Preliminary communication
UDC: 616.9-036.21Covid-19: 336.76(560)
https://doi.org/10.18045/zbefri.2022.2.421

Emerging equity market reaction to pandemic prevention policy: Evidence from regression discontinuity design*

Bora Aktan[1]

Abstract

The purpose of this study is both to release the effects of the current pandemic on emerging equity markets and to examine the efficacy of the prevention policy to lessen the plausible negative effects. In this context, Turkey, as an emerging market, is examined by adopting the Regression Discontinuity Design which is a robust non-experimental approach for evaluating the causal effects of interventions. The results of the research reveal that the COVID-19 pandemic is effective in Bourse Istanbul after a certain period when it first appeared in the world. And therewithal, the efficiency of preventing policy taken in the country statistically decreased the negative impact of the pandemic.

Key words: *COVID-19, pandemic, emerging equity markets, Turkey, regression discontinuity*

JEL classification: *G10, G18*

1. Introduction

The coronavirus crisis, namely COVID-19, broke out in the city of Wuhan, China, in December 2019. Since the influenza pandemic of 1918, COVID-19 was unique considering its astounding global spread, which is due to exponentially growing cases resulting from a delayed response in terms of general awareness. China officially informed World Health Organization (WHO) about the unknown illness on 31st of December 2019. WHO declared COVID-19 as a global emergency on the

* Received: 29-04-2022; accepted: 29-12-2022

[1] *Associate Professor, University of Bahrain, College of Business Administration, P.O. Box: 32038, Kingdom of Bahrain. Scientific affiliation: finance, investments, merging financial markets. Phone: +973 17438547. E-mail: gbora@uob.edu.bh.*

30th of January 2020, which was later declared a pandemic on the 11th of March 2020. On the 19th of January 2022, 328,826,023 confirmed cases with 5,557,754 deaths in total were reported to WHO.

Governments took emergency measures like lockdowns, restrictions on travel, and quarantining to ensure social distancing. Such measures increased social distancing in addition to putting people in difficult situations as most people's incomes considerably decreased, and general economic activity slowed down. Unfortunately, today's world has to deal with the social and moral costs in addition to the financial and economic consequences of the pandemic. Stock markets have faced a few shock waves starting in February 2020, and the uncertainty stemming from COVID-19 has continued to prevail. While COVID-19 has a larger impact on some industries, it has negatively affected global domestic demand and has created enormous economic destruction through the disruption to operations and finance unprecedentedly. On the 16th of March 2020 and 12th of March 2020, there were 12.93% and 9.99% declines in DJİA, respectively, which was the third and the sixth largest daily drops for it (World Economic Forum, 2020). Bloomberg announced that: *Through 1 p.m. on March 18 the S&P 500 index was off 27% for the year to date, Germany's DAX was down 38%, and Japan's Nikkei was off 29%* (Coy, 2020). The first quarter of 2020 was the worst quarter since 1987 for FTSE100 as it dropped by 24.80% (Partington, 2020). Global output collapsed in the first two quarters of 2020 with decreases of more than one-fifth in some advanced and emerging market economies, including Great Britain, Spain, and India. Even though there are some efforts to re-balance the output and other financial indicators, the recovery process slowed down during the summer (OECD, 2020).

The primary goal of this study is to assess how China's official announcement of the pandemic's presence and the preventive measures that have been made public by governments to combat it have affected the economy of the nation. Numerous studies in the existing literature have concentrated on these research issues for this goal (Baker et al., 2020a; Okorie and Lin, 2020; Zhang et al., 2020; Akhtaruzzaman et al., 2020; Zaremba et al., 2020; Haroon and Rizvi, 2020; Harjoto and Rossi, 2021). In this study, the effects of the precautionary measures decided upon for the announced pandemic in Turkey with the official announcement of the pandemic by China on the nation's economy will be measured for the first time using a method (Regression Discontinuity Design) that is statistically more appropriate for the case in question. Therefore, this study will contribute to the methodologically relevant literature by demonstrating the usability of this method in the COVID-19 pandemic or similar cases.

This study used both BIST100 Index return values in the log-return form and Turkey's 5-Year Credit Default Swap (CDS) values starting from the 3rd of September 2019. On the 31st of December 2019, China reported the cases of unknown illness to WHO, hence the agents in the financial markets were informed

about it by then. In addition, on the evening of the 10th of March 2020, the first case of COVID-19 in Turkey was announced by the Ministry of Health of Turkey. After this incidence, the government's first economic stimulus announced was a $15.4 billion economic stability package on the 18th of March 2020. Benefiting from these two cut-offs, Regression Discontinuity Design (RDD) is applied in our study to calculate the causal effect of the announcements by comparing the groups treated and untreated. The timing of the report and the first economic stimulus package in Turkey were unexpected, hence its exogeneity was ensured.

This study aims to measure the impact of the COVID-19 pandemic on the Turkish economy with two cases. The first is the event of China officially announcing the COVID-19 pandemic to the world, and the second is the announcement of precautionary policies for the COVID-19 pandemic in Turkey. In this regard, the research has two main questions. These are (i) Does China's pandemic announcement have an impact on the country's economy? and (ii) Do countries' pandemic preparedness packages have an impact on their economies? These two research questions will be tested within the scope of this research specific to the Turkish economy. The hypothesis proposed for the first research question is that China's pandemic announcement has an impact on the economies of the countries. The main reason for this was that the global effects of the COVID-19 case were expected to harm the economies of the countries in the short and long term. In particular, it was clear that problems would arise in trade supply chain management due to the quarantine practices implemented by China following the outbreak of the pandemic. The hypothesis proposed for the second research question is that the precautionary policies developed by the countries against the pandemic have a positive effect on the economies of the countries. The main reason for this is to reduce the risk and uncertainty caused by the pandemic.

