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Nexus of Government Responses towards COVID-19 Pandemic and Performance of Economic Activities

Hammed Adetola Adefeso[1] and Mujeeb Opeyemi Muraina[2]

ABSTRACT

This paper examines the nexus between responses of government towards the COVID-19 pandemic and the performance of economic activities. The study pooled daily data from 69 purposively selected countries from January 22, 2020, to December 31, 2020. The study employs Autoregressive Distributed Lagged (ARDL) model. This study specifically estimates Dynamic Fixed Effect (DFE), Mean Group (MG) and Pooled Mean Group (PMG) models based on error correction using STATA 15.0 to analyse the panel data. In this paper, we find PMG appropriate for the study. The study finds that, government response measures have no significant impact on unemployment rate in the short run at all conventional levels of significance. In the long run however, social distance/lockdown measures and economic support packages largely have significant and increasing impact on unemployment rate at 1 percent level, while government containment measures such as testing policy, contact tracing and government awareness program on COVID-19 have decreasing impact on unemployment at 1 percent level of significance during the period of study. Our findings have crucial policy implications for the management of policy conflicts as the results reveals that an enforcement of social distance/lockdown measures have a deteriorating impact on economic activities while containment measures have favorable impact on economic activities in the long run.

[1] Department of Local Government and Development Studies, Faculty of Administration, Obafemi Awolowo University, Ile-Ife, Nigeria.
Email: haadefeso@oauife.edu.ng

[2] Department of Public Administration, Faculty of Administration, Obafemi Awolowo University, Ile-Ife, Nigeria.
Email: murainamujeeb@gmail.com

ملخص

يتناول هذا البحث العلاقة بين استجابة الحكومة لجائحة كوفيد-19 وأداء الأنشطة الاقتصادية. جمعت الدراسة بيانات يومية من 69 دولة مختارة من 22 يناير 2020 إلى 31 ديسمبر 2020. تستخدم الدراسة نموذج الانحدار الذاتي للإبطاء الموزع .(ARDL) تُقدر هذه الدراسة نموذج التأثيرات الثابتة الديناميكية (DFE) والمجموعة المتوسطة(MG) ، والمجموعة المتوسطة المجمعة (PMG) بناءً على منهجية تصحيح الخطأ باستخدام برنامج ستاتا 15 لتحليل بيانات اللوحة. ويتبين أن المجموعة المتوسطة المجمعة هو النموذج الأنسب لهذه الدراسة. وخلصت الدراسة إلى أن تدابير الاستجابة الحكومية ليس لها تأثير كبير على معدل البطالة على المدى القصير على جميع المستويات التقليدية المختلفة من الأهمية. ومع ذلك، على المدى الطويل، فإن إجراءات التباعد الاجتماعي/الإغلاق وحزم الدعم الاقتصادي لها تأثير كبير ومتزايد على معدل البطالة عند مستوى 1%، في حين أن تدابير الاحتواء الحكومية مثل سياسة فحص الإصابة وتتبع حالات المخالطين للمصابين بالمرض وبرنامج التوعية الحكومية بشأن جائحة كوفيد-19 لها تأثير متناقص على البطالة عند مستوى 1 % من الأهمية خلال فترة الدراسة. وتترتب على النتائج التي توصلنا إليها آثار حاسمة في مجال السياسة العامة بالنسبة لإدارة تضارب السياسات، حيث تكشف النتائج أن تنفيذ إجراءات التباعد الاجتماعي/الإغلاق لها أثر سلبي على الأنشطة الاقتصادية، في حين أن تدابير الاحتواء لها تأثير إيجابي على الأنشطة الاقتصادية على المدى الطويل.

ABSTRAITE

Cet article examine le lien entre les réponses des gouvernements à la pandémie de COVID-19 et la performance des activités économiques. L'étude a mis en commun les données quotidiennes de 69 pays sélectionnés à dessein entre le 22 janvier 2020 et le 31 décembre 2020. L'étude utilise le modèle ARDL (Autoregressive Distributed Lagged). Cette étude estime spécifiquement les modèles Dynamic Fixed Effect (DFE), Mean Group (MG) et Pooled Mean Group (PMG) basés sur la correction d'erreur en utilisant STATA 15.0 pour analyser les données de panel. Dans ce document, nous estimons que le modèle PMG est approprié pour l'étude. L'étude montre que les mesures prises par le gouvernement n'ont pas d'impact significatif sur le taux de chômage à court terme à tous les niveaux de signification conventionnels. À long terme, cependant, les mesures de distance sociale et d'enfermement ainsi que les mesures de soutien économique ont un impact significatif et croissant sur le taux de chômage au niveau de 1 %, tandis que les mesures d'endiguement du gouvernement, telles que la politique de dépistage, la recherche des contacts et le programme de sensibilisation du gouvernement au COVID-19, ont un impact décroissant sur le chômage au niveau de 1 % de signification pendant la période étudiée. Nos résultats ont des implications politiques cruciales pour la gestion des conflits politiques, car ils révèlent que l'application de mesures d'éloignement social/de confinement a un impact négatif sur les activités économiques, tandis que les mesures de confinement ont un impact favorable sur les activités économiques à long terme.

Keywords: COVID-19, government, daily data, performance, economic activities, ARDL.

