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Time Scales Based Analysis of the Effects of COVID-19 Related Economic Support on the Stock Markets in Emerging Markets

Abstract: The main purpose of this study is to investigate the causal response of the stock market returns to COVID-19 related economic support in 19 emerging countries by using the Maximal Overlap Discrete Wavelet Transform (MODWT) and Fourier Toda-Yamamoto Causality Test (FTYCT). With the help of MODWT, we identify the instant, short-term, mid-term and long-term reactions of stock market returns and COVID-19 related economic support to each other. Implementing FTYCT, we determine the existence of the causal relationships running from COVID-19 related economic support to stock returns. We obtain two major results. First, the COVID-19 related economic support have significant effects on stock market returns in the short-, medium-, and long-term, except in China. Second, the results of the causality tests vary across countries based on the different time scales. Some emerging markets show an immediate reaction to the Economic Support, while most stock market reactions occur over the medium- and long-term. Since economic support will created unintended effects on stock market returns, the way that these support policies are implemented should be reconsidered. Also, their effectiveness should be evaluated carefully.

Keywords: COVID-19 related economic support , stock market returns, emerging markets, time scales wavelet transform, Fourier Toda-Yamamoto causality test.

JEL Classification: C58, G01, G15.

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1. Introduction

COVID-19 pandemic has generated unprecedented negative impacts not only on human lives, but also on the global economy, mostly because of severe reductions in global economic activity due to lockdowns, strict quarantine policies, and social distancing practices (Luburić, 2021). As of the 16 September 2022, the virus has affected more than 616 million people causing 6.5 million global deaths.[1] In order to slow down the impacts of national lockdowns and the sparking fear triggered by the pandemic, governments and central banks responded the pandemic with multiple policy approaches (Nicola et al., 2020; Kozińska, 2022). Although travel restrictions and lockdowns helped to slow the spread of the virus, they led to drastic falls in economic activity. Thus, to offer support to employees who lost jobs and to businesses which struggled to survive, various fiscal, monetary and macro-financial policies, as well as exchange rate and balance of payments policies, were implemented. These policies were put into practice not only in developing and emerging countries, as well as developed countries across the globe. According to Zhang, Hu & Ji (2020), implementing pre-determined policies to contain the virus spread could be effective in the short-term by alleviating investor panic. Nonetheless, Gormsen and Koijen (2020) contend that such policies may create a discrepancy between investors' short-term and long-term expectations.

Regarding the economic impacts of COVID-19, the extant literature has presented how the pandemic has influenced stock markets (Lyócsa, Baumöhl, Výrost & Molnar, 2020; Lyócsa & Molnár, 2020; Mishra, Rath & Dash, 2020; Haroon and Rizvi, 2020; Ali, Alam & Rizvi, 2020; Al-Awadhi et al., 2020); exchange rates (Iyke, 2020a); various sectors and industries (He et al., 2020a, He et al., 2020b; Xiong et al., 2020; Gu et al., 2020), as well as investor sentiment (Chen, Liu & Zhao, 2020; Salisu and Akanni, 2020). Stock markets have exhibited heterogeneous reactions to the pandemic (Rahman et al., 2021). For example, Al-Awadhi, Alsaifi, Al-Awadhi & Alhammadi, (2020) suggested that overall share prices declined in China due to the expected adverse economic outcomes of COVID-19. Yet, several studies imply that COVID-19 has led to increases in stock market returns (Chen et al., 2020; Salisu and Akanni, 2020; Lyócsa et al., 2020; Lyócsa & Molnár, 2020; Mishra et al., 2020; Zhang et al., 2020; Haroon and Rizvi, 2020).

Although there is a large number of studies exploring the stock market reactions to COVID-19, only few studies have explored particularly stock market reactions to COVID-19 related economic support packages (Prabheesh, 2020; Zaremba, Kizys, Aharon, & Demir, 2020; Gil-Alana and Claudio-Quiroga, 2020;

[1] Data was retrieved from https://www.worldometers.info/coronavirus/ on 16 September 2022.