By adopting the RDD approach, the current study can make some important contributions to not only the literature but also our understanding of emerging equity markets' reaction to governments' prevention policies against the great coronavirus pandemic of 2020. According to our results, the announcement China made did not have a significant impact on the log return of BIST100. Hence, there was a lagged reaction by financial markets, which resulted in becoming an inefficient market. The first economic stimulus package did not have a significant impact on the log return of BIST100 when we use our full dataset. We found that this package had an increasing effect on the log return of BIST100 when the dataset is narrowed down to start on the 31st of December 2019. The remainder of the paper is as follows: Section 2 briefly reviews the previous studies. Data and empirical methodology are explained in Section 3 whereas results are demonstrated in Section 4 and, finally in Section 5, the conclusion is presented.

2. Literature review

Existing literature about pandemics is limited as pandemics at the global scale are rarely witnessed. Even though these occurrences are unfortunate, they provide academia with the opportunity to investigate the tail risks and reaction dynamics in financial markets, which, accordingly, has led to increased interest in the relation of the economic and financial impacts of COVID-19.

Baker et al. (2020a) examined the response of the U.S. stock market to COVID-19 and other viral epidemics, such as the Spanish Flu, and discovered that COVID-19 caused remarkable market volatility compared to previous infectious diseases, which had only moderate effects on the U.S. stock market. In this study, neither quasi-experimental nor experimental methods are employed. He attributed this outcome to government constraints on business activity and voluntary social separation in the service-based economy of the United States. Okorie and Lin (2020) explored the contagion effect of the COVID-19 pandemic on the financial markets, and they discovered a substantial fractal contagion impact on market volatility and market return that dissipates over the medium and long term for both the stock markets' return and volatility. This study utilized the Detrended Moving Cross-Correlation Analysis (DMCA) and Detrended Cross-Correlation Analysis (DCCA) methods before and after the treatment date. Zhang et al. (2020) examined the volatility of stock markets in the nations with the greatest number of confirmed cases between January and February of 2020. He demonstrated that volatility increased considerably in February owing to COVID-19. In this research, authors conducted volatility analysis, correlation analysis, and minimum spanning tree algorithm in their research setting. Akhtaruzzaman et al. (2020) explored whether financial contagion occurs among listed enterprises in China and the G7 nations and found that conditional correlations for market returns increased significantly over the COVID-19 period. In addition, they discovered that the financial contagion follows a similar pattern to the viral spread. In this paper, volatility is modeled through the DCC-GARCH framework.

Harjoto and Rossi (2021) worked on market reaction to WHO's announcement comparing developed and developing countries as an event study. They used daily stock index data and adopted Carhart and GARCH (1,1) models. Findings indicated that the COVID-19 pandemic had a significantly greater negative impact on the equity markets in developing countries. In their study, Haroon and Rizvi (2020) looked at the connection between stock market volatility and news reports about the coronavirus. They discovered that this sort of news spreads fear among individuals, which is linked to rising equity market volatility. They demonstrated that the most severely impacted industries had increased volatility. In this study, the E-GARCH model is used to model volatility. When examining the influence of governmental interventions on the impact of COVID-19 on stock market volatility, Zaremba

et al. (2020) showed that these actions had a limited impact in terms of both magnitude and breadth by using panel data regression. The impact of worldwide pandemic economic uncertainty on broad commodity price indices was examined by Bakas and Triantafyllou (2020). They found that volatility in the oil market greatly decreased after the pandemic uncertainty shock, however, volatility in the gold market marginally rose by using VAR (Vector Autoregressive) framework. Albulescu (2020a) demonstrated that the number of new infection cases and the mortality ratio observed both globally and domestically had a favorable effect on the turbulence of the American financial markets by using regression analysis. The influence of new COVID-19 case announcements and the death ratio on the financial markets volatility index (VIX) was explored by Albulescu (2020b) by using regression analysis, who found that the death ratio had a favorable impact on VIX and that the death ratio outside of China had a higher impact. The new cases reported in China and outside China had a mixed impact on financial volatility.

Al-Awadhi et al. (2020) evaluated the impact of COVID-19 on stock market outcomes, focusing on the Chinese stock market in the framework of regression analysis, and found that total share prices in China declined, owing to the anticipated negative economic effects of COVID-19. Goldberg and Reed (2020) provided preliminary evidence on the public health and short-run economic effects of the COVID-19 crisis in emerging markets and developing economies. Ashraf (2020a) analyzed the influence of government actions on stock market performance by conducting a regression analysis. Using data from 77 nations, he demonstrated that the government's social distancing efforts had a direct negative influence on stock market returns owing to their negative effect on economic activity and an indirect beneficial effect due to the decline in COVID-19 verified cases. Stock markets had a negative response to the COVID-19 epidemic, according to Ashraf (2020b), however, this reaction is only relevant to the rise in confirmed cases, not to the increase in fatalities. In this paper, the author conducted a regression analysis. Ali et al. (2020) analyzed the worldwide response of financial markets by using the E-GARCH model to COVID-19 in terms of declines and volatility as the epicenter of the Coronavirus spread from China to Europe and the United States. They discovered that the market in China was stabilized due to the prompt steps taken by the government when the epicenter shifted out of China. As the core of the epidemic shifted to the United States, even the returns on more secure commodities, such as gold, became negative, although volatility was low for these commodities. Using U.S. data, Alfaro et al. (2020) determined that the stock market value decreased in reaction to pandemic diseases such as COVID-19 and SARS. In addition, they emphasize that the unanticipated changes in the course of COVID-19 infections had an impact on U.S. market returns. They employed exponential and logistic growth models which are used to model infection and mortality in biology and epidemiology. Ozili and Arun (2020) discovered that the preventative measures taken in response to COVID-19 had a significant negative impact on the amount of

economic activity and the closing, opening, minimum, and maximum stock prices of key stock market indexes by conducting a panel data regression. Jana et.al. (2022) attempted to explore the impact of COVID-19 on the US equity market by embracing machine learning and the Johansen co-integration test together with a detrended cross-correlation analysis (DCCA). They used data about the COVID-19 news and the US equity market sectors' daily data over the period January 1, 2020–March 20, 2020. They found out that, at an early stage of the pandemic, global fears had a significant effect on most sectorial equity indices and COVID-19 increased the performance of a couple of sectors such as telecommunication and teleworking.