JEL Classification: C33, E61, G51, I38, H51

1. Introduction

The world is recently ravaged by the novel coronavirus disease (COVID-19). The World Health Organisation (WHO), on March 11, 2020, declared the novel coronavirus a global pandemic. Its impacts have affected humanity socially, economically, and politically. As at May 20, 2020, the world has recorded 5,297,518 cases with 339,389 deaths, while as at, November 12, 2020, the data revealed that the coronavirus cases have tremendously increased to 52,597,396 with 1,291,962 and 36,770,832 deaths and recovery, respectively. Globally, as of today, March 11, 2022, 21:15 GMT, we now have 454,646,423 confirmed cases of COVID-19 with 6,055,292 deaths. The percent increase in the coronavirus cases and death caused by the virus are unprecedented despite the administration of 6,545,309,084 doses of vaccine as of October 19, 2021 (WHO, 2021). Figure 1 and figure 2 show the trend and pattern of waves of movement of daily confirmed cases of COVID-19 and corresponding cases of death in the world. Although early data and statistical reports show that a great deal of the cases stemmed from Europe (Zebin et al., 2020), community transmission has further worsened the situations in various countries across the globe. With the discovery and administration of preventive COVID-19 vaccine, there are still substantial active cases of COVID-19 and associated deaths.

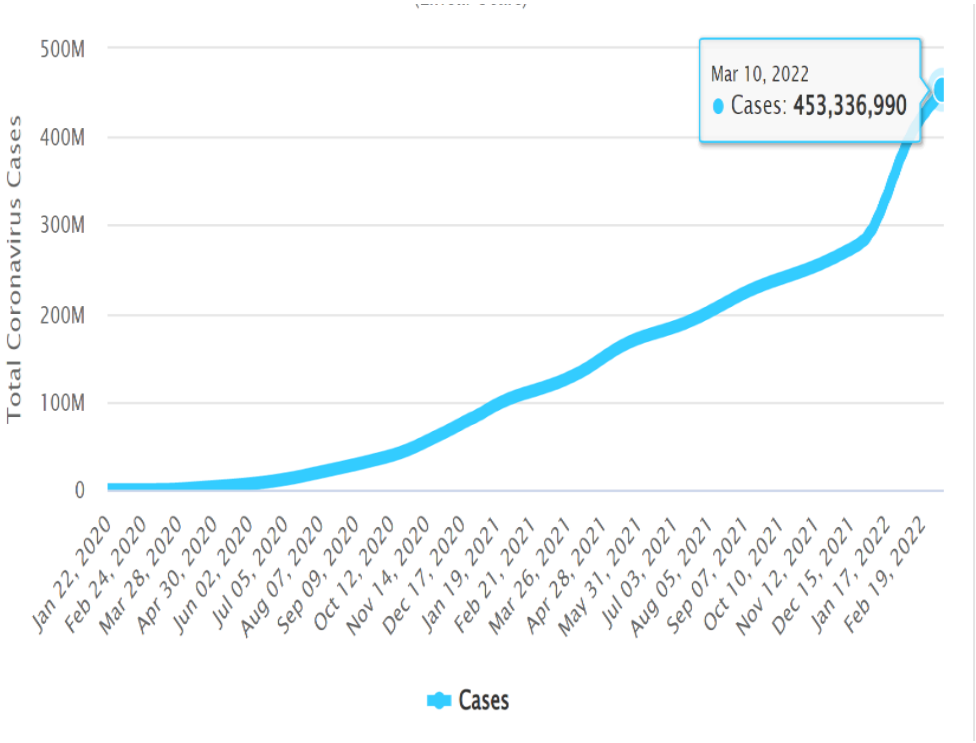
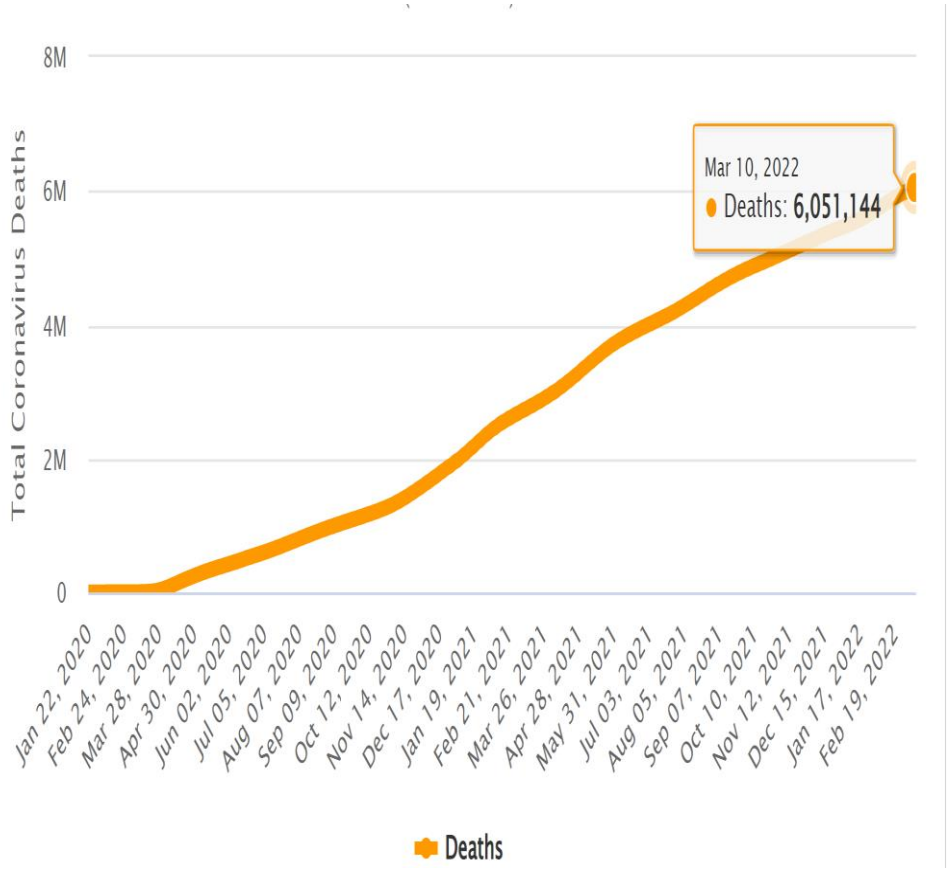


