THE ASYMMETRICAL IMPACT OF POLICY RESPONSES ON VOLATILITY OF SOVEREIGN DEFAULT SWAPS

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Abstract

The COVID-19 pandemic has adversely influenced economies around the world through supply and demand channels. The increasing uncertainty and the decreasing demand due to the strict social measures of the government to cushion the spread of the pandemic have transformed COVID-19 from a health crisis into an economic crisis. To moderate the negative economic atmosphere during this period, the governments have implemented expansionary fiscal policy. The purpose of this paper is to investigate the impacts of the social and economic measures taken during COVID-19 on the volatility of sovereign credit default swaps for Turkey, Italy, Spain, the United Kingdom, and the United States. The empirical findings indicate that social distancing measures increase uncertainty, but health and economic policies moderate the negative impacts on the economy of Turkey, Spain, and the United Kingdom. The impact of the policies in question is greater in the high number of case regimes.

Keywords: Credit default swap premium, public policies, threshold regression

JEL Classification: C24; G18; I18

1. Introduction

Fluctuations in fundamental macroeconomic variables may increase the likelihood of sovereign default, especially for countries that generate dollar-denominated export income and pay a foreign debt in dollars, which causes the economic indicators to severely deteriorate (Hilscher and Nosbusch, 2010). Increasing credit risk leads to tremendous losses in hedging costs against potential losses from public debt. Particularly with the European debt crisis, interest in sovereign credit default swaps (CDSs) seems to have increased over

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the past decade due to their speculative nature and the potential to exacerbate the collapse in the credit market and affect borrowing costs. Thus, CDS premiums, which serve as insurance against the risk of failure to repay sovereign debt, have become a key indicator closely followed by international investors (Weistroffer, 2009).

Credit Default Swap (CDS), proposed by JP Morgan Chase in 1995, is acknowledged as an important measure of country risk premium, especially in emerging market economies. CDS gives information about the financial situation and ensures the balance of credit risk (IMF, 2013). In summary, CDS accepted as a popular indicator of a country's risk is an insurance-type credit derivative contract covering the loss to be incurred against the country's insolvency risk. The investor has invested in bonds (Tang ve Yan, 2012). Sovereign risk is an important aspect for investors who want to make portfolio investments or direct investments in emerging markets. Therefore, the CDS market reflecting market participants' perceptions regarding the creditor country's financial health is used as a market-based indicator for sovereign risk (Badaoui et al., 2013; Bouri et al., 2017). Consequently, investors can comment on the risk position and decide on their investments by monitoring CDS premiums.

Uncertainty in economic conditions is the driving factor that affects movements in CDS premiums. If uncertainty increases in the economy, it leads to excessive volatility in CDS premiums. Over the past two decades, uncertainty in the global economy has increased due to spillover effects of the European sovereign debt crisis, The Ebola pandemic, the Brexit withdrawal agreement, the Asian conflicts, the trade war between China and the United States, etc. The final wave of uncertainty stemmed from the COVID-19 pandemic, which has turned into an economic crisis in addition to a health crisis (Liu, 2020).

COVID-19, which emerged in Wuhan China, in December 2019, turned into a global outbreak in the early months of 2020. Public health and social measures such as quarantine applications, travel restrictions, factory closures or reduction in production, and significant reduction of many activities in the service sector, which are taken by many countries to control the spread of the COVID-19 pandemic, have led to unprecedented disruption of economic and social life. Similarly, many workplaces have implemented a home-office application. Congresses, organizations, and sports activities were delayed and postponed later (Ayittey et al., 2020). These measures taken against the COVID-19 pandemic have caused important consequences from the labor market to the tourism sector, from the financial markets to the service sector. This health crisis, unlike the previous crisis, has emerged as a supply and demand shock. Many governments implemented financial support packages for businesses and workers to reduce the adverse effect of the COVID-19 pandemic on economies (Williams and Kayaoglu, 2020). While the number of cases, which continues to increase daily, feeds the uncertain environment, the so-called uncertainty brings along risk and fear. It harms the economy.

It is uncertain how long it will take to keep the health crisis under control. In case the violence of the COVID-19 pandemic deteriorates more than expected, or developments in treatments or testing don't actualize, the decline in economic activity may be sharper. With the increase in the second wave case number and start, the stringent social distancing measures will come back to decrease in new cases per day—the WHO has announced the minimum required conditions so that the governments can safely loosen the social distancing measures.

In light of this information, this study investigates the effects of governments' responses to the COVID-19 pandemic on the volatility of sovereign CDS premiums for Turkey, Italy, Spain, the United Kingdom, and the United States. It is rather difficult to foresee the economic effect of COVID-19 because it is not clear how long the outbreak in question takes. A longer duration of COVID-19 will lead to a deep recession in the economy. Therefore, governments have had to take stringent measures to support economic recovery and delimit the spread of the pandemic. In this context, we take into account the policy indices: the overall government response index, stringency index, containment, and health index, and economic support index generated to measure the extent of the government response to the COVID-19 pandemic. So, our objective is to assess the impacts of the measures taken against COVID-19 on sovereign risk. Empirical evidence offers a clear view that strict social distancing measures and health policies lead CDS premiums to increase by creating high uncertainty in the periods of a greater number of cases. Loosening of the so-called measures due to a decrease in the number of cases supports economic recovery, which reduces the movements in the volatility of sovereign CDS premiums.