Celik and Aktan (2020) discovered that the Turkish financial markets reacted significantly to the outbreak in the near term, and they predict the markets to fluctuate and stay unstable in the short run by using descriptive evaluation. Goodell (2020) emphasized in his descriptive study that the COVID-19 crisis taught investors, policymakers, and the general public that natural catastrophes may cause tremendous economic devastation in any region of the world. The G-Cubed Multi-Country Model, a global intertemporal general equilibrium model with heterogeneous agents, is used in this research. McKibbin and Fernando (2020) calculated the cost of the COVID-19 pandemic under many alternative scenarios and showed that, even though costs might be very high, they can be mitigated via global cooperative efforts, particularly in the poorest nations. The G-Cubed Multi-Country Model, a global intertemporal general equilibrium model with heterogeneous agents, is used in this research. Ramelli and Wagner (2020) showed that the response of investors to the pandemic and its rapid spread heightens their worries about business debt and cash reserves by using regression analysis. Corbet et al. (2020) examined the impact of the term *corona* on the return and volatility of equities during the COVID-19 pandemic in the framework of the GARCH model. After the announcement of the pandemic, they discovered that firms with the term *corona* in their names saw big increases in hourly volatility, large spikes in trading volumes, and high negative hourly returns. Schell et al. (2020) analyzed stock market responses to World Health Organization PHEIC (Public Health Emergencies of International Concern) notifications by using the Event Study framework and found no regular trends. In addition, they discovered that of all the disorders included in their analysis, only Covid-19 had a negative influence on stock markets that lasted at least 30 days. Using data from the six nations most impacted by COVID-19, Cepoi (2020) evaluated the stock market's response to coronavirus-related news by using panel quantile regression. He discovered that stock markets exhibited asymmetric dependence on COVID-19-related news with the media coverage causing a decline in returns for the middle and higher quantiles while not influencing the lower quantiles.

Mirza et al. (2020) evaluated the price reaction, performance, and volatility timing of European investment funds during the Covid-19 pandemic outbreak and discovered

that while the majority of investment funds exhibited stressed performance, social entrepreneurship funds were more resilient and exhibited volatility-timing in the framework of Event Study framework. Sharif et al. (2020) investigated the relationship between the spread of COVID-19, the oil price volatility shock, the stock market, geopolitical risk, and economic policy uncertainty in the United States by using a wavelet-based approach. They demonstrated that the COVID-19 outbreak had a higher effect on geopolitical risk and economic uncertainty in the United States than on the stock market. Additionally, they discovered that the pandemic had an effect on gasoline prices, which may be explained by travel limitations. Baker et al. (2020b) evaluated the uncertainty that has persisted since the commencement of the COVID-19 epidemic using a variety of metrics, including indicators of stock market volatility. By way of illustration, they determined that more than half of the predicted production decline is due to COVID-induced uncertainty in the framework GARCH model. Ma et al. (2020) demonstrated a negative stock market reaction and a lasting negative impact on real GDP growth for a panel of 210 countries, with the effect being felt more in nations with a less aggressive first-year response in government expenditure by using panel data regression.

3. Methodology

We utilized a method, Regression Discontinuity Design (RDD), classified under the framework of quasi-experimental design. Several methods are available in this branch of research methods, including Regression Discontinuity, Difference-in-differences, Synthetic Control, Event Studies, Matching Methods, and Interrupted Time Series. The differences among these methods are their underlying assumptions. The primary purpose of selecting Regression Discontinuity Design (RDD) in the present study is that their underlying assumptions fit well into the current research structure. In addition, this is the first attempt to adopt this method to a pandemic event.

Taking advantage of these cut-offs, Regression Discontinuity Design (RDD) (*please see Imbens & Lemieux, (2007) for a broad discussion*) is implemented to calculate the causal effects of the announcements and CDS on BIST100 Index values by comparing the groups treated and untreated. The main notion underlying the RD design is that treatment assignment is determined, entirely or partially, by the value of a predictor (the covariate) being on either side of a predetermined threshold. This predictor may be connected with the potential outcomes, however, it is expected that this association is smooth. Therefore, any discontinuity in the conditional distribution of the outcome as a function of this covariate at the cutoff value is viewed as evidence of a causal influence of the treatment (Imbens and Lemieux, 2007). The first essential identifying assumption that ensures validity is that assignment is random at the cutoff. Near the cutoff, there should not be any systematic differences between the pre-treatment characteristics of the treatment

and control groups. The only systematic difference between them will be whether or not they heard the announcement. In this study, treatment is assigned based on date, and values on or after the cutoff dates are considered treated. Due to the actualization of events, it is evident that the date is not manipulated. Second, the timing of announcements should not be contingent on any aspect that influences BIST100 levels. The timing of China's report and the first economic stimulus plan was unexpected, ensuring the report's objectivity. The final defining premise of RDD is that the relationship between the assignment variable and the outcome must be continuous. Thus, we can go as close as feasible to the discontinuity from both sides, and only the discontinuous portion will be cut off. The relationship between the date and BIST100 values is continuous, hence the assumption is sustained. Sharp and Fuzzy Regression Discontinuity Designs are two main alternatives of RDD in applications. We follow Sharp RDD in the current study.