Figure 1: Trend of daily new cases of COVID-19 Pandemic

Figure 2: Trend of daily deaths from COVID-19 Pandemic



This disturbing trend across the world has been attributed to lack of prompt information on the novel virus, inefficient detection rate, limited investigative and detective apparatuses, protracted policymaking, and implementation of appropriate containment measures in the initial phases of the outbreak (Marzia et al., 2020), nonchalant attitude towards the vaccine and conspiracy theory. As usual, there is always a prolonged vaccine development cycle to combat any epidemic disease, there are preventive vaccines to combat the

pandemic in the recent time. The governments across the globe initially responded by replicating the preventive measures adopted elsewhere such as contact tracing of the affected person, social distancing, use of nose masks and hand sanitizer, keeping of personal hygiene, quarantine of visitors and isolation of COVID-19 patients, school closure policy, international travel control, income support, and declaration of curfew and total lockdown of the economic activities. All these measures have been relaxed across countries of the world with the discovery of preventive vaccines.

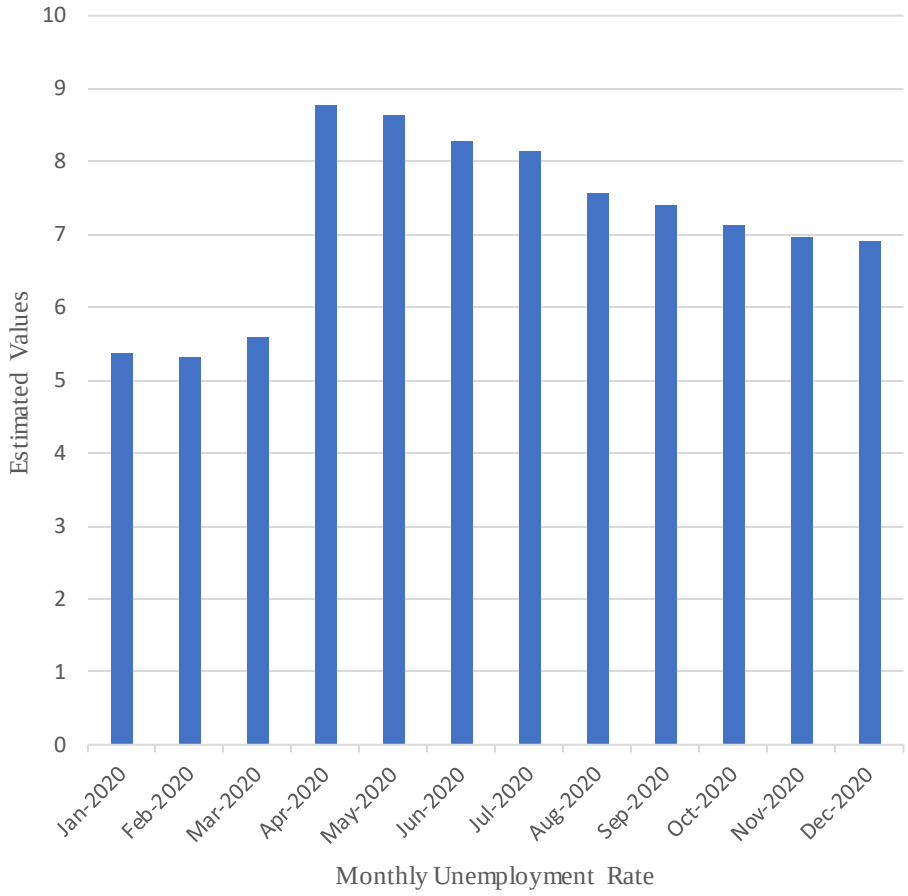
However, the deplorable social-economic situation across countries has made combatting the pandemic challenging. These challenges have manifested in the shortage supply of required health facilities, lower testing capacities, and dilapidating healthcare system because of unpreparedness for the pandemic, which easily facilitate the spread of the virus. The countries with cool weather are arguably worst hit because of suspected weather. On the other hand, the total lockdown of the economy cum insufficient and limited expansionary fiscal stimulus, majorly in the form of palliatives to cushion the negative effects of lockdown of economic activities, has resulted in an economic crisis as the unemployment rate soared.