Sharma, 2020; Erdem, 2020). Because the impacts and intensity of COVID-19 experience in each country show important differences, there are differences in government responses to COVID-19. Moreover, the health responses and economic responses have generated diverse effects on the global stock markets. Thus, stock price absorptivity differs over time across countries (Zhang et al., 2020). The findings of Chang, Feng & Zheng (2021); Phan and Narayan (2020); Ashraf (2020), and Narayan, Phan & Liu (2021) supported that government announcements regarding income support and stimulus packages largely resulted in positive market returns mainly through reductions in COVID-19 cases. In fact, the main reason behind this reaction is that generous income support programs led to significant reductions in infection rates by motivating lower income individuals to stay at home (Lou, Shen & Niemeier, 2020; Wright, Sonin, Driscoll & Wilson, 2020). However, some studies have claimed that the government economic support policies did not have a statistically significant impact on stock market returns (Yang and Deng, 2021; Iyke, 2020b). Since there seems to be research gap with respect to the effects of COVID-19 related economic support on stock market performance, we focus on the impacts of especially Economic Response, which includes income support and debt/contract relief for households, on stock market returns. Within the scope of Economic Response, there are mainly two types of support packages estimated by Hale et al. (2021): Income Support and Debt/Contract Relief for household. Income Support pertains to the set of government measures that involve either compensating the earnings or offering direct monetary grants, such as a universal basic income, to those individuals who have lost their employment or are incapable of working. Additionally, Income Support encompasses financial allocations that are given to companies, provided that these disbursements are explicitly tied to the salaries of their employees. Household Debt/Contract Relief pertains to the measures taken by the government to suspend financial responsibilities such as putting a halt to loan payments, preventing termination of services such as water supply, or prohibiting eviction.

As governments continue to respond to COVID-19, it is imperative to study which measures are effective and which are not. Therefore, we should test whether the results of the government policies remain significant over a longer time horizon (Topcu and Gulal, 2020). Hence, we focus on the dynamic effects of specifically economic support policies in response to COVID-19 on stock markets. For this purpose, we employ the Fourier Toda-Yamamoto causality test developed by Nazlioglu, Gormus & Soytas (2016).

Most of the studies based on the relationships between COVID-19 and financial assets investigate the impact of daily cases and deaths on financial assets within the framework of behavioural finance (Ashraf, 2020; Phan and Narayan, 2020;

Fernandez-Perez, Gilbert, Indriawan & Nguyen, 2021; Gao, Ren & Uma, 2022; Li, Su, Altuntaş & Li, 2022). Unlike the existing literature, the main goal of this study is to empirically investigate the impact of COVID-19 related economic support on the stock market performance in 19 emerging countries.

However, this study contributes to the existing literature by addressing the impact of COVID-19 related economic support on stock market performance. Within the framework of our study's main contribution to literature, we can also add three more contributions. First, we contribute to the literature by investigating these impacts specific to time scales based on the Maximal Overlap Discrete Wavelet Transform (MODWT). By doing this, we provide evidence about the stock market reactions to COVID-19 related economic support in different time scales as instant, short-, medium and long-term reactions. In other words, we investigated exclusively instant reactions (2 days), short-term reactions (between 4-32 days), mid-term reactions (between 64-128 days) and long-term reactions (between 256-512 days) of stock market returns to COVID-19 related economic support. Second, we investigate the causal effects of COVID-19 related economic support on stock market performance by using the non-linear causality method of Fourier Toda-Yamamoto Causality Test (FTYCT). Finally, our study focuses on emerging markets rather than developed markets since we still do not know much about how COVID-19 related economic support has affected emerging stock markets after economic responses were implemented.

To achieve the main goal of study, we try to provide evidence to answer the following research questions:

- Is there a causal relation between stock market returns and COVID-19 related economic support?
- Do COVID-19 related economic support affect the stock market returns immediately?
- Do the causal effects of COVID-19 related economic support on stock market returns vary across emerging stock markets in terms of different time scales?

The rest of the paper is organized as follows: Section 2 introduces the data and econometric framework while Section 3 presents and discusses the empirical results of the study. Finally, a conclusion is drawn in Section 4.

2. Data and Econometric Framework

Our main goal in this study is to determine the impact of COVID-19 related economic support on the stock market returns by using non-stationary time series in the combined time-and-scale domain. For this purpose, we use daily data on country-specific COVID-19 related economic support and stock market prices in 19 emerging markets. These countries are Brazil (BRA), Chile (CHL), China (CHN), Colombia (COL), Egypt (EGY), Greece (GRC), Hungary (HUN), India (IND), Indonesia (IDN), Kuwait (KWT), Malaysia (MYS), Mexico (MEX), Poland (POL), Qatar (QAT), Russia (RUS), South Africa (ZAF), Thailand (THA), Turkey (TUR), and United Arab Emirates (ARE). The reason why we include these countries in the sample is that they have permanent COVID-19 related economic support in place and also their supports were subject to significant change over time. Moreover, we selected the countries which have a certain level of stock market development in terms of market depth. Following this criterion, we include the countries whose market depth ratio, measured as "Stock Market Total Value Traded to GDP (%) ratio" (obtained from "World Bank Global Financial Development Database"), is over 3%. Because of this, we include 19 of 23 emerging countries classified by the IMF in the sample.