Especially after the 2008 global financial crisis, the studies on CDS Premium have shown an increase (Alexander and Kaeck, 2008; Fender et al., 2012; Oliveria and Santos, 2014, Pires et al., 2015, Blommestein et al., 2016, Oh and Patton, 2018; Chen and Chen, 2018;

Yang et al., 2018; Chuffart and Hooper, 2019; Sabkha et al.,2019; David-Pur, L. et al., 2020;). Similarly, many studies in the literature focused on the economic impacts of COVID-19 (Baker et al.,2020; Kristoufek, 2020; McKibbin and Fernando, 2020; Zhang et al., 2020; Ramelli and Wagner, 2020; Sharif et al., 2020, etc.). However, these studies did not consider government response policies to COVID-19. The number of studies reviewing the impacts of the policies in question on economic activity (Ozili and Arun, 2020; Kuckertz et al., 2020; Oruonye and Ahmed, 2020; Zhang et al., 2020; Ozili, 2020; Leduc and Liu, 2020) is rather limited. These studies indicate that the social and economic policies, such as the number of days of lockdown and international travel restrictions, influenced the stock markets and economic activities in many countries by creating an unprecedented level of risk and increasing uncertainty through various supply and demand channels. They also specified that the restriction on internal movement and monetary and fiscal policy decisions positively affected the level of economic activities. However, we did not meet any study investigating the effect of COVID-19 on CDS volatility. This study assesses the impacts of the social, health, and economic policies taken against COVID-19 on sovereign CDS by using the threshold regression model. In other words, we present evidence of the asymmetrical impacts of governments' responses to the COVID-19 pandemic on the credit market by using a nonlinear econometric model.

The study contributes to the literature in several ways:

1. We contribute to the literature in question by assessing how socio-economic policies, such as social distancing, health policies, and economic support policies, impact sovereign risk, a subject not to have been investigated in the existing literature.
2. This study empirically focuses on the economic effect of COVID-19 by means of its impact on uncertainty and the response to socio-economic policies.
3. This study uses a nonlinear threshold regression model in to analyse the effects in question.

The study provides policymakers with strategies for the economic advantage of the so-called policy responses.

The rest of the paper is designed as follows. Section 2 describes the methodology used in the study. Section 3 shows the empirical results of the model on the impacts of socio-economic policies on sovereign risk. Section 4 concludes the study.

2. Model

The effect of social, health, and economic policies taken against COVID-19 on sovereign CDS volatility is analysed using a two-step process: 1) Univariate EGARCH volatility model is used to obtain conditional volatility of each CDS premium. 2) The threshold regression model, which is one of the nonlinear time series models, is used to find asymmetric effects of the policies regarding conditional volatility.

Step 1) One of the main characteristic features of the financial time series is the volatility cluster, known as heteroscedasticity. To overcome the so-called problem, firstly, the ARCH model was proposed by Engle (1982). Bollerslev (1986) developed the GARCH model by including lagged values of conditional variance in the ARCH model. Then, alternative models (EGARCH (Nelson, 1991), TARCH (Zakoian, 1994), and APARCH (Ding et.al., 1993))were suggested to consider asymmetric effects. In this study, we used the EGARCH model to obtain the conditional volatility of CDS premiums. This model assumes that negative shocks have a greater effect on conditional volatility than positive shocks.

To model the CDS premiums, they are supposed to pursue an AR(1) process as follows:

$$y_t = \emptyset_0 + \emptyset_1 y_{t-1} + \varepsilon_t \tag{1}$$

where $y_t = \ln(CDS_t) - \ln(CDS_{t-1})$, $\emptyset_0$ is a constant, $|\emptyset_1| < 1$ and $\varepsilon_t = e_t \sigma_t$, e_t generates white noise with $E(e_{t-1}^2) = 1$.

The EGARCH model proposed by Nelson (1991) is as follows:

$$log(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j log\left(\sigma_{t-j}^2\right) + \sum_{i=1}^{p} \alpha_i \left|\frac{\epsilon_{t-i}}{\sigma_{t-i}}\right| + \sum_{k=1}^{r} \gamma_k \frac{\epsilon_{t-k}}{\sigma_{t-k}} \tag{2}$$

The presence of leverage effects can be tested by the hypothesis that $\gamma_i < 0$. If $\gamma_i \neq 0$, there is an asymmetric effect.

Step 2) Threshold regression models are non-linear, in which the relationships between dependent and independent variables vary depending upon a threshold variable. In these models, time-series data are separated into regimes by a threshold parameter, also called the change point. The so-called models allow coefficients to differ across regimes defined by a threshold variable above or below a threshold value.