In a nutshell, the central objective of government responses towards COVID-19 is the containment of the disease and simultaneously lessening its adverse effects on the economic wellbeing of the populace. The positive impact and certainty of the potency of these government responses are still questionable as they have further arguably worsened the challenges to the economy. The emergence of an economic crisis is inevitable as catastrophic losses in available hours for work caused by the pandemic have significantly reduced workers' income worldwide (ILO, 2020). It was reported that the global income of workers was estimated to have dropped by 10.7 percent, or $3.5 trillion in 2020's first three quarters compared with the same period in 2019, this seems to be supported by data as shown in the Fig. 3. The global losses in hours of work from January to September of 2020 were considerably large (ILO, 2020). Also, Global Financial Institution forecasted a contraction in the region's economy by at least 2.1% or as high as 5.1% in the year 2020. The impact of economic outcome of COVID-19 pandemic is relatively unexplored (Antipova, 2021) as the world is being cautious of the waves of the COVID-19 pandemic, it has become expedient to investigate the nexus

between government responses towards curbing the spread of the virus and world economic performance. This is because in attempts curb the spread of the virus through various government responses like stringent, containment and health as well as economic support policies purposely to reduce the death rate by saving life, which is the essence of the government. The resulted rearrangement and reorganization of the employees in the work places have impacted and changed the pattern of business transactions and economic activities in the world.

This study, therefore, examines the nexus of governments' swift responses towards curbing the spread of COVID-19 pandemic and economic performance in the selected countries from January 22, 2020 to December 31, 2020 in an autoregressive distributed lagged (ARDL) framework, while taking into consideration the dynamic nature of the data to be employed in the analysis. The significance of this study is that it focused on 69 affected countries of the world and adopted the autoregressive distributed lagged (ARDL) model for two reasons. The first reason is that it is scarcely employed in COVID-19 literature. The second is that it enables the estimation of the short and long-run analyses. More importantly, the study facilitates making a relative comparison of the state of the economic activities across the 69 selected countries as government response measures against the global pandemic are notably implemented. To the best knowledge of the researchers, this study is the first of this nature to be carried-out.

Figure 3: Total Monthly Unemployment Rate from OECD



2. Literature Review

There is dearth of studies that specifically examine the government interventions towards minimizing the destabilizing impact on productivity of workers and unemployment rate. The studies related to ours measure the impact of the actions of government towards COVID-19 on either return on stock values or stock prices. Government intervention policies were suggested by economic models as highly potent and efficient in cushioning

COVID-19-related economic damages. Alofayan, Mabrouk and Bousrih (2022) assesses the impact of COVID-19 Pandemic on Economic Performance. The study shows that the resources of the affected household by the COVID-19 decreases because of indirect cost of the pandemic as it relates to the loss in the productivity and labour supply. Also, COVID-19 pandemic affects individuals with higher degree of schooling and high skills are not affected as the effect is more noticeable in Riyadh, Southern and Western region and it is more intensive in the private sector. As confirmed in the studies of (Fernandes, 2020; Glocker and Piribauer, 2021), the COVID-19 pandemic is different and unique in the human history as it is global in the sense that it affects countries of all income levels, lowest level of interest rate in the history, led to spill-over effects in the supply chains, destruct the forces of demand and supply as well.

Lambovska, Sardinha and Belas (2021) examines the impact of the COVID-19 pandemic o youth unemployment in the European Union, the study submits that the strict measures introduced to prevent the spread of COVID-19 have caused a significant increase in unemployment among young population, which has harmed the economic growth. Baldwin and Mauro (2020a) discovers that the emergence of COVID-19 pandemic, which led to the reduction in the global growth rates in the first quarter of 2020, is fueled by a drastic deterioration in private consumption, industrial activities and global trade. Also, as confirmed by the studies of (Barrot, Grassi & Sauvagnat, 2020; Koren & Peto 2020), Baldwin and Mauro (2020b) observes that social distancing policy measure adopted and imposed by many governments from different countries to curb the spread of the COVID-19 has significantly affected the supply of labour, which led to the reduction in the global output. In a similar submission, Ferguson et al, (2020) submits that such social distance measures have an economic cost implication of cumulative loss of hours of working and there is huge loss of live because of the contamination of the virus. Bonacini et al., (2021) posits that, increase in the income inequality among employees has been the result of working from home as the only method to ensure the continuity of job with the minimum risk to the COVID-19. This is because working from home policy would be of more benefit to graduate, male, older, highly paid employees. The empirical result of Ahmad, Khan, Jiang, Kazmi and Abbas (2020) shows that

the unemployment rate will be higher in the coming years, as a result of the consequence of the coronavirus, and it will take at least 5 years to overcome the impact of COVID-19 in the selected developed countries.

Cespele, Chang and Velasco's (2020) study shows that the largeness of fiscal interventions determines the possible change public behaviour and motivate the citizenry to adhere to home restrictions; lest, the risk of increasing the virus spread. The study of Deb, Furceri, Ostry, and Tawk (2020) presents empirical evidence besides the U.S. from a broader set of countries, and the results show that a combination of fiscal and monetary stimulus might affect the negative impact of containment activities on the economy. Also, the economic harm was still massive; over a month, industrial activities slipped by about 15 percent. Nations that provided inadequate monetary and fiscal policy interventions experienced as much as 20 percent loss in industrial operations. Ashraf (2020), as it relates to the asset market, found that the provision for income debt relief and income support measures by the government positively impacted returns on stock price. Davis, Liu, and Sheng (2020) revealed that a significant drop in stock price was a result of stringent lockdown measures once the impacts of debt relief, pandemic severity, income support and workplace mobility measures are taken into consideration.