We set up the estimation model as follows (Angrist and Pischke, 2008). Sharp RD is utilized when the treatment status is a discontinuous and deterministic function of a covariate, xi. Consider, for instance, that;

$$p_i = \begin{cases} 1 \ \ if \ \ x_i \geq x_0 \\ 0 \ \ if \ \ x_i < x_0 \end{cases} \tag{1}$$

In this set up, x_0 is predetermined cutoff level. This assignment process is a deterministic function of xi, as once xi is known, pi can be determined. It is a discontinuous function because the treatment remains unchanged until $x_i = x_0$, regardless of how close x_i is to x_0. The most important difference between RDD and the similar quasi-experimental design is that observations just before and after cutoff level is considered which may results a jump at cutoff.

Specifying the estimation, linear regression is set up as it is the standard procedure in Sharp RDD. As it is structured in Angrist and Pischke (2008), linear regression is formed as follows:

$$E[Y_{0i}|x_i] = \alpha + \beta x_i \tag{2}$$

$$Y_{1i} = Y_{0i} + p \tag{3}$$

In this set up, equation (2) represents expected outcomes before and after cutoff. Equation (3) demonstrates constant effect model in which the announcement effect presents. Hence, we run the following regression that reflects the equation (2) and (3) as follows.

$$y_i = \alpha + \beta x_i + pt_i + \varepsilon_i \tag{4}$$

In this equation, y_i represents the dependent variable. We have two thresholds for two different regression sets. The timing of China's report and the first economic stimulus plan are considered as treatments which are depicted by ti also known as running variable in the context of RDD.

4. Empirical data and results

4.1. Empirical data

Daily financial data is used in this analysis consisting of BIST100 Index values and 5-year Credit Default Swaps (CDS) of the country which both are the main variables in the regressions. Moreover, *China* and *Package* were used as dummy variables as independent variables and cutoffs respectively for two different regression sets and regression discontinuity design. In the second regression set, one lagged value of Turkey's 5-year CDS, as CDS (-1) was used. The dataset of this study includes data starting from the 3rd of September 2019 to 21st of October 2020, making a total of 286 data points. In the first group of regressions for which we used the China announcement as the cut-off, the values before 31st of December 2019 are labeled as *untreated*, while the values on and after the announcement date are labeled as *treated*. Similarly, in the second group of regressions for which we used the Turkey's first economic stimulus package date as the cut-off, the values before 18th of March 2020 are labeled as *untreated*, while the values on and after the cut-off are labeled as *treated*.

Table 1 shows the summary statistics on BIST100 Index and Turkey CDS values for the period it's considered. Mean BIST100 and CDS values are 1078.81 and 428.31, respectively.

Table 1: Summary Statistics I

	Mean	Std. Dev.	Min.	Max.	Observation
BIST100	1078.81	88.80	842.46	1235.56	286
CDS	428.31	118.76	234.75	651.91	286

Source: Author's calculation

Other independent variables used are *China*, which is a dummy variable that takes value of 0 before the China's announcement and 1 otherwise, and *Package* which is a dummy variable that takes value of 0 before the first case announcement in Turkey, and 1 otherwise. Table 2 below shows the summary statistics on these dummy variables for the period examined.

Table 2: Summary Statistics II

	Mean	Std. Dev.	Min.	Max.	Observation
China	0.71	0.46	0	1	286
Package	0.52	0.50	0	1	286

Source: Author's calculation

We used two different cut-offs for two different regression sets in this study. The first cut-off is the 31st of December 2019, when China reported the cases of unknown illness to WHO, hence the agents in the financial markets were informed about it by then. The government's first economic stimulus was a $15.4 billion economic stability package on 18th of March 2020 (Celik and Aktan, 2020). Hence, the second cutoff is 18th of March 2020.

4.2. Empirical analysis

According to the results, the impact of the CDS on the log return of BIST100 is significant at 10%, even though the coefficient is very small. When we use one-lagged CDS in the analysis, the coefficient does not change while it is still significant at 10%, almost at 5% (as the p-value is 0.053), which can be seen on Panel B of Table 3 below. Hence, CDS and CDS with a lag have positive impacts on the log-return of BIST100 separately.

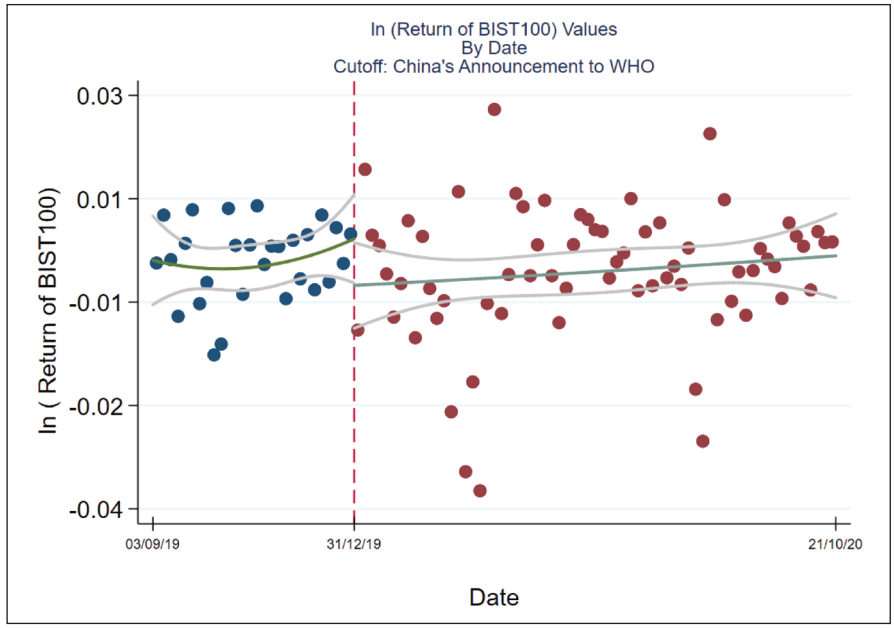
Table 3: Regression Results I

OLS	A) CDS		B) CDS (One Lag)	
	China Announ.	CDS	China Announ.	CDS (One Lag)
ln(Return of BIST100)	-0.00375	0.00002*	-0.00376	0.00002*
P-value	[0.113]	[0.061]	[0.109]	[0.053]