Threshold regression models have improved rapidly since Tong and Lim (1980) and Tong (1983) studies. Common threshold models involve the threshold autoregression model, such as the smooth transition threshold model proposed by Chen and Tsay (1993), the threshold autoregressive heteroscedastic model proposed by Li and Lam (1995), and Li and Li (1996), and the self-exciting threshold model. Hansen (2011) and Tong (2011) evaluated the threshold autoregression model's improvement in time series. In the threshold autoregression model, the dependent variable is a function of its lagged values, while in the self-exciting threshold model, its lagged values are considered threshold variables.

A threshold regression model with two regimes identified by a threshold as follows:

$$y_t = x_t\beta + z_t\delta_1 + \varepsilon_t \qquad if \quad -\infty < w_t \leq \gamma \tag{3}$$

$$y_t = x_t\beta + z_t\delta_2 + \varepsilon_t \qquad if \quad \gamma < w_t < \infty \tag{4}$$

In the above equations y_t is a dependent variable, x_t is a 1xk vector of covariates possibly containing lagged values of y_t, β is a kx1 vector of regime-invariant parameters, z_t is a vector of exogenous variables with regime-specific coefficient vectors δ_1, δ_2 and w_t and γ are respectively a threshold variable and threshold value.

Regime 1 (equation 3) is identified as the subset of the observations that the value of w_t is lower than the threshold value γ while Regime 2 (equation 4) is identified as the subset of the observations that the value of w_t is higher than the threshold value γ (Hansen, 1997, 2000).

In our paper, y_t indicates CDS premium for Turkey, Italy, Spain, the United Kingdom (UK), and the United States (US) while z_t indicates government response index, stringency index, containment, and health index, and economic support index. w_t is the logarithm of the number of cases.

3. Data

This study is aimed to investigate the impacts of responses of governments to the COVID-19 pandemic on the volatility of Credit

Default Swaps (CDS) for Turkey, Italy, Spain, the UK, and the US. CDS is one of the important indicators indicating country risk and reflects adverse conditions and uncertainty in the economy. The stringency index, overall government response index, containment and health index and economic support index are used to measure the stringency of the policies implemented by governments. The stringency index consists of workplace, school closings, closed public events cancelation, restrictions on gathering size, stay-at-home requirements, closed public transport, restrictions on internal movement, restrictions on international travel, and public information campaigns. The containment and health index consists of school closing, workplace closing, cancelling public events, restrictions on gathering size, closing public transport, stay at home requirements, restrictions on internal movement, restrictions on international travel, public information campaign, testing policy, and contact tracking. The government response index consists of school closing, workplace closing, cancel public events, restrictions on gathering size, closing public transport, stay at home requirements, restrictions on internal movement, restrictions on international travel, public information campaign, testing policy, contact tracing, income support, and debt/contract relief for households. The economic support index consists of income support and debt/contract relief for households. They are obtained from the Oxford Covid-19 Government Response Tracker (OXCGRT). (Hale et.al., 2020). Each index takes a value between 0 and 100.

These indices should not be evaluated as a measure of the effectiveness of the response of a government (Hale et.al., 2020). CDS premiums in all countries have increased since the period in which the COVID-19 pandemic began to reveal itself in the countries in question. Therefore, it can be stated that the CDS premiums follow a way parallel to the increase in the number of cases. However, containment and health measures are taken to slow the spread of the COVID-19 pandemic. The economic support policies implemented to reduce the negative effects on the economy led to a decrease in CDS premiums. In Turkey and Italy, although economic support policies lagged behind closure and containment and health policies by June 2020, since this date, the economic support index was above other indices due to the decrease in measures with normalization steps. Although the economic support index was above the other ones in Spain and the United Kingdom, it was below other policy indices in the United States.

Table 1 (in the Appendix) shows descriptive statistics for Turkey, Italy, Spain, the United Kingdom, and the United States. The analysis period for each country began when the first of COVID-19 cases were revealed in the countries in question.

As seen in Table 1 (in the Appendix), Turkey has the highest mean CDS premium and the highest CDS premium variability according to standard deviation. The government response index, the stringency index, and the containment and health index have the highest mean values in Turkey. In contrast, the country has the highest mean value economic support index in Spain. In Turkey, Italy, and the United States, the mean containment and health measures taken to control the spread of the COVID-19 pandemic are above economic support measures. In Spain and the United Kingdom, economic support measures are greater than containment and health measures.

4. Empirical results

The return series for CDS premiums were generated using the formula of $ln(CDS_t/CDS_{t-1})$. Then, non-linearity and stationarity of the returns of CDS premiums are tested. We used Teraesvirta's neural network test, White neural network test, Keenan's one-degree test for nonlinearity, and Tsay's test for nonlinearity. The null hypothesis of Teraesvirta and White's tests is linearity, while the null hypothesis of Keenan's and Tsay's tests indicates that the time series follows some AR process. The results are given in Table 2. According to the results in Table 2, CDS premiums for all countries exhibit a nonlinear structure.