Table 1: Beginning and Ending Dates of Economic Support

	Beginning Date	Ending Date	Observations		Beginning Date	Ending Date	Observations
ARE	3.31.2020	11.11.2021	423	KWT	3.31.2020	3.09.2022	507
BRA	3.16.2020	3.09.2022	518	MEX	10.08.2020	3.09.2022	370
CHL	3.26.2020	8.26.2021	371	MYS	3.31.2020	3.09.2022	507
CHN	4.10.2020	3.09.2022	499	POL	3.17.2020	3.09.2022	517
COL	3.16.2020	1.31.2022	491	QAT	3.27.2020	3.09.2022	509
EGY	3.20.2020	3.09.2022	514	RUS	3.31.2020	3.09.2022	507
GRC	3.17.2020	3.09.2022	500	THA	3.31.2020	3.09.2022	507
HUN	3.17.2020	3.09.2022	517	TUR	4.06.2020	8.10.2021	352
IDN	3.31.2020	3.09.2022	507	ZAF	4.20.2020	3.09.2022	493
IND	2.28.2020	3.09.2022	529				

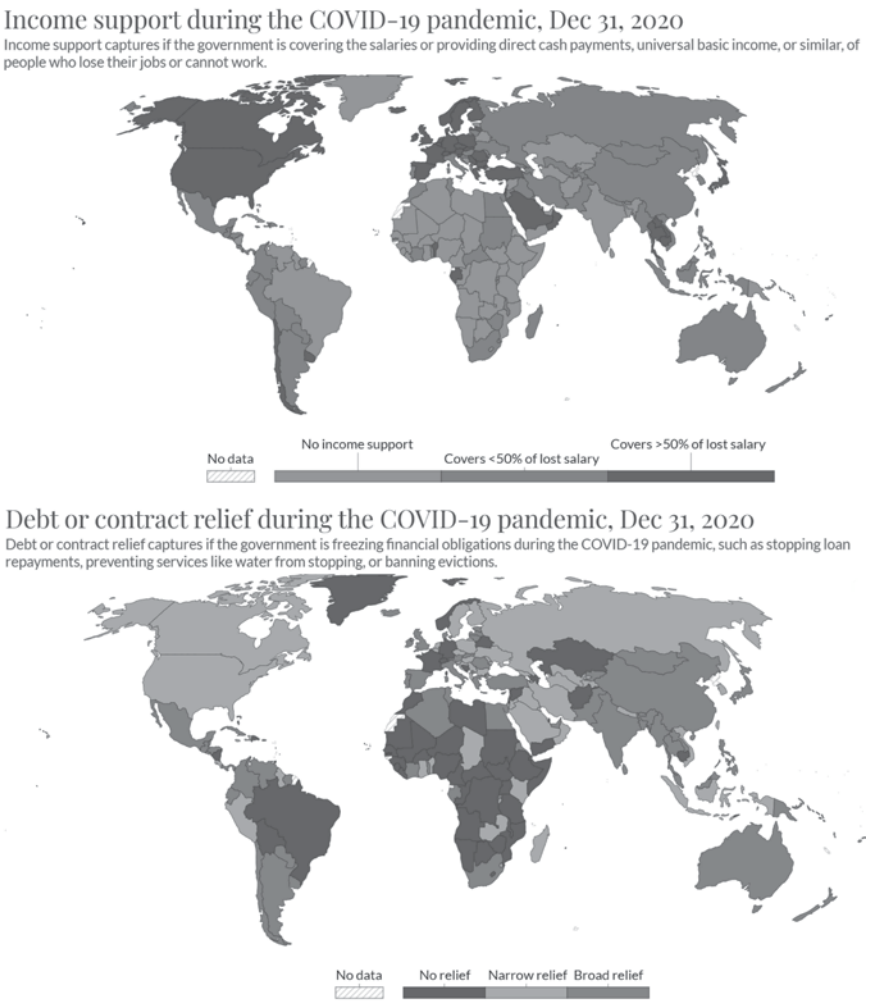
Source: https://www.bsg.ox.ac.uk/research/COVID-19-government-response-tracker