Source: Author's calculation

When we consider the impact of the announcement made by China on the log-return of BIST100, we do not have any significant coefficient. However, as p-values are quite close to 0.10 for both regressions using CDS and one-lagged CDS as independent variables; they are almost significant at 10%. When China made the official announcement of the unknown illness to WHO on 31st of December 2019; there was no immediate impact on the financial markets in Turkey. In fact, financial markets reacted because of the transmission of COVID-19 virus to other countries after a 20-day delay (Celik and Aktan, 2020). As we can see a lagged reaction here, efficiency of the financial markets in Turkey could be re-considered.

Figure 1: Ln (BIST100 Returns) By Date – Cutoff 31.12.2019



Source: Author's elaboration

Figure 1 above shows the values of ln (BIST100 returns) by date, in which the cutoff date is 31st of December 2019. Here, we do not observe a significant jump considering the interaction of confidence intervals on both sides of the cutoff. This figure is consistent with our regression findings of this study.

In the second part, analyses were done by using Turkey's 5-year CDS values and the dummy variable showing the first economic stimulus package after the first COVID-19 case in Turkey as independent variables. This exposure is determined by date as the data points before the cutoff date (18.03.2020) took the value of *0* and 1 otherwise. The dependent variable is log-return of BIST100 values. Regressions are made by using CDS values and one-lagged CDS values separately. Both results are shown in Table 4.

Table 4: Regression Results II

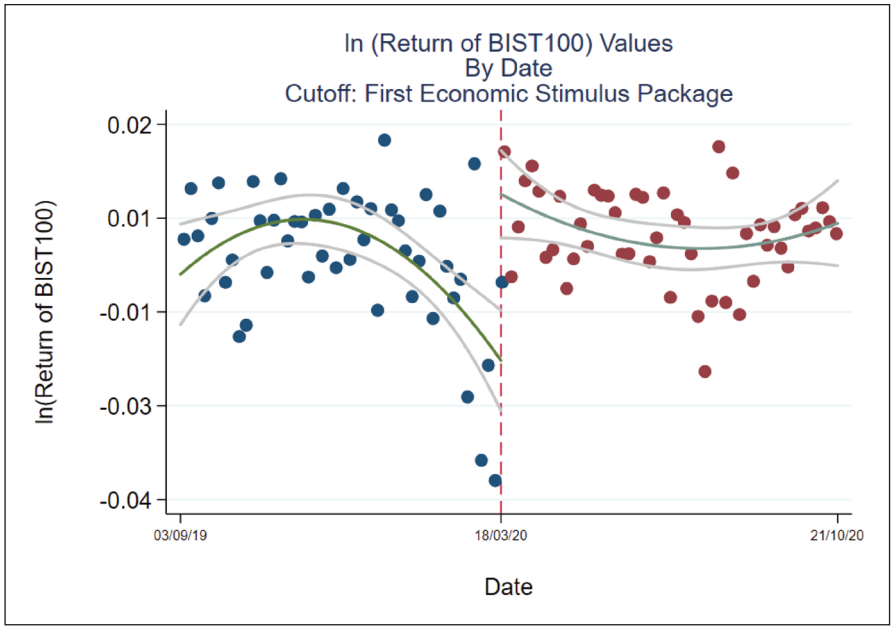
OLS	A) CDS		B) CDS (One Lag)	
	Package	CDS	Package	CDS (One Lag)
ln(Return of BIST100) P-value	0.00521 [0.204]	0.00000 [0.574]	0.00474 [0.256]	0.00000 [0.671]

Source: Author's calculation

Results show that the impact of the CDS on the log return of BIST100 is insignificant. When we use one-lagged CDS in the regression, the coefficient decreases slightly, but it is not significant as before, seen on Panel B of Table 4. Hence, CDS and CDS with a lag do not have any significant impacts on the log return of BIST100.

When the effect of the first economic stimulus package on the log return of BIST100 is evaluated, we do not have any significant coefficient and we cannot make any deductions about a significant impact for the regressions using CDS and CDS with a lag separately. However, we have a relatively big dataset here. Observing the impact of the package would be possible if regression analyses are made with a narrower dataset.

Figure 2: Ln (BIST100 Returns) By Date – Cutoff 18.03.2020



Source: Author's elaboration

Figure 2 above shows the values of ln (BIST100 returns) by date, in which the cutoff date is 18th of March 2020. Here, we observe a significant jump considering the place and pattern of lines and confidence intervals on both sides of the cutoff. As we observe a positive jump here, making the regression analysis showing the causal impact of the package on the log-return of BIST100 values with a narrower data window would be useful.

In the third part, analyses done by using Turkey's 5 Year CDS values and the dummy variable showing the first economic stimulus package after the first COVID-19 case in Turkey as independent variables like in the second part. However, this time the dataset is narrowed down to start with 31st of December 2019. Again, the dummy variable's value is determined by date as the data points before the cutoff date (18.03.2020) took the value of *0* and *1* otherwise. The dependent variable is log-return of BIST100 values. Regressions are made by using CDS values and one-lagged CDS values separately. Both results are shown in Table 5 below.