Table 2

The results of non-linearity tests

	Teraesvirta	White	Keenan	Tsay
CDS_{TURKEY}	10.816^{***}	9.483^{***}	9.993^{***}	7.152^{***}
	(0.004)	(0.008)	(0.002)	(0.000)
CDS_{ITALY}	3.701	4.020	0.072	4.005^{***}
	(0.157)	(0.133)	(0.787)	(0.000)
CDS_{SPAIN}	12.582^{***}	14.664^{***}	3.944^{**}	5.570^{***}
	(0.001)	(0.000)	(0.049)	(0.000)
$CDS_{UNITEDKINGDOM}$	6.757^{**}	8.216^{**}	5.555^{**}	1.188
	(0.034)	(0.016)	(0.019)	(0.264)
$CDS_{UNITEDSTATES}$	8.749^{**}	11.525^{***}	15.532^{***}	11.446^{***}
	(0.012)	(0.003)	(0.000)	(0.000)

Note: ***, **, * indicate significance at %1, %5 and %10 levels, respectively

Source: author's calculations

The stationarity of the variables in question was tested by using KSS (Kapetanious, Shin, and Snell, 2003) and Kruse's (2011) nonlinear unit root tests. The results are given in Table 3. KSS (2003) and Kruse (2011) nonlinear unit root tests are based on the nonlinear ESTAR (Exponential Smooth Transition Autoregressive) process. The null hypothesis of a unit roots against the alternative hypothesis of the globally stationary ESTAR process. In these tests, the deterministic elements do not include the auxiliary regression model.

Alternatively, three different alternatives are used: 1) raw data, 2) demeaned data, and 3) detrended data.

According to the results of the KSS and Kruse nonlinear unit root test results, the return series of CDS premiums for all countries show a globally stationary ESTAR process at significance level of 5%.

Table 3

The results of nonlinear unit root tests

	Raw Data	Demeaned Data	Data Detrended
	KSS Non-linear Unit Root Test		
CDS_{TURKEY}	-3.973***	-4.078***	-4.256***
CDS_{ITALY}	-4.167***	-4.245***	-4.323***
CDS_{SPAIN}	-4.347***	-4.480***	-4.859***
$CDS_{UNITEDKINGDOM}$	-3.868***	-3.884***	-3.858**
$CDS_{UNITEDSTATES}$	-2.636**	-2.979**	-2.704
	Kruse Non-linear Unit Root Test		
CDS_{TURKEY}	26.203***	26.427***	26.720***
CDS_{ITALY}	22.072***	22.176***	21.687***
CDS_{SPAIN}	31.067***	31.398***	32.102***
$CDS_{UNITEDKINGDOM}$	34.738***	34.843***	33.470***
$CDS_{UNITEDSTATES}$	31.593***	31.871***	31.979***

*Note: ***,**,* indicate significance at %1, %5 and %10 levels, respectively*
Source: author's calculations

We also applied TAR unit root test proposed by Caner and Hansen (2001) for CDS return series in Turkey, Italy, Spain, the United Kingdom, and United States. Firstly, we examine whether TAR models are suitable. So, we estimate the TAR model constant for five series. The results are given in Table 4. The threshold values are respectively -0.0173, -0.0183, 0.03003, 0.0060 and 0.0085 for Turkey, Italy, Spain, United Kingdom, and United States. The observations are in first regime if CDS returns increase less than so-called values, otherwise in second regime.

Table 4

Estimation results for TAR models

Turkey				
	First Regime		Second Regime	
$\hat{\gamma} = -0.0173$	$Z_{t-1} < \hat{\gamma}$		$Z_{t-1} \geq \hat{\gamma}$	
	Estimate	Standard Error	Estimate	Standard Error
Constant	-0.0190	0.0038	-0.0005	0.0010
CDS(t-1)	-1.1788	0.1390	-1.0805	0.1146
DCDS(t-1)	-0.5329	0.1261	0.1402	0.0977
DCDS(t-2)	-0.0841	0.0671	0.1032	0.0655
Italy				
$\hat{\gamma} = -0.0183$	$Z_{t-1} < \hat{\gamma}$		$Z_{t-1} \geq \hat{\gamma}$	
	Estimate	Standard Error	Estimate	Standard Error
Constant	-0.0135	0.0046	-0.0015	0.0011
CDS(t-1)	-0.6143	0.1778	-1.0758	0.1102
DCDS(t-1)	-0.8914	0.1604	-0.0434	0.0917
DCDS(t-2)	-0.4961	0.1011	-0.0605	0.0538
Spain				
$\hat{\gamma} = 0.03003$	$Z_{t-1} < \hat{\gamma}$		$Z_{t-1} \geq \hat{\gamma}$	
	Estimate	Standard Error	Estimate	Standard Error
Constant	-0.0011	0.0012	-0.0031	0.0042
CDS(t-1)	-2.3498	0.1680	-3.2771	0.2120
DCDS(t-1)	0.5406	0.1284	1.2149	0.1573
DCDS(t-2)	0.1448	0.0670	0.2899	0.0677
United Kingdom				
$\hat{\gamma} = -0.0060$	$Z_{t-1} < \hat{\gamma}$		$Z_{t-1} \geq \hat{\gamma}$	
	Estimate	Standard Error	Estimate	Standard Error
Constant	0.0042	0.0032	-0.0023	0.0013
CDS(t-1)	-2.8918	0.2214	-2.5455	0.1787
DCDS(t-1)	1.0164	0.1772	0.6875	0.1254
DCDS(t-2)	0.3628	0.0956	0.0948	0.0565
United States				
$\hat{\gamma}$ =0.0085	$Z_{t-1} < \hat{\gamma}$		$Z_{t-1} \geq \hat{\gamma}$	
	Estimate	Standard Error	Estimate	Standard Error
Constant	0.0000051	0.0014	0.01068	0.00484
CDS(t-1)	-2.134	0.1393	-4.574	0.2584
DCDS(t-1)	0.4325	0.1033	2.429	0.2088
DCDS(t-2)	0.1125	0..0463	1.345	0.1231

