A thorough investigation of the literature reveals that high EPU is associated with adverse effects on all components of the economic system. As such, the incredibly

high levels of uncertainty are a major impediment to a rapid recovery. Further this rise in uncertainty has been an increase in downside tail-risk reported by firms. This uncertainty has played three roles. First, amplifying the drop in economic activity early in the pandemic; second slowing the subsequent recovery; and finally reducing the impact of policy as uncertainty tends to make firms more cautious in responding to changes in business conditions (Barrak et al., 2020; Jose and Nick, 2020). Qian (2020) employed the dynamic conditional correlation model with mixed data sampling regressions to investigate the impact of economic policy uncertainty (EPU) and the COVID-19 pandemic on the correlation between the cryptocurrency index CRIX and the world stock market portfolio, as well as the hedging properties of CRIX. The study shows that the high (low) level of EPU has a significantly positive (negative) effect on the optimal hedge ratio of CRIX, which increases significantly during the COVID-19 period. Moreover, most of the abnormal market relations exist in high levels of EPU or during the COVID-19 period, and the impact of global EPU is greater than that of EPU originating in the United States, Europe, Russia, and China. David et al. (2020) consider the relationship between economic uncertainty indicators before and during the COVID-19 pandemic in the case of the US and the UK. The results have shown that all indicators show huge uncertainty jumps in reaction to the pandemic and its economic fallout. Indeed, most indicators reach their highest values on record. Another result peak amplitudes differ greatly – from a rise of around 100% (relative to January 2020) in two-year implied volatility on the S&P 500 and subjective uncertainty around year-ahead sales for UK firms to a 20-fold rise in forecaster disagreement about UK growth.

According to Dayong et al. (2020), using statistical analysis of the impact of the COVID-19 pandemic on stock market risk for Countries on the top 10 list of confirmed cases have been selected (according to the data on 27 March 2020) together with Japan, Korea, and Singapore during the period from dated 29 Feb 2020 to 27 March 2020. The results have shown that the individual stock market reactions are linked to the severity of the outbreak in each country. The great uncertainty of the pandemic and its associated economic losses has caused markets to become highly volatile and unpredictable. That means COVID-19 had a significant impact on the financial markets from 29 Feb 2020 to 27 March 2020. Other results show that global financial market risks have increased substantially in response to the pandemic.

According to Alaoui Mdaghri et al. (2020), employed the panel data regression to investigate the impact of the global coronavirus (COVID-19) pandemic on stock market liquidity in six Middle East and North African (MENA) countries from February to May 2020. The regression estimation shows that the liquidity related to the depth measure was positively correlated with the growth in

the confirmed number of cases and deaths and stringency index. Moreover, the market depth was positively related to the confirmed cases of COVID-19. Other results show that the liquidity of small-cap and big-cap firms was significantly impacted by the confirmed number of cases, while the stringency index is only significant for the liquidity depth measure. Moreover, the results regarding sectors and country-level analysis confirmed that COVID-19 had a significant and negative impact on stock market liquidity. Rabhi (2020) used panel data from January 2, 2020 – March 1, 2020, for 6 emerging Asian countries (China, India, Indonesia, Malaysia, Philippines, and Thailand) and examined the relationship between the Stock market and the COVID-19 pandemic. They found that the reported daily growth of Covid-19 confirmed cases along with the triggering fear event related to news about death, affected the Asian stock market performance negatively.

3. Methods and Materials

3.1 Data

This study attempts to measure the effect of COVID-19 on economic policy uncertainty in the US, UK, and Brazil for the period March 16, 2020, to April 16, 2020 (64 observations). Therefore, we use the EPU index as the dependent variable in our study. We use COVID-19 daily new cases of oil prices as independent variables. Definitions and sources for all variables can be found in Table 1.

Table 1. A Schematic Overview of the Variables

Variable	Description	Source
EPU economic policy uncertainty	(news-based index)	Website of Economic Policy Uncertainty
COVID-19	observations of COVID-19 (measured as the number of infected cases of a novel COVID-19 in the US and UK)	Centers for Disease Control and Prevention (CDC)
Oil price	oil prices (measured as WTI benchmark crude oil prices)	Data Stream

Source: The World Bank Database (2020); Global Entrepreneurship Monitor (2020).