Table 5: Regression Results III

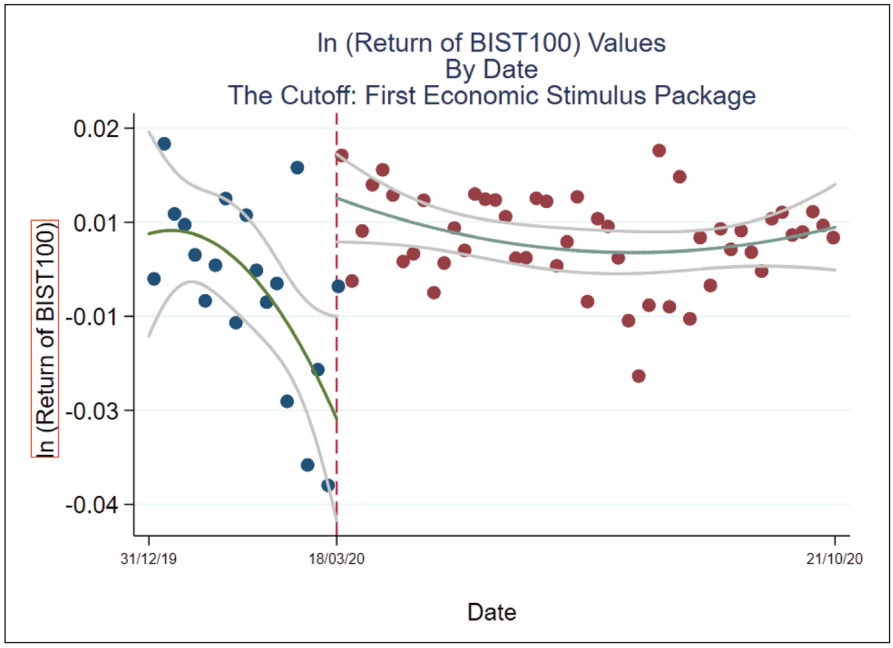
OLS [Dataset 31.12.2019 - 21.10.2020]	A) CDS		B) CDS (One Lag)	
	Package	CDS	Package	CDS (One Lag)
ln(Return of BIST100)	0.01321**	-0.00002	0.01376**	-0.00003
P-value	[0.021]	[0.244]	[0.022]	[0.231]

Source: Author's calculation

Results indicate that the impact of the CDS on the log return of BIST100 is not significant and the coefficient is very small. When we use one-lagged CDS in the regression; the coefficient does not change much and it is still not significant, which can be seen on Panel B of Table 5. In sum, both CDS and CDS with one lag do not have any significant impact on the log return of BIST100.

When we evaluate the effect of the first economic stimulus package after the first COVID-19 case in Turkey on the log-return of BIST100, we observe that the economic stimulus package has a positive impact of 13% approximately on the log-return of BIST100. As the p-value for this coefficient is 0.02, this result is significant at 5%. When we run the same regression with the independent variable of CDS with a lag instead of CDS, regression results show that the package has a positive effect of 14% approximately on the log return of BIST100. As the p-value is 0.02, this impact is significant at 5%, too. Hence, both regression results confirm that the economic stimulus package had an increasing impact on the log return of BIST100. This result was expected as the objective in the implementation of this package was to accelerate the financial and economic markets, and the results we get are parallel with this objective.

Figure 3: Ln (BIST100 Returns) By Date - Cutoff 18.03.2020 – Narrow Dataset



Source: Author's elaboration

Figure 3 above shows the values of ln (BIST100 returns) by date, in which the cutoff date is 18th of March 2020 with a dataset starting on 31st of December 2019. Here, we observe a significant jump considering the place and pattern of lines and confidence intervals on both sides of the cutoff. This result follows the regression results in Table 5 as we found that the first economic stimulus package implemented created a positive impact on the log-return of BIST100.

5. Results and Discussion

In this study, there are two research questions examined which are (i) Does China's pandemic announcement have an impact on the economies of the countries? and (ii) Do countries' pandemic measure packages have an impact on their economies? The hypothesis developed for the first research question was rejected for Turkey's data. In other words, the view that China's pandemic announcement has an impact on the Turkish economy is not supported by data. The main reason for this result can be interpreted as the fact that the negative impact of the pandemic on the economies in both the public and private sectors in Turkey is not perceived sufficiently. Another reason is that the research method used in this study is aimed at revealing the effect of the case just before and after

the incident. In other words, the method used in this study is aimed at testing the presence of a short-term effect.

The hypothesis developed for the second research question could not be rejected for Turkey's data. In other words, the precautionary policies that Turkey announced against the pandemic had a positive impact on the country's economy. The main reason for this is that the precautionary policies announced in Turkey were announced approximately two months after the pandemic. The fact that the level of perception against the pandemic has increased in Turkey in the last two months and the positive atmosphere created by the precautionary packages has caused the market to be felt immediately.

The results obtained in this study reveal important results when compared with similar studies in the relevant literature. The first of these is whether the statistical method used can measure the short- or long-term effect. If the method used measures a long-term data range before and after the event occurs, the results may be biased. This makes it difficult to measure the effect that is intended to be measured as it moves away from the event. This is particularly difficult because the impact of other news may also be included in the measurement. From this point of view, this research shows that the research method used will give more accurate results when used under the influence of pandemics and similar cases. Another important result of this study is that the impact of pandemics and similar cases on the economies of different countries may not be instantaneous. As of the analysis period for the Turkish economy examined in this study, the level of perception of the pandemic may differ in other countries. As a result, while the pandemic is expected to harm the economies of the countries, differences in the market efficiency levels of the relevant countries suggest that the negative effect may have a delayed reflection on the markets. The results obtained in this study reveal that researchers should consider the issue of market efficiency in studies that measure the levels of negative cases.