To carry out our empirical analysis, we use economic support index from Oxford COVID-19 Government Response Tracker (OXCGRT) as a proxy for COVID-19 related Economic Support and stock market prices were extracted from Refinitiv Database. Oxford COVID-19 Government Response Tracker (OXCGRT) measures government responses with four main indexes: overall government response index, containment and health index, stringency index and economic support

index (Hale et al., 2021). However, we use the economic support index, which reflects government income support and debt/contract relief for households' programs. The sample period is restricted by availability of data. Thus, it includes daily observations starting from 1 January 2020 and up to 3 March 2022. But the sample size differs across the countries, because of the change in the date of Pandemic. Table 1 defines the sample period for each country.

Figure 1 shows the COVID-19 related supports around the world.

Figure 1: Income support & Debt or contract relief during COVID-19 pandemic



Source: https://ourworldindata.org/policy-responses-covid#income-support-and-debt-relief

As is clearly seen in Figure 1, the developed countries' COVID-19 related support was much greater than that of developing countries in terms of both the amounts provided and the number of support programs. This reality can be also considered as another rationale behind carrying out this kind of study which includes only emerging markets separately.

To calculate the stock market returns, we take the first differences of logarithmic stock market index. To investigate the causal relations between COVID-19 related economic support on the stock market returns, we employ a two-stage econometric framework, which combines the use of recently developed two novel approaches to times series modelling: Wavelet transformation and Fourier Toda-Yamamoto (TY) causality test developed by Nazlioglu et al. (2016). In the first stage of our econometric analysis, we perform wavelet transformation to both variables by using the Discrete Wavelet Transform (DWT). We use DWT, since it is not a complex process and provides enough information. Also, it perfectly fits to our purpose, since it enables us to carry out econometric exercises by using non-stationary time series in the combined time-and-scale domain. Finally, we obtain the short-time and long-times scales associated with high and low frequencies respectively by decomposing each time series into its components corresponding to different time scales. To compute the DWT, we employ the Maximal Overlap Discrete Wavelet Transform (MODWT). Besides MODWT, we use Daubechies Least Asymmetric wavelet with the length of 8 (LA8), since this algorithm has some desired properties, such as being orthogonal, having almost symmetric and having "compact support and good smoothness" features (Ha, Tan & Goh, 2018). After the wavelet transformation, we obtain the following frequencies: d1 (Days 0-2), which shows the instant market reaction; d2 (Days 4-32), which represents the short-term reaction; d3 (Days 64-128), which reflects the medium-term reaction and d4 (Days 256-512), which shows the long-term reaction.

In the second stage of our econometric framework, we perform the Fourier Toda-Yamamoto causality test to determine the existence and the direction of the causal relationships between variables. The approach uses Toda-Yamamoto (1995) type causality and "Fourier approximation", which is derived based on some variant of Gallant (1981)'s Flexible Fourier Form (Nazlioglu et al., 2016). By using this approximation, we do not need any prior knowledge about the break(s) date(s), if they exist in the data. Moreover, according to Nazlioglu et al. (2016), this approach has the property of capturing structural break(s) "as a gradual/smooth process by using a small number of low frequency components." Therefore, applying this causality test, we will have the ability obtain the stock markets' reaction to COVID-19 related economic support in different time horizons, such as short-term, medium- term and long-term.

To derive the test equation, we use lag-augmented VAR(p+d) model given in following Equation (1)

$$x_t = \alpha + \beta_1 y_{t-1} + \cdots + \beta_p dy_{t-(p+d)} + \epsilon_t \quad (1)$$

where y_t includes K endogenous variables, α is a vector of constants terms, β are coefficient matrices and ϵ_t are white noise error term. We test the following null hypothesis to decide if y causes x:

$$H_0 : \beta_1 = \ldots = \beta_p = 0 \quad (2)$$

Test statistics is Wald statistic which has an asymptotic X^2 distribution with p degrees of freedom.