Source: author's calculations

Table 5 shows the results of non-linear unit root test of TAR. The delay parameter m is chosen as 1 by minimum SSE value. The lag parameter p is detected by the AIC information criteria. The results of the Wald test based on the bootstrap threshold test investigating the threshold effect in a series indicate the presence of threshold effect for all countries. Therefore, the null hypothesis of linearity is rejected at the 0.05 significance level. Then, we evaluated R_1 and R_2 tests statistics. R_2 test is tested the null hypothesis of $H_0 = \rho_1 = \rho_2 = 0$ against the alternative hypothesis of $H_0 = \rho_1 \neq \rho_2 \neq 0$. R_1 test is tested the null hypothesis of $H_0 = \rho_1 = \rho_2 = 0$ against the alternative hypothesis of $H_0 = \rho_1 < 0$, $\rho_2 < 0$.

Table 5

Caner and Hansen (2001) unit root test results

	Wald statistics	Boot p-value	Asymp. p value
Turkey			
Bootstrap Threshold Test	66.01	0.000	0.000
Two-way Wald Test R_2	161	0.000	0.000
One-way Wald Test R_1	161	0.000	0.000
t_1 test	85	0.000	0.000
t_2 test	9.426	0.000	0.000
Italy			
Bootstrap Threshold Test	29.09	0.000	0.000
Two-way Wald Test R_2	107	0.000	0.000
One-way Wald Test R_1	107	0.000	0.000
t_1 test	3.453	0.030	0.031
t_2 test	9.756	0.000	0.000
Spain			
Bootstrap Threshold Test	20.251	0.010	0.025
Two-way Wald Test R_2	435	0.000	0.000
One-way Wald Test R_1	435	0.000	0.000
t_1 test	14	0.000	0.000
t_2 test	15.459	0.000	0.000
United Kingdom			
Bootstrap Threshold Test	14.99	0.07	0.09
Two-way Wald Test R_2	373	0.000	0.000
One-way Wald Test R_1	373	0.000	0.000
t_1 test	13.1	0.000	0.000
t_2 test	14.24	0.000	0.000
United States			
Bootstrap Threshold Test	90.61	0.000	0.010
Two-way Wald Test R_2	548	0.000	0.000
One-way Wald Test R_1	548	0.000	0.000
t_1 test	15.3	0.000	0.000
t_2 test	17.7	0.000	0.000

Source: author's calculations

According to the results in Table 5, the null hypothesis is rejected at 0.05 significance level for all countries. The stationarity for each regime is tested by t_1 and t_2 tests. From the results of t_1 and t_2 tests, it is inferred that CDS returns are stationary for each regime.

We estimate the AR(1)-EGARCH(1,1) model to obtain the conditional variance of CDS premiums due to our purpose, which is to determine the impacts of the measures against COVID-19 on the volatility of CDS premiums. Then, we estimated the threshold regression model. Table 6 (in the Appendix) consists of three parts, which are Panel A, Panel B, and Panel C. Panel A, Panel B, and Panel C, respectively, indicates the estimation results for linear model, low regime, and high regime.

The linear model results given by Panel A can be summarized as follows: Government response index lead volatility in CDS premiums to increase for only Italy and Spain with the highest number of cases and mortality rates. Similarly, stringency index, containment, and health index increase the volatility in CDS premiums for Turkey, Italy, and Spain while economic support index has reducing impact on the so-called volatility only for Turkey.

As examined by panel B, during the period in which daily cases are lower than the endogenously determined threshold value by the model, the overall government response index statistically significantly decreases volatility in the CDS premium for Turkey, while it enhances the volatility CDS premiums for Italy and the United Kingdom. The stringency index statistically significantly negatively affects volatility in the CDS premium for Turkey while positively affecting Italy, Spain, and the United Kingdom. The containment and health index reduces volatility in CDS premiums for Turkey, although it enhances volatility in CDS premiums for Italy, Spain, and the United Kingdom. The economic support index has a statistically significant and decreasing effect on volatility in only Turkey. However, there is no statistically significant effect in Italy, Spain, the United Kingdom, and the United States.