6. Conclusion

We attempted to measure the effects of the current pandemic on emerging equity markets and to examine the efficacy of the preventing policies to reduce the plausible negative effects. With these objects in mind, we used both the log-return of BIST100 values and Turkey's 5-year CDS values from the 3rd of September 2019 to the 21st of October 2020. By considering the cutoff dates of China's announcement to WHO about unknown illness and the first economic stimulus package in Turkey, Regression Discontinuity Design (RDD) approach was implemented to compare the *treated* and *untreated* groups.

Our RDD estimates show that the announcement China made on the 31st of December 2019 did not have a significant effect on the log return of BIST100. This

may be a result of the lagged reaction of financial markets, which may stem from being an inefficient market. While the first economic stimulus package did not have a significant impact on the log return of BIST100 when we use our full dataset, we were able to observe that this package had an increasing effect on the log return of BIST100, when the dataset is narrowed down to start with 31st of December 2019. Results are consistent with some previous studies such as Jana et.al (2022) and Harjoto and Rossi (2021) that equity market(s) in many sectors recovered rapidly.

This study extends the literature which investigates market reactions to equity market shocks and provides insight into how an emerging equity market reacts government's stimulus amid the COVID-19 pandemic of 2020 and an opportunity for policymakers to take necessary measures as early as possible to avoid economic downturns and market crashes. As pandemics are rare but inevitable incidences, observing their effects on every aspect of community life is a rare opportunity for academia for their research. By observing the effects of the measurements taken on every aspect of community life, the world could be more prepared for such incidences that might reoccur in the future.

Finally, we should emphasize that the scope of this study is restricted to Turkey's equity market, therefore, it would be useful to expand the market coverage in further research.

References

Akhtaruzzaman, M. D., Boubaker, S., Sensoy. A. (2020) "Financial Contagion During COVID-19 Crisis", *Finance Research Letters*, Vol. 38, pp. 1–20, https://doi.org/10.1016/j.frl.2020.101604.

Al-Awadhi, A. M. et al. (2020) "Death and Contagious Infectious Diseases: Impact of the COVID-19 Virus on Stock Market Returns" *Journal of Behavioral and Experimental Finance*, Vol. 27, Np. 1, pp. 1–2, https://doi.org/10.1016/j.jbef.2020.100326.

Albulescu, C. T. (2020a) "COVID-19 and the United States Financial Markets' volatility", *Finance Research Letters*, Vol 38, pp. 1–5, https://doi.org/10.1016/j.frl.2020.101699.

Albulescu, C. (2020b) "Coronavirus and Financial Volatility: 40 Days of Fasting and Fear", *SSRN*, http://dx.doi.org/10.2139/ssrn.3550630.

Alfaro, L., et al. (2020) *Aggregate and Firm-Level Stock Returns During Pandemics, in Real Time*, NBER Working Paper No. 26950, National Bureau of Economic Research https://doi.org/10.3386/w26950.

Ali, M., Alam, N., Rizvi, S. A. R. (2020) "Coronavirus (COVID-19)–An Epidemic or Pandemic for Financial Markets", *Journal of Behavioral and Experimental Finance*, Vol. 27, pp. 1–6, https://doi.org/10.1016/j.jbef.2020.100341.

Angrist, J. D., Pischke, J. S. (2008) *Mostly harmless econometrics: An empiricist's companion*, Princeton, NJ: Princeton University Press.

Ashraf, B. N. (2020a) "Economic Impact of Government Interventions During the COVID-19 Pandemic: International Evidence From Financial Markets" *Journal of Behavioral and Experimental Finance*, Vol. 27, pp. 1–9, https://doi.org/10.1016/j.jbef.2020.100371.

Ashraf, B. N. (2020b) "Stock Markets' Reaction to COVID-19: Cases or Fatalities?" *Research in International Business and Finance*, Vol. 54, pp. 1–7, https://doi.org/10.1016/j.ribaf.2020.101249.

Bakas, D., Triantafyllou, A. (2020) "Commodity Price Volatility and the Economic Uncertainty of Pandemics", *Economics Letters*, Vol. 193, https://doi.org/10.1016/j.econlet.2020.109283.

Baker, S. R. at al. (2020a) "The Unprecedented Stock Market Reaction to COVID-19", *The Review of Asset Pricing Studies*, Vol. 10, No. 4, pp. 742–758, https://doi.org/10.1093/rapstu/raaa008.

Baker, S. R. at al. (2020b) *COVID-Induced Economic Uncertainty*, NBER Working Paper No. 26983, National Bureau of Economic Research, pp. 1–16, https://doi.org/10.3386/w26983.

Bloomberg. (2020) *The Great Coronavirus Crash is Different*, Bloomberg, Available at: <https://www.bloomberg.com/news/articles/2020-03-19/the-great-coronavirus-crash-of-2020-is-different?leadSource=uverify%20wall> [Accessed: July 11, 2022].

Celik, S., Aktan B. (2020) "The Consequences of the COVID-19 Pandemic on the Turkish Economy", In S. E. Hidayat (Ed.), M. O. Farooq (Ed.) & E. A. Alim (Ed.)., *Impacts of the Covid-19 Outbreak on Islamic Finance in the OIC Countries*, (1st ed., pp. 109–116), Republic of Indonesia: National Committee for Islamic Economy and Finance.

Cepoi, C. O. (2020) "Asymmetric Dependence Between Stock Market Returns and News During COVID-19 Financial Turmoil" *Finance Research Letters*, Vol. 36, pp. 1–6, https://doi.org/10.1016/j.frl.2020.101658.