Zaremba, Aharon, Demir, Kizys, and Zawad (2020) consider COVID-19, policy responses of government, and global stock market liquidity. Using data drawn from the first four months in 2020 on daily basis for 49 countries, the study investigates the effect of policy responses of government on liquidity of stock market across the globe. The study found that the influence of the policy actions to be finite in scope and scale. School and workplace closures worsen the emerging markets' liquidity, while campaigns about the virus improve trading activities. Haleem et al. (2020) show that the slowdown in the economy across the globe stems from the COVID-19 effects on daily life activities. They also argue that the slowdown in the essential goods manufacturing, national and global business losses, supply chain disruption, significant slowing down in the revenue growth and abysmal market cash flow are the economic implications. Meanwhile, shutdown of the hospitality industry, large-scale cancellation or postponement of sports events, mental health issues, physical distancing from peer and relatives,

disruption of celebration of cultural, and festive events, closure of worship centers, rendering of the entertainment sector inactive, and closure of recreation centers among others are the social consequences of the pandemic.

Fornaro and Wolf (2020) found coronavirus as triggering a harmful supply shock by employing a simple model. The study suggested that both drastic fiscal and monetary policy responses, would be necessary to avoid this negative shock from causing severe damage to productivity and employment. Ozili and Arun (2020) found that monetary policy actions, restrictions on international travel, and rising number of days of lockdown have severe impact on economic activities globally and the closing, opening, lowest and highest stock price of major stock market indicators globally. They also found imposition of restrictions on people's movement internally and higher fiscal expenditure to have positively impacted the level of economic activities. Oruonye and Ahmed (2020) find that the pandemic caused swift closures in states and cities in Nigeria, thereby having devastating effect on the tourism sector. Zhang et al. (2020) reveal that the financial markets were affected by COVID-19 worldwide, and it is a level of risk never experienced before, leading to significant losses suffered by investors in a short period. Ben Ayed, Medini, and Ammar (2020) also investigate the stock market in the COVID-19 era in Tunisia. The study adopts panel data analysis (Swamy-Arora method) from January 2020 to 20 April, 2020, using the Tunis Stock Exchange listed companies' stock returns and COVID-19 metrics such as the growth of daily confirmed cases, recovered cases and death toll. The study concludes that the growth of daily confirmed cases is positively related with stock returns, while death toll negatively affects stock returns performance.

Alber (2020) analyses the coronavirus' impact on stock markets in six worst-hit countries using the GMM technique. After documenting a stock market sensitivity to mortalities less than coronavirus cases, and coronavirus cumulative indices exceeding fresh ones. The result signifies an adverse implication of the virus' spread on the French, German, Chinese and Spanish stock markets, but not the Italian and American markets. Al-awadhi, Alsaifi, Al-awadhi, and Alhammadi (2020) examine the impact of outbreak on stock market returns by investigating if it affects the outcomes of the China's stock market. The study shows that the disease to have significant adverse effects

on the country's stock prices. Chaouachi and Slim (2020) analyze the pandemic's impact on the KSA stock market, using the cointegration approach of Autoregressive Distributed Lag (ARDL). The study analyzed the nexus between the natural logarithms of the Tadawull All Shares Index trading volume and the daily confirmed cases of COVID in the long and short runs. The cointegration's bounds test was completed for a series spanning 2 March, 2020 to 20 May, 2020, and implemented between the variables was the Toda-Yamamoto causality test. The study shows the existence of an adverse effect of the outbreak on the market in the long-run only. A unidirectional causality was revealed from the prevalence measure of the pandemic to the stock market, and the robustness check demonstrated conclusiveness.

Based on the debates in the literature, this study examines the impact of stringent; containment and health and economic support measures adopted by governments to combat COVID-19 in various countries on the performance of the economies. Unlike previous studies, this study employs the aggregated policy measures adopted by the government to contain the virus by measuring their effectiveness and their impacts on the economic performance in an ARDL framework.

3. Data and Methodology

3.1. Data sources

This paper follows previous literature by employing daily data series of the selected COVID-19 pandemic measures used in previous studies (Zaremba et al., 2020; Ashraf, 2020). However, the significance of this study is the coverage of the sampled countries across all the regions of the world. The adoption of the daily unemployment data as a proxy for economic performance, which is the dependent variable. It makes the study unique since most existing studies adopt stock market return and price as the two vital indices of market performance (Hong, Bian, and Lee, 2020; Ashraf, 2020). Unemployment data are sourced mainly from 2 sources: Census and Economic Information Center (CIEC) and OECD (2022) other sources are Hong Kong Census and Statistics Department, Manpower Research and

Statistics Department, Singapore; Department of Statistics, Malaysia; Department of Statistics, Mauritius and Centre for Monitoring Indian Economy. Data on the responses of government towards COVID-19 are mainly from Oxford COVID-19 Government Response Tracker (OxCGRT) from January 22, 2020 to December 31, 2020. The base year is justified because that was the early confirmation of the COVID-19 around the world (Ashraf, 2020), government responses and subsequent job lost occurred in irregular pattern throughout the year. All countries with missing data are omitted in this study. The identified variables of government responses towards curbing the spread of the pandemic were grouped majorly into 3: Economic Support Index, Containment and Health Index, and Stringent Index. This is discussed in the Section 3.2.