According to the results given by Panel C, during the period in which daily cases are higher than the threshold value, the government response index has a decreasing effect on volatility in CDS premiums for Turkey and the United Kingdom, and it has an increasing effect in Italy, Spain, and the United States. The stringency index improves the volatility of CDS premiums for Turkey, Italy, and Spain while it reduces in the United Kingdom. The containment and health index diminish the volatility in question for Turkey and the United Kingdom while enhancing it for Italy and Spain. The economic support index decreases the so-called volatility in Turkey, Spain, and the United Kingdom, while increasing in the United States.

5. Conclusion

The COVID-19 pandemic is an unprecedented disaster that adversely affects the global economy through the supply and demand chains. This pandemic led to an economic crisis as well as a health crisis in terms of its social and economic impacts on society. Governments worldwide have taken some measures against this health crisis, including social distancing measures, health policy, and economic support policy, to temper its negative impacts on the economy. However, uncertainty from the strict measures taken to stop an increase in the number of cases has led to the deterioration of macroeconomic stability, reflected in sovereign CDS premiums.

This paper focuses on how social distancing, containment, and health measures taken to slow the spread of the COVID-19 pandemic and economic support policies implemented to decrease its negative effects on the economy affect movements in sovereign CDS premiums in different regimes in which the daily number of cases is above or below a given threshold. The empirical results indicate that in the context of the global economy and integrated cross-border supply chains, social distancing, and containment measures implemented to decrease the spread of COVID-19, such as lockdown and international travel bans, have brought the global economy to a sharp stop, and as a result of which, the so-called measures have created an increasing effect on the volatility of sovereign CDS for Turkey, Italy, and Spain. However, economic support policies by the governments around the world to help households and businesses to recover rapidly have enabled the volatility of sovereign CDS premiums for Turkey to decrease. When we consider the United States, none of the so-called polices creates a significant impact on CDS premiums. However, the results differ in terms of the regimes.

In low regime, government response index, stringency index, containment and health index create a mitigating effect on CDS for Turkey, but an enhancing effect for Italy, Spain, and United Kingdom. Economic support index has a significant and decreasing effect on it for only Turkey. The reason of so-called discrepancy is that the uncertainty among investors multiplies due to the suddenly increased number of incidence and death in Italy, Spain and United Kingdom in spite of a quite restricted increase in Turkey. None of the policies in question have a significant impact on CDS for the United States due to the quite low levels of these policies.

In a high regime, the government response index and the containment and health index cushion the effect on CDS for Turkey and the United Kingdom but compound it for Italy and Spain. The collapse of the health systems of Italy and Spain due to having a rather high rate of case and death from COVID-19 and therefore the implementation of very strict stringency and lockdown policies to diminish the increase rate of case and death have caused the uncertainty to increase, which creates a pressure on CDS premium. In spite of that, the success of the health policies in reducing of the growth rate of cases and death due to COVID-19 and having a strong health system of Turkey as a emerging economy have led to more flexible stringency and partial lockdown policies, which allows the negative effects of COVID-19 on the economy to mitigate. Economic support policies help adverse economic situation from COVID-19 to recovery for Turkey, Italy and Spain. The results show that the support policies are swift and adequately implemented in the so-called countries. For the United States, government response index and economic support index increase the volatility of CDS premiums. The reason for this result can be attributed to the failure to make timely decisions on economic support packages and stringency policies and the insufficient amount of economic support packages in United States.

The results of the threshold regression model show that the effects of the so-called policies to control the spread of COVID-19 and to reduce its economic effect on the volatility of CDS premiums are higher in the high regime.

As a conclusion, excessive lockdown precautions and string stringency policies to prevent spread of the so-called virus in the initial periods of the COVID-19 have led economic activity to decelerate by disrupting supply and demand channels. Therefore, countries have experienced substantial losses and the higher CDS premiums. Therefore, the composition of the policies of stringency, containment and health and economic support contributes to reducing the adverse effects on the volatility of CDS premiums due to COVID-19. In particular, the power of the health system enhances the effectiveness of stringency and lockdown policies by helping to control the number of cases and deaths. In the event of inadequate fiscal capacity, CDS premiums give more reaction to an exogenous shock. Thus, ensuring that the amount of economic support packages is at the required level and in time is of importance in terms of increasing the effectiveness of the policy.

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Appendix

Table 1

Descriptive Statistics

TURKEY (12.3.2020-14.8.2020)					
	CDS	Government Response	Stringency	Containment Health	Economic Support
Mean	531.8993	66.55161	64.76705	67.04402	63.83929
Median	534.4900	70.51000	63.89000	67.42000	62.50000
Maximum	651.9100	75.00000	75.93000	77.27000	87.50000
Minimum	414.7900	25.00000	23.15000	29.55000	0.000000
Std. Dev.	60.54095	9.676342	12.26641	10.04911	31.04583
Skewness	-0.076792	-1.798.127	-1.134.528	-1.270.937	-1.218.094
Kurtosis	2.094965	7.289273	3.924743	4.826972	3.112897
Jarque-Bera	3.932488	146.2109***	28.01759***	45.72843***	27.75621***
Observation	112	112	112	112	112