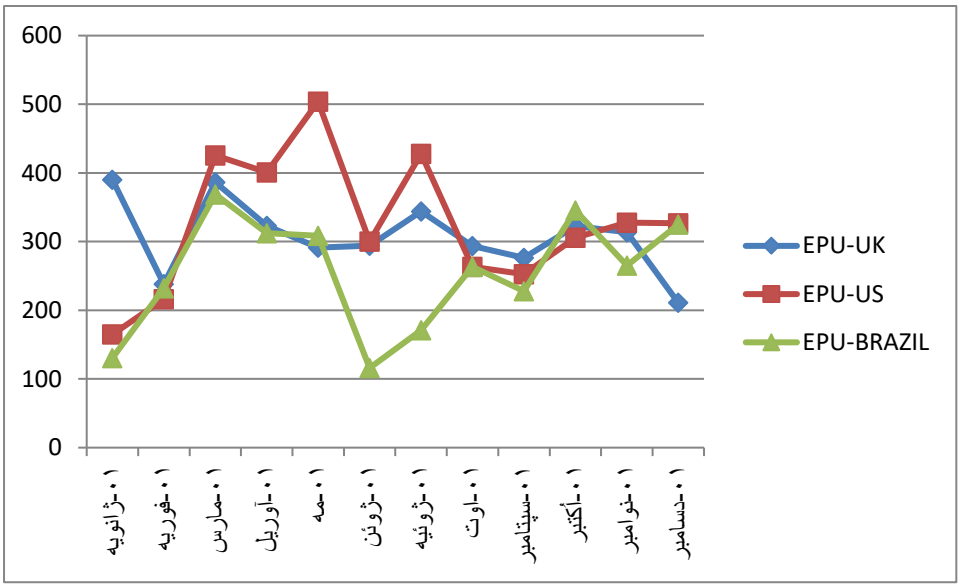

Figure 1. Economic Policy Uncertainty (EPU) in Three Countries (US, UK, Brazil)
Source: Website of Economic Policy Uncertainty.

3.2 Methodology

The Literature Review employed to explore the connection that exists between variables and the COVID-19 pandemic is a combination of theoretical and empirical. Accordingly, the model specification will be as follows:

$$EPU = f(Covid19, Oil\ Price) \quad (1)$$

To reduce the variation and induce stationary in the variance-covariance matrix, the natural logarithmic form (Ln) is applied to all the variables. The log-linear Equation 1 to examine the long-run relationship between variables is given as follows:

$$LnEPU = \alpha_0 + \alpha_1 LnCovid19 + \alpha_2 LnOil\ Price + \varepsilon_t \quad (2)$$

To estimate Equation 2 in the long run impacts of COVID-19 on economic policy uncertainty are examined by applying the panel autoregressive distributed lag (ARDL) approach to cointegration. There are various reasons that make the panel-ARDL model more useful than other techniques. Firstly, it can be applied irrespective of whether the series is I(0) or I(1). Also, the panel-ARDL approach is more suitable and produces more valid results for a small sample size. Also, the panel ARDL technique was selected to investigate the long-term and short-term cointegration correlations between the determinants and extract the ECM (error correction version) of the panel characteristics to identify the short-term dynamic. Based on the study variables, the following model can be suggested:

$$\Delta LnEPU_{it} = \emptyset_i(LnEPU_{i,i-1} - \theta' X_{-t}) + \sum_{j=1}^{p-1} \lambda_{ij}^{*} \Delta LnEPU_{i-J} + \sum_{j=0}^{q-1} \delta_{ij}^{*} \Delta LnCovid19_{\,i,-j} + \sum_{j=0}^{k-1} \psi_{ij}^{*} \Delta LnOilPrice_{i,-j} + \mu_i + \varepsilon_{it}$$

The parameter $\emptyset_i$ is the error-correcting speed of the adjustment term. If $\emptyset_i = 0$, then there would be no evidence for a long-run relationship. This parameter is expected to be significantly negative under the prior assumption that the variables show a return to the long-run equilibrium. Of particular importance is the vector θ' which contains the long-run relationships between the variables (Mezouri, 2019).

4. Results and Discussion

4.1 Result of Descriptive Statistics

Table 1 shows the descriptive statistics of the variables used in our study, the mean of economic policy uncertainty (EPU) amounted to 1.203574 with a standard deviation of 1.658412 from March 16, 2020, to April 16, 2020, the Economic policy uncertainty (EPU) can achieve as high as 2.208745 or as low as 0.235741 throughout these 64 days. The statistic of Skewness reveals that Economic policy uncertainty (EPU) COVID-19, and oil prices are the left-side skewness. Furthermore, the natural logarithmic form (Ln) is applied to all the variables to reduce the variation and induce stationarity in the variance-covariance matrix.