3.2. Data measurement

The study uses the OxCGRT database (Hale *et al.*, 2020b; Ashraf, 2020), which measures government responses to COVID-19 incidence summarized with 3 main indexes. These main indexes are Economic Support Index, Stringent Index, and Containment and Health Index. The Stringent Index gathers information mainly on physical distancing measure. It specifically records how strict the lockdown is or policies that mainly limit people's behaviour and this is coded using 8 indicators as shown in Table 1. The index on Containment and Health is encoded using 3 indices as shown in table 1. It captures emergency response measure taken by the government regarding health condition such as contact tracing and testing policy for COVID-19. Also, the index of Economic Support is encoded using 2 indices, which are income support program by government and debt/contact relief packages for the household schemes during COVID-19 period as shown in Table 1. All these 3 indexes are simple aggregate of the underlying indicators into a single number from 0 to 100. It reveals the number of relevant indicators a government has acted upon, and to what degree. The summary of government response variables adopted in this study are:

Table 1: Government's COVID-19 response policies and indicators

Government's COVID-19 response policies	Indicators
Stringent Indexes (Social Distance Measures)	Workplace Closure; Restrictions on Gathering; School Closure; Cancel Public Events; Stay at Home Requirement; Close Public Transport; International Travel Control and Restriction on Internal Movement
Containment and Health Indexes	Contact Tracing, Testing Policy and Public Awareness program/Campaign
Economic Support Indexes	Debt/Contract Relief for the families and Government Income Support

Source: https://github.com/OxCGRT/covid-policy-tracker

The choice of 69 sampled countries is based on data availability and accessibility. These countries are purposely selected because of evidence of community spread of the virus and swift government intervention on stringent and containment measures. The list of these countries and their 1st dates of the confirmation of COVID-19 case are presented in Table 2.

Table 2: Sampled Countries and 1st Date of COVID-19 Confirmation

S/N	Sampled Countries	Date of 1st Confirmation	S/N	Sampled Countries	Date of 1st Confirmation
1	Austria	25-Feb	36	Japan	22-Jan
2	Denmark	27-Feb	37	South Korea	22-Jan
3	Bulgaria	8-Mar	38	Malaysia	25-Jan
4	Portugal	2-Mar	39	Mongolia	10-Mar
5	Cyprus	9-Mar	40	New Zealand	28-Feb
6	Belgium	4-Feb	41	Philippines	30-Jan
7	Germany	27-Jan	42	Singapore	23-Jan
8	France	24-Jan	43	Taiwan	22-Jan
9	Hungary	4-Mar	44	Thailand	22-Jan

10	Iceland	28-Feb	45	Hong Kong	23-Jan
11	Ireland	29-Feb	46	Sri Lanka	27-Jan
12	Israel	21-Feb	47	India	30-Jan
13	Italy	31-Jan	48	Mauritius	18-Mar
14	Netherlands	27-Feb	49	Nigeria	28-Feb
15	Norway	26-Feb	50	South Africa	5-Mar
16	Poland	4-Mar	51	Canada	25-Jan
17	Croatia	25-Feb	52	United States of America	20-Jan
18	Russia	31-Jan	53	Brazil	26-Feb
19	Slovakia	6-Mar	54	Argentina	3-Mar
20	Slovenia	5-Mar	55	Colombia	6-Mar
21	Spain	1-Feb	56	Chile	3-Mar
22	Sweden	31-Jan	57	Mexico	28-Feb
23	Switzerland	25-Feb	58	Peru	6-Mar
24	Turkey	11-Mar	59	Uruguay	13-Mar
25	Ukraine	3-Mar	60	Paraguay	7-Mar
26	United Kingdom	31-Jan	61	Costa Rica	6-Mar
27	Czech Republic	1-Mar	62	Egypt	14-Feb
28	Latvia	2-Mar	63	Iran	19-Feb
29	Luxembourg	29-Feb	64	Israel	3-Jan
30	Lithuania	29-Feb	65	Morocco	2-Mar
31	Estonia	27-Feb	66	Oman	24-Feb
32	Finland	29-Jan	67	Saudi Arabia	2-Mar
33	Australia	26-Jan	68	Tunisia	4-Mar
34	China	22-Jan	69	Jordan	2-Mar
35	Indonesia	2-Mar			

Note: All dates were recorded in 2020

3.2 **Methodology**

The sole objective of this paper is to examine the nexus between government responses towards mitigating the impacts of the COVID-19 outbreak and economic activities. This was achieved using the heterogeneous panel data model, which allowed the study to focus on the long and short run

relationships. Specifically, the study estimated a model that is a dynamic panel with autoregressive distributed lag (ARDL) specification. A panel of 69 countries of the world was constructed by the study from January 22, 2020 to December 31, 2020 on which the error-correction form of ARDL specification by the alternative three methods such as the Dynamic Fixed-Effect (DFE), Mean Group (MG) and Pooled Mean Group (PMG) estimations were employed. Following the proposition of Pesaran and Smith (1995); Pesaran, Shin, and Smith (1997, 1999), this study starts with a panel data representation of the time series autoregressive distributed lag (ARDL) (p, q) model that includes both lagged independent and dependent variables:

$$y_{it} = \sum_{k=1}^{p} \gamma_{ik} y_{i,t-k} + \sum_{j=0}^{q} \vartheta_{ij} x'_{i,t-j} + \mu_i + \varepsilon_{it} \quad (1)$$

In the equation above, for i = 1, 2, 3, ……, N; and t = 1, 2, 3,….., T; k = 1, 2, ..., p; and j = 0, 1, 2……., q. Also, μ_i denotes the group-specific effect; i indicates the number of groups; t represents the number of periods; p and q are the lags for the independent and dependent variables. While y_{it} is the economic performance captured by Unemployment rate, $x'_{i,t}$ is the vector of key independent variables of government responses towards COVID-19 pandemic such as stringent index, economic support index and containment and health index. The study, therefore, gathered data from OxCGRT. Equation 1 can be rewritten in a way that allows us to estimate the long-run and short-run relationships as follow:

$$\Delta y_{it} = \alpha_{1i} y_{i,t-1} + \alpha_{2i} x_{i,t-1} + \sum_{k=1}^{p-1} \gamma_{ik} \Delta y_{i,t-k} + \sum_{j=0}^{q-1} \vartheta_{ij} \Delta x_{i,t-j} + \mu_i + \varepsilon_{it} \quad (2)$$