ITALY (30.1.2020-14.8.2020)					
	CDS	Government Response	Stringency	Containment Health	Economic Support
Mean	171.6838	62.73141	62.21049	65.56127	47.18310
Median	163.8950	64.10000	60.64500	64.77500	50.00000
Maximum	260.0100	85.26000	93.52000	91.67000	75.00000
Minimum	97.54000	5.770000	8.330000	6.820000	0.000000
Std. Dev.	43.03560	17.56103	22.48748	19.33178	28.72877
Skewness	0.095044	-1.043.100	-0.307809	-0.496674	-0.693468
Kurtosis	2.308619	4.011427	2.505177	2.906071	2.054689
Jarque-Bera	3.042004	31.80337***	3.691024	5.890411**	16.66845***
Observation	142	142	142	142	142

SPAIN (31.1.2020-14.8.2020)					
	CDS	Government Response	Stringency	Containment Health	Economic Support
Mean	83.19839	59.84773	57.24348	56.52021	78.28014
Median	77.85000	66.99000	64.35000	63.26000	87.50000
Maximum	148.7300	81.41000	85.19000	80.30000	87.50000
Minimum	34.11000	21.79000	11.11000	16.67000	50.00000
Std. Dev.	30.82160	19.39019	25.71215	20.52685	15.85688
Skewness	0.184427	-0.933916	-0.780062	-0.839485	-1.197.091
Kurtosis	2.126104	2.493264	2.315858	2.383195	2.486531
Jarque-Bera	5.286019	22.00526	17.04947	18.79641	35.22506
Observation	141	141	141	141	141

UNITED KINGDOM (20.1.2020-14.8.2020)					
	CDS	Government Response	Stringency	Containment Health	Economic Support
Mean	16.54209	55.17940	52.28447	52.29120	71.00000
Median	14.82000	70.51000	67.59000	65.15000	100.0000
Maximum	27.97000	78.85000	75.93000	75.00000	100.0000
Minimum	10.80000	2.560000	0.000000	3.030000	0.000000
Std. Dev.	5.195291	26.95279	28.49920	23.93065	44.73824
Skewness	0.661600	-0.902545	-0.856948	-0.911890	-0.930447
Kurtosis	2.078863	1.972618	1.875695	2.088146	1.894801
Jarque-Bera	16.24596	26.96163	26.25940	25.98534	29.27746
Observation	150	150	150	150	150

UNITED STATES (21.1.2020-14.8..2020)					
	CDS	Government Response	Stringency	Containment Health	Economic Support
Mean	11.01435	53.59282	54.16242	55.95940	42.36577
Median	10.20000	68.91000	68.98000	70.08000	62.50000
Maximum	16.61000	71.47000	72.69000	73.11000	62.50000
Minimum	8.860000	3.850000	0.000000	4.550000	0.000000
Std. Dev.	1.356623	26.28075	28.09265	26.47196	29.30470
Skewness	0.592833	-1.083.868	-1.115.973	-1.144.648	-0.761193
Kurtosis	3.509483	2.316738	2.355211	2.430050	1.579414
Jarque-Bera	10.33921	32.07180	33.50845	34.55383	26.91760
Observation	149	149	149	149	149