To account for the effects of structural breaks in data, we rewrite the Equation (1) as we allow the change in constant term:

$$x_t = \alpha(t) + \beta_1 y_{t-1} + \cdots + \beta_p dy_{t-(p+d)} + \epsilon_t \quad (3)$$

where the constant tern is expressed as the function of time and represents the structural breaks in xt. this time dependency of constant is expressed as follow:

$$\alpha(t) = \alpha_0 + \sum_{k=1}^{n} \gamma_1 k sin\left(\frac{2\pi k}{t}\right) + \sum_{k=1}^{n} \gamma_2 k cos\left(\frac{2\pi k}{t}\right) \quad (4)$$

where *n* is the number of frequencies, and k denotes the optimal frequency. There are two approaches to determine the value of k: either integer of fractional. In this study we use integer to determine the optimal frequency. Test equation that we use to determine the presence of causality running from COVID-19 related economic support to stock market returns is given below:

obtain

$$x_t = \alpha_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \beta_1 y_{t-1} + \cdots + \beta_{p+d} y_{t-(p+d)} + \in_t \quad (5)$$

After estimating the above equation, we can determine the existence of causal relations between two variables along with frequency of it as well. Null hypothesis of this test states that there are no causal relations between two variables. Even though the outcome of this test can be determined by carrying out Wald test and F-test, they both suffer from some power problems. To increase the power of test, we follow the suggestion of Mantalos (2000); Hatemi-J (2002); Hacker and Hatemi-J (2006); Balcilar, Ozdemir & Arslanturk (2010) and use the bootstrap distribution of F-statistics based on the residual sampling bootstrap approach developed by Efron (1992). Another important issue that we have to consider is

the correct determination of lag-lengths. To determine them, we prefer to use the Schwarz Information Criterion.

To decide if COVID-19 Economic Support does have a causal effect on stock returns, we test the following null hypothesis:

$$H_0 = \beta_1 = \beta_2 = \cdots = \beta_p = 0 \quad (2)$$

We reject this null hypothesis since the p value of test statistics smaller than the level of significance and conclude that COVID-19 related economic support does cause stock market returns at different time scales.

3. Empirical Results and Discussion

The descriptive statistics of the stock market index returns of the countries investigated are presented in Table 2 (Stock Market Returns, ending with SM and Economic Support, ending with ES). As it is seen in Table 2, the average stock market returns are negative for Russia, Chile, Hungary, Brazil, Egypt, Greece, Poland, Malaysia, Indonesia, Colombia, Thailand and positive for China, South Africa, Mexico, Kuwait, Qatar, India, Turkey, United Arab Emirates. During the sample period, the most volatile stock markets are Russia, Brazil, Turkey, Hungary, Greece, Poland, South Africa, Thailand, Chile, in decreasing order. Except for India, almost all stock market returns have negative skewness and excess kurtosis. That is, they are leptokurtic. According to the Jarque-Bera statistics, stock market returns are not normally distributed.