Equation 2 is re-specified in error-correction form as

$$\Delta y_{it} = \alpha_{1i} v_{i,t-1} + \sum_{k=1}^{p-1} \gamma_{ik} \Delta y_{i,t-k} + \sum_{j=0}^{q-1} \vartheta_{ij} \Delta x_{i,t-j} + \mu_i + \varepsilon_{it} \quad (3)$$

where: $v_{i,t-1} = y_{i,t-1} - \delta_{1i} x_{i,t-1}$

From the above, the long and short-run estimates on the nexus of government responses to curb COVID-19 and economic activities are computed as $-\frac{\alpha_{2i}}{\alpha_{1i}}$ and $\sum_{j=0}^{q-1} \vartheta_{ij}$, respectively. The third equation can be estimated using three dissimilar estimators: PMG, MG, and DFE, which take the long-run equilibrium and the heterogeneity of the dynamic adjustment process into consideration (Demetriades and Law, 2006) and are computed based on highest likelihood. Unlike Johansen (1995) and Philips and Hansen (1990), the ARDL model by Pasaran and Shin (1999) can be utilized with variables of different order of integration of either I(0) or I(1) or a combination of both. PMG requires a long-run relation among the variables of interest with a negative coefficient of error correction term and being about -2 low.

This signifies the requisite condition for the consistency, efficiency and validity of a long-run relationship among the variables; also, the resulting residual must be uncorrelated serially, and the explanatory variable can be admitted as exogenous determinants; the relative size of T and N is vital. The largeness of both is the precondition for the technique of dynamic panel, which helps in avoiding bias in the average estimate and solves heterogeneity issues. The second technique (MG) calls for the estimation of separate regression for each cross-section. It provides short and long-run parameters by taking a mean of each individual parameters from each country-specific regression. This method imposes no limits. It allows for variation and heterogeneity in all coefficients in both the short and long-runs. The condition for the validity and consistency of MG estimators are largely dependent on the big dimension of time-series nature of the data. Finally, the DFE method is completed by relying on some restrictions. It features intercepts that are country-specific. It also limits the adjustment coefficient and the long and short-run coefficients to be similar with respect to all countries. Hausman test allows the determination and identification of the consistency and efficiency of each estimator when compared with others.

4 Empirical Results and Discussion

4.1 Empirical Results

The empirical results for the study are explicitly contained in this section. The table 3 reveals summary of descriptive statistics for the major variables. The proxy for the performance of economic activities, the unemployment rate variable has an average of 8.3301, and it moves from 1 to 33.28 from January 22, 2020 to December 31, 2020 with a standard deviation of 5.69. The standard deviation measures the extent to which the data series dispersed around the mean in the statistical analysis. The average value of stringent index is 56.36, which indicates that on the average daily basis government enforces stringent index by 5636 percent and it machineries of enforcement moves from a minimum of 0.0 to a maximum of 100. Both containment and health economic support indexes have means of 53.899 and 50.732 with standard deviations 32.988 and 21.646 respectively. The value of enforcement of containment and health index moves from 0 to 91.96 while that of economic support index changes 0 to 100. The maximum and minimum figures of government response indices reveal that the government has responded with critical changes in policy implementations, as also found in the previous studies, see for example (Ashraf, 2020).

Table 3: Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Unemployment Rate	23,805	8.3301	5.69188	1	33.28
Stringent Index	23,805	54.360	25.0597	0	100
Containment and Health Index	23,805	50.732	21.6467	0	91.96
Economic Support Index	23,805	53.899	32.9889	0	100

Since our dataset captures a large time period (t) of 345 days for each of all 69 selected countries (N), (t > N), the variables are likely correlated and characterized by unit root processes (Nelson and Plosser, 1982). The study, therefore, employed multicollinearity test and panel unit root tests to determine whether variables of interest were correlated or otherwise and to know the order of integration between the series in the dataset. The unit root test was conducted just to validate that the variables are either I(0) or I(1) since the autoregressive distributed lag model (ARDL) crashes in the presence of I(2). After ascertaining that the independent variables were independent of each other, the table 4 reveals that not one of the variables included in the regression analysis is integrated of order 2, i.e. I(2) when

adopting LLC, IPS, Breitung tests. The study specifically finds that the variables of interest are a mix of I(0) and I(1) series, hence adopting the ARDL model is justified.

Table 4: Panel Unit Root Tests

	Levin-Lin-Chu (LLC) Test		Breitung Test		Hadri Test	
	Level	**Difference**	**Level**	**Difference**	**Level**	**Difference**
Unemployment Rate	-6.831***	-1.1e+02***	0.6856	-1.1e+02***	710.6369***	1.4636*
Stringent Index	-9.269***	-87.686***	3.7213	-59.939***	412.3099***	16.3474***
Containment and Health Index	-14.288***	-87.374***	6.5062	-63.9775***	591.4074***	20.3115***
Economic Support Index	-9.1249***	-1.0e+02***	1.7474	-1.1e+02***	950.1659***	5.2478***

Note: Adjusted t* is reported in LLC test, lambda is reported in BT test and Z statistic was reported for Hadri test; *p<0.10; **p<0.05; *** p<0.01

ARDL panel data model was adopted for the selected countries in this study. All the conditions enumerated in section 3.3 for ARDL adoption were satisfied for PMG, MG and DFE. Since the condition for the ARDL panel model is the existence of a long-run relationship premised on the criterion that the coefficient of the error correction term must be negative and not lower than the threshold of -2 for the validity, consistency, and efficiency among the variables of interest.