Source: author's calculations

Table 6

The estimation results of threshold regression

	TURKEY				ITALY				SPAIN			
	Model 1	Model 2	Model3	Model 4	Model 1	Model 2	Model3	Model 4	Model 1	Model 2	Model3	Model 4
Panel A: Linear Model												
Constant	0.0042*	-0.0086**	-0.0063*	0.0029***	-0.0064***	-0.0066***	-0.0084***	0.0010***	-0.0167***	-0.0085***	-0.0144***	0.0021
	(0.0022)	(0.0037)	(0.0035)	(0.0006)	(0.0015)	(0.0010)	(0.0020)	(0.0001)	(0.0040)	(0.0018)	(0.0032)	(0.0149)
Government	-0.0016	-	-	-	0.0043***	-	-	-	0.0134***	-	-	-
Response	(0.0012)				(0.0009)				(0.0024)			
Stringency	-	0.0023**	-	-	-	0.0044***	-	-	-	0.0090***	-	-
	-	(0.0009)				(0.0006)				(0.0013)		
Containment Health	-	-	0.0042**	-	-	-	0.0053***	-	-	-	0.0123***	-
	-		(0.0020)				(0.0011)				(0.0021)	
Economic Support	-	-	-	-0.0010***	-	-	-	0.00015	-	-	-	0.0024
				(0.0003)				(0.00012)				(0.0078)
Panel B: Low Regime												
$w_t \leq \gamma$	3116	1542	1704	3116	2091	2091	2091	2091	2114	2114	2114	921
Constant	0.0038	0.0019**	0.0032***	0.0022***	-0.0011***	-0.0014***	-0.0018***	0.0006***	0.0007	-0.0001	-0.0002	0.0010
	(0.0103)	(0.0008)	(0.0010)	(0.0004)	(0.0003)	(0.0003)	(0.0006)	(0.0001)	(0.0024)	(0.0011)	(0.0019)	(0.0038)
Government	-0.0052***	-	-	-	0.0009***	-	-	-	0.0017	-	-	-
Response	(0.0018)				(0.0002)				(0.0013)			
Stringency	-	-0.0033***	-	-	-	0.0011***	-	-	-	0.0024***	-	-
		(0.0002)				(0.0002)				(0.0008)		
Containment Health	-	-	-0.0014**	-	-	-	0.0013***	-	-	-	0.0024**	-
			(0.0005)				(0.0003)				(0.0012)	
Economic Support	-	-	-	-0.0009***	-	-	-	-0.00009	-	-	-	0.0007
				(0.0002)				(0.00007)				(0.0020)
Panel C: High Regime												
$w_t > \gamma$	3116	1542	1704	3116	2091	2091	2091	2091	2114	2114	2114	921
Constant	0.1590***	-0.0569***	0.4048***	0.0116***	-0.0224	-0.0433**	-0.0530**	0.0031***	-0.3176***	-0.2482***	-0.2833***	0.1511
	(0.0433)	(0.0147)	(0.0597)	(0.0006)	(0.0141)	(0.0217)	(0.0262)	(0.0004)	(0.0637)	(0.0246)	(0.04004)	(0.0200)
Government	-0.0830***	-	-	-	0.0137*	-	-	-	0.1777***	-	-	-
Response	(0.0234)				(0.0074)				(0.0340)			
Stringency	-	0.0138***	-	-	-	0.0240**	-	-	-	0.1397***	-	-
		(0.0035)				(0.0111)				(0.0132)		
Containment Health	-	-	-0.2140***	-	-	-	0.0290**	-	-	-	0.1607***	-
			(0.0316)				(0.0135)				(0.0218)	
Economic Support	-	-		-0.0037*	-	-	-	0.00038	-	-	-	-0.0726**
				(0.0022)				(0.0003)				(0.0105)
LM-test	15.2939***	21.5753***	17.4001***	47.4907***	55.3989***	62.5266***	63.0517***	55.6697***	33.7924	37.8369***	35.2393***	35.0361***

*Note: ***,**,* indicate significance at %1, %5 and %10 levels, respectively. The values in the parentheses are standard errors*

Table 6 (contin.)

	UNITED KINGDOM				UNITED STATES			
	Model 1	Model 2	Model3	Model 4	Model 1	Model 2	Model3	Model 4
Panel A: Linear Model								
Constant	0.0006***	0.0006***	0.0006***	0.0007***	0.0016	0.0023***	0.0014	0.0035***
	(0.0001)	(0.0001)	(0.0001)	(0.0008)	(0.0011)	(0.0006)	(0.0012)	(0.0005)
Government Response	0.00007	-	-	-	0.0016	-	-	-
	(0.0008)				(0.0010)			
Stringency		0.00009*	-	-	-	0.0012	-	-
	-	(0.0005)				(0.0007)		
Containment Health	-	-	0.00006	-	-	-	0.0016*	-
			(0.0009)				(0.0010)	
Economic Support	-	-	-	0.00003	-	-	-	0.0005
				(0.0004)				(0.0006)
Panel B: Low Regime								
$w_t \leq \gamma$	56	56	56	70	57525	34720	34720	18665
Constant	0.0003***	0.0004***	0.0003***	0.0005***	0.0013	0.0029	0.0029***	0.0035***
	(0.0005)	(0.0003)	(0.0005)	(0.0006)	(0.0047)	(0.0006)	(0.0008)	(0.0005)
Government Response	0.00012***	-	-		-0.0009	-	-	-
	(0.0004)				(0.0008)			
Stringency	-	0.00008***	-	-	-	-0.0005	-	-
		(0.0003)				(0.0006)		
Containment Health	-	-	0.00012***	-	-	-	0.00002	-
			(0.0004)				(0.0004)	
Economic Support	-	-	-	0.00004	-	-	-	-0.0001
				(0.0003)				(0.0003)
Panel C: High Regime								
$w_t > \gamma$	56	56	56	70	57525	34720	34720	18665
Constant	0.0040***	0.0037***	0.0042***	0.0020***	-0.7032**	0.4543	0.5624*	0.0643***
	(0.0004)	(0.0003)	(0.0004)	(0.0002)	(0.3379)	(0.2318)	(0.2873)	(0.0069)
Government Response	-0.0017***	-	-	-	0.3918**	-	-	-
	(0.0002)				(0.1877)			
Stringency	-	-0.0016***	-	-	-	-0.2427	-	-
		(0.0001)				(0.1245)		
Containment Health	-	-	-0.0019***	-	-	-	-0.3004*	-
			(0.0002)				(0.1541)	
Economic Support	-	-	-	-0.0006***	-	-	-	0.0176***
				(0.0001)				(0.0058)
LM-test	14.6267***	13.8868***	16.2315***	14.8365***	30.2321***	13.4069**	13.9994**	38.2333***

*Note: ***,**,* indicate significance at %1, %5 and %10 levels, respectively. The values in the parentheses are standard errors.*
Source: author's calculations