Table 2: Descriptive Statistics

	Mean	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
ARE_SM	0.0010	0.061	-0.077	0.011	-1.229	16.85	4716.7*
BRA_SM	-0.0002	0.115	-0.148	0.019	-1.626	19.18	6493.9*
CHL_SM	-0.0003	0.077	-0.122	0.015	-1.571	17.95	5563.8*
CHN_SM	0.0001	0.054	-0.079	0.012	-0.803	7.798	610.13*
COL_SM	-0.0001	0.086	-0.115	0.014	-1.752	24.10	10906*
EGY_SM	-0.0002	0.037	-0.065	0.011	-1.427	9.881	1322.7*
GRC_SM	-0.0002	0.088	-0.122	0.017	-1.423	15.52	3926.4*
HUN_SM	-0.0002	0.070	-0.131	0.018	-1.913	16.55	4721.5*
IDN_SM	-0.0001	0.121	-0.076	0.014	0.386	15.62	3807.7*
IND_SM	0.0006	0.074	-0.130	0.014	-2.085	21.44	8520.4*
KWT_SM	0.0004	0.045	-0.095	0.011	-3.704	35.55	26560*
MEX_SM	0.0004	0.036	-0.050	0.010	-0.595	6.128	266.98*
MYS_SM	-0.0001	0.061	-0.052	0.009	-0.503	11.73	1841.6*
POL_SM	-0.0002	0.073	-0.131	0.016	-1.448	16.09	4286.4*
QAT_SM	0.0005	0.039	-0.099	0.009	-2.353	29.76	17589*
RUS_SM	-0.0004	0.080	-0.302	0.020	-6.471	92.28	19395*
THA_SM	-0.00005	0.086	-0.118	0.015	-1.565	20.02	7134.6*
TUR_SM	0.0009	0.065	-0.095	0.019	-1.132	7.919	698.87*
ZAF_SM	0.0003	0.065	-0.099	0.015	-1.211	12.34	2220.6*
ARE_ES	34.66	50.00	0.00	22.86	-0.838	1.724	105.7*
BRA_ES	25.94	50.00	0.00	19.06	0.113	1.575	49.65*
CHL_ES	53.08	100.00	0.00	45.17	-0.098	1.189	79.12*
CHN_ES	47.01	62.50	0.00	22.55	-1.148	2.833	126.4*
COL_ES	60.51	75.00	0.00	27.14	-1.601	3.800	259.6*
EGY_ES	65.56	75.00	0.00	22.66	-2.416	7.164	969.6*
GRC_ES	74.08	100.00	0.00	28.02	-1.809	5.051	412.4*
HUN_ES	46.81	87.50	0.00	28.43	0.189	1.869	33.90*
IDN_ES	30.79	37.50	0.00	12.07	-1.795	4.909	394.1*
IND_ES	37.63	75.00	0.00	21.52	0.033	2.351	10.14*
KWT_ES	32.52	50.00	0.00	13.91	-1.466	3.940	225.8*
MEX_ES	23.78	75.00	0.00	24.51	1.069	3.228	110.3*
MYS_ES	66.26	75.00	0.00	23.84	-2.406	6.826	900.6*
POL_ES	65.21	100.00	0.00	31.11	-0.704	2.497	53.35*
QAT_ES	49.24	87.50	0.00	21.22	-0.980	3.842	108.4*
RUS_ES	46.31	75.00	0.00	22.93	-0.511	2.524	30.32*
THA_ES	70.54	100.00	0.00	29.44	-1.424	4.264	231.4*
TUR_ES	40.41	87.50	0.00	38.08	0.095	1.289	70.62
ZAF_ES	52.45	75.00	0.00	26.06	-0.930	2.635	85.56

Source: Authors' Calculation

*, **, *** denote 1%, 5%, and 10% significance level, respectively.

Greece has the largest mean value of COVID-19 Economic Support Index, followed by Thailand, Malaysia, Egypt, Poland, Colombia. Similar to market returns, they are also left skewed, have an excess kurtosis and do not have normal distribution.

To determine the time series properties of each variable, we use traditional unit root test of Augmented Dickey Fuller (ADF). The results of these test are given in Table 3.

Table 3: ADF Unit Root Test Results

ARE_ES	-1.734	KWT_ES	-2.268	ARE_SM	-11.19*	KWT_SM	-19.92*
BRA_ES	-2.015	MEX_ES	-1.970	BRA_SM	-30.49*	MEX_SM	-23.21*
CHL_ES	-1.090	MYS_ES	-2.934**	CHL_SM	-14.25*	MYS_SM	-23.73*
CHN_ES	-2.003	POL_ES	-2.064	CHN_SM	-23.97*	POL_SM	-24.18*
COL_ES	-1.308	QAT_ES	-2.568	COL_SM	-13.09*	QAT_SM	-17.96*
EGY_ES	-2.916**	RUS_ES	-2.755***	EGY_SM	-19.95*	RUS_SM	-12.04*
GRC_ES	-2.630***	THA_ES	-2.915**	GRC_SM	-8.308*	THA_SM	-8.430*
HUN_ES	-1.871	TUR_ES	-1.565	HUN_SM	-11.48*	TUR_SM	-14.58*
IDN_ES	-2.509	ZAF_ES	-2.277	IDN_SM	-23.05*	ZAF_SM	-23.87*
IND_ES	-2.287			IND_SM	-7.756*		

Source: Authors' Calculation

*, **, *** denote 1%, 5%, and 10% significance level, respectively.

According to results in Table 3, the stock market returns and COVID-19 economic support series are level stationary in Egypt, Greece, Malaysia, Russia and Thailand. But they are first difference stationary in the remaining countries in the sample.

To determine the existence of causality between stock market returns and COVID-19 Economic Support at different time scales, we carry out Fourier Toda–Yamamoto test of Nazlioglu et al. (2016). Table 4 presents the results of these tests.