Table 2. Descriptive Statistics

	EPU	Covid19	Oil Price
Mean	1.215632	2.125354	0.256341
Median	1.203574	1.417213	0.258743
Maximum	2.208745	2.642567	1.214632
Minimum	0.235741	1.147265	0.184526
Std. Dev.	1.658412	1.213625	1.210365
Skewness	-1.308421	-0.201450	-0.258741
Kurtosis	2.185201	1.210654	0.102584
Jarque-Bera	1.3201	23.3652	4.6587
Sum	60.0210	45.2564	23.82145
Sum Sq. Dev.	0.687541	1.365241	0.63001
Observations	64	64	64

Source: Research finding, using Eviews 09.

4.2 Result of Unit Root Test

We start by applying the IPS panel unit root tests to each series, to conclude whether the series are stationarity or not. Table 2 shows the test of stationary result, from the table we see that Economic policy uncertainty (EPU) is stationary at level and variable oil prices (WTI), Covid-19 are non-stationary at level but stationary at 1erdifference with 5% significance level. As all the variables are found to have the order of I(0) and I(1), we choose to employ the Panel-ARDL test to determine the long-run cointegration between (Covid-19), (Oil Price) with (EPU) in US and UK. In these cases, the long-term relationship between the research variables is examined by the Kao Residual Cointegration Test (1999).

Table 2. Panel Unit Root Tests (est IPS)

Variables	First Difference		Level	
	P-Values	Statistic	P-Values	Statistic
EPU	-	-	0,000	-6,65
Covid19	0,000	-5,27	0,3654	-0,24
Oil Price	0,000	-6,56	0,6748	-1,32

Source: Research finding, using Eviews 09.

According to the Kao Residual co-integration Test (Kao, 1999), the hypothesis of zero non-cointegration is rejected and the existence of a long-term relationship between research variables is confirmed (Table 2 and Figure 2). In these cases, we reject the null hypothesis and accept the alternative hypothesis that there is a common integration between the variables of the study. These results allow us to estimate the error model of the Panel ARDL (long-term equilibrium speed).

4.3 Results of the KAO Cointegration Test

The second step was the estimation of a basic panel-ARDL model that explains Economic policy uncertainty (EPU) and its determinants are achievable. The first step is to determine the optimal delay and ARDL pattern form.

As seen in Figure 2, Schwartz's lowest criterion is related to ARDL (1,1,1); therefore, the optimal pattern is ARDL (1,1,1).

Table 3. Results of KAO Cointegration Test

Kao Residual Cointegration Test Series: EPU COV MARK		
ADF	t-Statistic	Prob.
	-3.325410	0.0000
Residual variance	0.025413	
HAC variance	0.001452	

Source: Research finding, using Eviews 09.

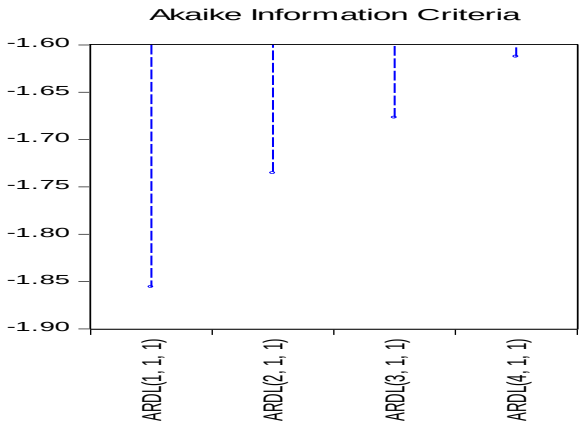

Figure 2. Selection Optimal Model ARDL According to Schwarz Criterion

Source: Research finding, using Eviews 09.

4.4 Long and Short-Run Estimates of Panel-ARDL Approach

Table 4 shows the long-run coefficient of the ARDL model, concerning we can see that according to long-run coefficients of Economic policy uncertainty (EPU) COVID-19 (COV) oil prices are statically significant in levels at 1%, 5%, and 10%. On the other hand, the results show that Economic policy uncertainty (EPU) is positively correlated with COVID-19, this indicates that an increase in COVID-19 can enhance Economic policy uncertainty (EPU), which is an increase by 1% of COVID-19, leads to 0.325640% increase in Economic policy uncertainty (EPU). This means that an increase in new cases raises the uncertainty of economic policy in the US, UK, and Brazil. The results also show that the Economic policy uncertainty (EPU) is negatively correlated with the oil prices. This result is consistent with the finding theoretical and empirical.