The table 5 illustrates the empirical result of government responses towards the COVID-19 pandemic and economic performance proxied by unemployment rate in 69 selected countries. The study finds PMG appropriate as the p-value was not significant at the 5% level. The study finds that the economic support and containment and health indexes have insignificant increasing impact on the unemployment rate in the short run while contrary to the expectation, the social distance measure has insignificant reducing impact on the unemployment rate in the short run. In the long run however, stringent and economic supports indexes have

significant increasing impact at 1 percent on unemployment rate. while containment and health index has significant reducing impact at 1 percent on the unemployment rate in the selected countries.

Table 5: Empirical Results

	(1)	(2)	(3)
Method	MG	PMG	DFE
Dependent Variable: Unemployment Rate			
Error-correction (coefficient)	-0.0363***	-0.0153***	-0.0156***
	(0.00248)	(0.00152)	(0.00105)
Short-run coefficient			
D. Stringent Index	-0.00703	-0.00497	-0.00493***
	(0.00479)	(0.00458)	(0.00132)
D. Containment and Health Index	0.00839	0.00503	0.00534***
	(0.00596)	(0.00563)	(0.00174)
D. Economic Support Index	1.76e-05	0.000622	0.000448
	(0.000798)	(0.000759)	(0.000426)
Long-run Coefficient			
Stringent Index	0.0297	0.0360***	0.0298*
	(0.0289)	(0.00662)	(0.0171)
Containment and Health Index	-0.0294	-0.0204**	-0.0113
	(0.0328)	(0.00840)	(0.0225)
Economic Support Index	0.0214***	0.00571***	0.00686
	(0.00711)	(0.00164)	(0.00500)
Constant	0.284***	0.123***	0.112***
	(0.0347)	(0.0177)	(0.00842)
Observations	23,736	23,736	23,736
Number of countries	69	69	69
Hausman test	**MG VS PMG**	**PMG VS DFE**	**MG VS DFE**
Chi2	6.34	0.41	0.31
Prob > chi2	0.0962	0.9387	0.9575

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

4.2 Discussion

The study finds the government response measures towards curbing the pandemic only have long run significant impact on the unemployment rate. The government social distance measure has significant positive impact on unemployment rate is supported by related studies, Ozili and Arun (2020), which reports that growing number of lockdown days and international travel

restriction have severe impact on economic activities globally. The result is also, supported by Afolayan et al. (2022); Lambovska et al. (2021); Baldwin et al. (2020); Barrot, Grassi and Sauvagnat (2020); Koren and Peto (2020) and Ferguson (2020). As reported in the study of Lambovska et al. (2021), the study also found that government economic support index has significant an increasing impact on unemployment rate. Our finding is also in line with Ozili and Arun (2020), as the study reported that containment and health index have decreasing impact on unemployment rate as noted in the research work of Zaremba et al. (2020), who finds that containment and Health measure such as public information campaign about the virus improves the trading activities.

It is also noteworthy to acknowledge that the Prophet of Islam, Mahammad (PBUH) has recommended hygiene and the new quarantine during epidemics such as COVID-19 more than 1400 years ago. In an hadith reported by Usamah bin Zaid, Prophet of Islam was reported to have said that:

> "*if you hear a plague in a land, do not enter it. And if it broke out in a land that you were in, do not leave the land*" Agreed upon

The Prophet of Islam has recommended isolation of those infected with contagious diseases from the healthy ones. The goals intended by this Islamic law is the realization of benefit to mankind and to prevent them from harm both in this world and the hereafter. Qur'an says:

> "*And we have sent you (O Muhammad) not but as a mercy for the Universe*" (al-Anbiya : 107)

5 Concluding Remark

In this study, we examine the nexus between various government responses towards the COVID-19 pandemic and the performance of economic activities. These government responses are social distance measures, contact tracing, testing policy, public awareness campaign and economic support packages. This study analyzes the impact of these government policies on unemployment rate during the COVID-19 pandemic. For empirical analysis, the study employs daily data from January 22, 2020 to December 31, 2020 for 69 selected countries. The study finds that none of

the government response policy has significant impact in the short run. We also find that the government social distancing measures significantly increase unemployment rate at 1 percent level of significance, while containment and health measures such as government awareness program; contact tracing and testing policy on COVID-19 pandemic have significantly reducing impact on unemployment rate. The implication of this finding is that the enforcement of measures of government social distancing measures to save the life of the citizens are counter-productive when examining their economic impacts while containment and health measures on the COVID-19 are beneficial to the economic activities as also noted in the related studies. Therefore, the economic impact of social distancing policy measures on unemployment needs further research efforts to have a better understanding of such government measures so that it can facilitate the development of an appropriate government response in the nearest future and specifically, to resolve the suspected necessary policy conflict that may arise. Also, economic support measures have significant and increasing impact on the unemployment rate. This may be caused by the COVID-19 stimulus packages. As citizens receive these packages regularly, it would lead to discouragement to the supply of labour.

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