Table 4: Fourier Toda–Yamamoto test Results*

	Instant Market Reaction Days 0-2				Short-term Days 4th-32nd				Medium-term Days 64th-128th				Long-term Days 256th-512th			
	F-stat	Boot. p-value	p	k	F-stat	Boot. p-value	p	k	F-stat	Boot. p-value	p	k	F-stat	Boot. p-value	p	k
ARE	3.47	0.59	5	1	8.39	0.14	5	1	4.39	0.49	5	2	21.40	**<0.01**	4	1
BRA	8.05	0.16	5	1	10.1	**0.09**	5	3	2.37	0.80	5	2	10.806	**0.07**	5	2
CHL	2.67	0.72	5	3	3.55	0.61	5	3	19.7	**<0.01**	5	1	46.16	**<0.01**	5	1
CHN	8.69	0.12	5	3	9.12	0.11	5	2	7.82	0.18	5	2	7.239	0.21	5	1
COL	15.7	**0.01**	5	3	59.6	**<0.01**	5	2	48.9	**<0.01**	5	3	142.4	**<0.01**	5	1
EGY	22.3	**<0.01**	5	3	24.9	**<0.01**	5	3	20.0	**<0.01**	5	3	10.836	**0.02**	4	2
GRC	72.3	**<0.01**	5	3	68.1	**<0.01**	5	3	47.4	**<0.01**	5	2	138.0	**<0.01**	5	1
HUN	11.0	**0.07**	5	3	19.7	**<0.01**	5	3	36.0	**<0.01**	5	2	101.2	**<0.01**	5	2
IDN	12.7	**0.05**	5	3	17.8	**0.01**	5	3	3.14	0.66	5	3	11.129	**0.03**	4	1
IND	40.7	**<0.01**	5	3	50.6	**<0.01**	5	3	14.3	**0.02**	5	2	77.929	**<0.01**	5	2
KWT	21.5	**<0.01**	5	3	29.2	**<0.01**	5	3	40.9	**<0.01**	5	2	67.50	**<0.01**	5	2
MEX	6.75	0.23	5	3	7.47	0.2	5	3	13.9	**0.02**	5	2	13.934	**0.02**	5	2
MYS	7.93	0.15	5	3	6.48	0.27	5	3	36.6	**<0.01**	5	2	10.084	**0.08**	5	2
POL	28.0	**<0.01**	5	3	31.6	**<0.01**	5	2	28.5	**<0.01**	4	2	90.945	**<0.01**	5	1
QAT	6.20	0.26	5	3	3.99	0.54	5	3	7.37	0.17	5	3	93.006	**<0.01**	5	1
RUS	2.07	0.73	5	3	0.64	0.99	5	3	10.4	**0.07**	5	3	45.153	**<0.01**	5	1
THA	3.52	0.58	5	3	1.64	0.91	5	3	28.8	**<0.01**	5	3	53.134	**<0.01**	5	1
TUR	6.28	0.3	5	3	1.34	0.93	5	3	1.71	0.64	3	3	49.521	**<0.01**	5	2
ZAF	14.8	**0.01**	5	3	11.6	**0.05**	5	3	59.4	**<0.01**	5	3	88.229	**<0.01**	5	2

Source: Authors' Calculation

p, lag length, k is the optimal frequency.

* Significant at %10 level of significance

Is there a causal relation between stock market returns and COVID-19 related economic support?

Answer to this question will be yes, because we find evidence of causality running from COVID-19 related economic support to stock market returns in every country in the sample, except for China. These results can be taken as evidence of the fact that the investors preferred to use these additional incomes for stock market investments rather than for spending. This reflection of investor behaviour can be explained within the framework of "Ricardian Equivalence". To prepare themselves for future unexpected events like COVID-19 pandemics, investors prefer to accumulate their wealth. Our findings are in line with the findings

of Chang et al. (2021); Phan and Narayan (2020); Ashraf, (2020) and Narayan et al. (2021) suggesting that government announcements regarding income support and stimulus packages largely resulted in positive market returns.

Regarding the effects of the pandemic on the Chinese stock market, some studies emphasized increased stock market crash risk due to the pandemic (Liu, Huynh & Dai, 2021), and the tendency of investor sentiment to influence stock prices more severely after COVID-19 (Sun, Wu, Zeng & Peng, 2021). Yet, Gao et al. (2022) claimed that the powerful epidemic control did not lead to excessive abnormal volatility on the stock market in China. With the onset of the pandemic, China followed a myriad of monetary and fiscal policies and announced economic aids of RMB 4.9 trillion, which is about 4.7% of GDP (International Monetary Fund, 2021). Chinese stock markets were found to recover as a result of the timely actions taken by the authorities (Ali et al., 2020). On the other hand, unlike the majority of countries which predominantly implemented direct economic support policies, China preferred to implement indirect economic support policies. These policies consisted of tax reductions, additional public investments, liquidity injection into the banking system through open market operations, policies aimed at encouraging lending to SMEs, etc. and they were used by businesses and households appropriately to serve the intended purposes. As the Economic Support implemented played an important role in eliminating the economic uncertainty, those funds were not channelled to the stock markets in China in any period, unlike the other countries covered in the study. Our findings are line with the findings of Gao et al. (2022), since we demonstrate that "COVID-19 related economic support are not associated with stock market returns at any time scale in China", which support the relevance and success of the COVID-19 economic support policies.