The short-run results of the Panel-ARDL method of estimation are displayed in Table 4. The findings displayed a valid short-run relationship between Economic policy uncertainty (EPU) and its determinants in the US, UK, and Brazil. The coefficient of the error term displays the value of around -0.60 proposing that around 60% of instability is adjusted in the present year. Results also error correction coefficient (ECTt-1), which is negative and significant at 5%, the coefficient indicates the adjustment speed to restore equilibrium in the dynamic model that is the effect of a shock will be corrected by 60% within a day. This result is consistent with the findings of empirical studies.

Table 4. ARDL Model Estimation Results 1,1,1

Dependent Variable: D(EPU)
Method: ARDL
Selected Model: ARDL(1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*

Long Run Equation				
Covid-19	0.325640	0.156024	0.236874	0.0000
Oil Price	-0.202541	0.658974	-0.210364	0.0000
Short Run Equation				
COINTEQ01	-0.602541	0.325641	-2.258974	0.0000
D(Covid-19)	0.125034	0.147856	0.325415	0.0000
D(Oil Price)	-0.102547	0.258749	-0.105874	0.0000
C	8.201351	0.541874	3.210874	0.0000
Meandependent var	0.147854	S.D. dependent var		0.241051
S.E. of regression	0.210654	Akaike info criterion		-0.210587
Sumsquaredresid	0.478147	Schwarz criterion		-0.357951
Log likelihood	23.10325	Hannan-Quinn criter.		-0.541287

Source: Research finding, using Eviews 09.

Note: p-values and any subsequent tests do not account for the model.

4.5 Long-Run Coefficients by Country

According to the long-run coefficients of the COVID-19 Pandemic, oil prices in the three countries (US, UK, Brazil) are statically significant in levels at 1%, 5%, and 10%. These results indicated in Table 5; the results show that Economic policy uncertainty is positively correlated with the COVID-19 Pandemic, this indicates that an increase of 1 point COVID-19 score in the US, UK, and Brazil will increase economic policy uncertainty (0.141, 0.254, 0.102); respectively, within a day Meaning that an increase in the new cases raises the uncertainty of economic policy.

Also, the results show that economic policy uncertainty is negatively correlated with the oil price. It indicates an increase of 1 point in oil price score in the US, UK, and Brazil will decrease the economic policy uncertainty (-0.124, -0.321, -0.158), respectively, within a day, which means that an increase in new cases raises the uncertainty of economic policy.

Table 5. Long-run Coefficients by Country

Variables	Constant	COVID-19	Oil Price
US	43.261	0.141	-0.124
	(0.0000)	(0.0000)	(0.0000)
UK	25.210	0.254	-0. 321
	(0.0000)	(0.0000)	(0.0000)
BRAZIL	51.201	0.102	-0.158
	(0.0000)	(0.0000)	(0.0000)

Source: Research finding, using Eviews 09.

Note: Prob are in the parentheses.

5. Conclusion

We attempt to measure the effect of COVID-19 and oil prices on economic policy uncertainty in the US, UK, and Brazil from March 16, 2020, to April 16, 2020, by employing the Panel-ARDL and bounds test approach. The results show that:

- ✓ the literature indicates that the explained pandemic (COVID-19) outbreak will cause a dual demand and supply shock simultaneously which can slow down the trade flows and cause international supply chain distortions and the oil market is witnessing exceptional negative demand and positive supply shocks;
- ✓ The variables are found to have the order of I(0) and I(1), we choose to employ the Panel-ARDL bound test to determine the long-run cointegration;
- ✓ There is a long-run equilibrium relationship between the Economic policy uncertainty (EPU) and these determinants according to the Kao Residual Cointegration Test (1999);
- ✓ From the outcome of the study based on ARDL, COVID-19 (new cases) has a long-run influence on economic policy uncertainty in the US, UK, and Brazil Furthermore, Brent oil prices (WTI) have a negative and strong impact on the US and UK economic policy uncertainty in the equilibrium;
- ✓ Policy reactions to contain the virus and level the stock markets are needed; however, non-conventional policy interventions, such as the US, UK, and Brazil's unlimited QE, create further uncertainty and may cause long-term problems. As the result also indicates a strong relationship between oil prices (WTI) and economic policy uncertainty, policymakers should be more cautious when conducting macroeconomic policies in this pandemic time because the oil price shocks could destroy the effective outcomes of these policies.

6. General Proposals and Recommendations

- ✓ The policymakers should be more cautious when conducting economic policy uncertainty in this pandemic time because the COVID-19 Pandemic and the oil price shock could destroy the effective outcomes of these policies.
- ✓ This study will provide new insights for other scholars who will show their interest in this economic policy uncertainty in the future.

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