Do COVID-19 related economic support affects the stock market returns immediately?

The findings of the study provide evidence that Economic support do have significant effects on stock markets in the short-term, medium-term, and long-term in all the countries except for China. However, instant market reactions occur only in specific countries: Colombia, Egypt, Greece, Hungary, Indonesia, India, Kuwait, Poland and South Africa. The stock markets of these countries have a lower level of development, especially in terms of market depth, compared to the countries whose stock markets do not show an instant reaction to the COVID-19 related economic support in 2020, as can be seen in Table 5. In these countries, investors usually do not have too many alternatives to invest their temporary

income (supports) and earn high returns in the very short-run. In other words, stock market is the safe haven for them because of the lack of reliable alternatives.

Table 5: Stock Market Reaction and Stock Market Depth

Stock Markets with Instant Reaction		
Country	Market Reaction	Stock market total value traded to GDP (%)
COL	All frequencies	3.70
EGY	All frequencies	4.40
HUN	All frequencies	7.20
GRC	All frequencies	8.73
IDN	All frequencies	12.39
KWT	All frequencies	12.43
POL	All frequencies	13.92
IND	All frequencies	72.92
ZAF	All frequencies	87.03
Mean		**24.75**
Stock Markets with No Instant Reaction		
Country	Market Reaction	Stock market total value traded to GDP (%)
MEX	Medium & Long	7.58
ARE	Long	10.73
CHL	Medium & Long	15.72
QAT	Long	16.05
RUS	Medium & Long	18.57
MYS	Medium & Long	73.70
BRA	Short & Long	94.82
THA	Medium & Long	96.32
TUR	Long	120.59
CHN	None	215.01
Mean		**66.91**

Source: https://data.worldbank.org/indicator/CM.MKT.TRAD.GD.ZS

Do the causal effects of COVID-19 related economic support on the stock returns vary across emerging stock markets in terms of different time scales?

The empirical results of the study show that the causal effects of COVID-19 related economic support on stock market returns vary across emerging stock markets in terms of different time scales. For example, in Brazil, we found the evidences of short-and long-run causal effects. Our finding with respect to Brazil is in line

with Zhang et al. (2022) who claim that Brazil stock market shows outstanding resiliency to COVID-19 as Brazilian investors tend to focus on national situation rather than external shocks, hence the duration of stock price absorptivity is short. In addition, COVID-19 related economic support do have causal effects on stock markets in countries like the United Arab Emirates, Qatar, and Turkey only in the long-run. In countries like Chile, Mexico, Malaysia, Russia, and Thailand we found evidences of causal effects in the medium- and long-term. One striking feature of all these findings is that evidences of the most of these causal effects are coming from countries in the same regions. These regions are Latin America and South-East Asia. Besides countries in these regions, Russia's stock market returns show a similar pattern.

4. Conclusion

This study investigates the impacts of COVID-19 related economic support on the stock market returns in 19 emerging countries by considering instant reactions, short-term reactions, mid-term reactions and long-term reactions. The findings of the study provide evidence that economic support do have significant effects on stock markets in the short-term, medium-term, and long-term in all the countries, except for China. The causal relations between stock market returns and COVID-19 related economic support imply that economic support was typically channelled to stock market investments rather than spending in the economy. Our findings also illustrate that the causal effects of COVID-19 related economic support on the stock returns vary across emerging stock markets in terms of different time scales. Some emerging markets seem to exhibit an immediate reaction to the economic support , while most stock market reactions seem to occur over the medium-term and long-term. These cross-country differences mainly seem to result from the level of stock market development, particularly in terms of market depth. Furthermore, regional, and cultural reasons may have been influential. Future studies may focus on country-specific cultural determinants of investment behaviour to explain the time-scale of stock market reactions to government policies implemented to combat pandemics or similar extreme events.

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