Corbet, S., et al. (2020) "Aye Corona! The Contagion Effects of Being Named Corona during the COVID-19 Pandemic", *Finance Research Letters*, Vol. 38, pp. 1–9, https://doi.org/10.1016/j.frl.2020.101591.

Coy, P. (2020) *The Great Coronavirus Crash of 2020 Is Different*, Bloomberg Quint, Available at: <https://www.bloombergquint.com/businessweek/the-great-coronavirus-crash-of-2020-is-different> [Accessed: June 6, 2022]

Goldberg, P. K., Reed, T. (2020) *The Effects of the Coronavirus Pandemic in Emerging Market and Developing Economies: An Optimistic Preliminary Account*, Brookings Papers on Economic Activity, pp. 161–211, Available at: <https://www.brookings.edu/wp-content/uploads/2020/06/SU20_S3_Goldberg-Reed_-final-paper.pdf> [Accessed: August 26, 2022]

Goodell, J. W. (2020) "COVID-19 and Finance: Agendas for Future Research" *Finance Research Letters*, Vol. 35, pp. 1–5, https://doi.org/10.1016/j.frl.2020.101512.

Harjoto, M. A., Rossi, F. (2023) "Market Reaction to the COVID-19 Pandemic: evidence from Emerging Markets", *International Journal of Emerging Markets*, Vol. 18, No. 1, pp. 173–199, https://doi.org/10.1108/IJOEM-05-2020-0545.

Haroon, O., Rizvi, S. A. R. (2020) "COVID-19: Media Coverage and Financial Markets Behavior - A Sectoral Inquiry" *Journal of Behavioral and Experimental Finance*, Vol. 27, pp. 1–5, https://doi.org/10.1016/j.jbef.2020.100343.

Imbens, G.W., Lemieux, T. (2007) "Regression Discontinuity Designs: A Guide to Practice" *Journal of Econometrics*, Vol. 142, No. 2, pp. 615–635, https://doi.org/10.1016/j.jeconom.2007.05.001.

Jana, R.K., et al. (2022) "COVID-19 News and the US Equity Market Interactions: An Inspection Through Econometric and Machine Learning Lens", *Annals of Operations Research*, https://doi.org/10.1007/s10479-022-04744-x.

Ma, C., Rogers, J. H., Zhou, S. (2020) "Global Economic and Financial Effects of 21st Century Pandemics and Epidemics", *Covid Economics: Vetted and Real-Time Papers*, No. 5, pp. 56–78, Available at: <https://cepr.org/node/390357 > [Accessed: June 6, 2022].

McKibbin, W. J., Fernando, R. (2020) *The Global Macroeconomic Impacts of COVID-19: Seven Scenarios.* CAMA Working Paper No. 19/2020. The Center for Applied Macroeconomic Analysis, Australian National University, Available at: <https://cama.crawford.anu.edu.au/sites/default/files/publication/cama_crawford_anu_edu_au/2020-03/19_2020_mckibbin_fernando_0.pdf> [Accessed: May 11, 2022].

Mirza, N., et al. (2020) "Price Reaction, Volatility Timing and Funds' Performance During COVID-19", *Finance Research Letters*, Vol. 36, pp. 1–8, https://doi.org/10.1016/j.frl.2020.101657.

Partington, R. (2020) *FTSE 100 posts largest quarterly fall since Black Monday aftermath, Guardian*, Available at: <https://www.theguardian.com/business/2020/mar/31/ftse-100-posts-largest-quarterly-fall-since-black-monday-aftermath> [Accessed: March 31, 2020].

Okorie, D. I., Lin, B. (2020) "Stock Markets and the COVID-19 Fractal Contagion Effects", *Finance Research Letters*, Vol. 38, pp. 1–8, https://doi.org/10.1016/j.frl.2020.101640.

OECD (2020) "Coronavirus (COVID-19): Living with Uncertainty", *Economic Outlook, Interim Report*, No. 105, pp. 1–15, https://doi.org/10.1787/34ffc900-en.

Ozili, P. K., Arun, T. (2020) "Spillover of COVID-19: Impact on the Global Economy, *SSRN*, http://dx.doi.org/10.2139/ssrn.3562570.

Ramelli, S., Wagner, A. (2020) "Feverish Stock Price Reactions to COVID-19" *Swiss Finance Institute Research Paper*, Vol. 9, No. 3, pp. 622–655, https://doi.org/10.1093/rcfs/cfaa012.

Schell, D., Wang, M., Huynh, T. L. D. (2020) "This Time is Indeed Different: A Study on Global Market Reactions to Public Health Crisis", *Journal of Behavioral and Experimental Finance*, Vol. 27, pp. 1–5, https://doi.org/10.1016/j.jbef.2020.100349.

Sharif, A., Aloui, C., Yarovaya, L. (2020) "COVID-19 Pandemic, Oil Prices, Stock Market, Geopolitical Risk and Policy Uncertainty Nexus in the US Economy: Fresh Evidence From the Wavelet-based Approach", *International Review of Financial Analysis*, Vol. 70, pp. 1–9, https://doi.org/10.1016/j.irfa.2020.101496.

World Economic Forum (2020) *Mad March: how the stock market is being hit by COVID-19*, World Economic Forum, Available at: <https://www.weforum.org/agenda/2020/03/stockmarket-volatility-coronavirus/> [Accessed: March 23, 2022].

Zaremba, A. et al. (2020) "COVID-19, Government Policy Responses, and Stock Market Liquidity around the World: A Note" *Research in International Business and Finance,* Vol 56, pp. 1–9, https://doi.org/10.1016/j.ribaf.2020.101359.

Zhang, D., Hu, M., & Ji, Q. (2020) "Financial Markets Under the Global Pandemic of COVID-19", *Finance Research Letters*, Vol. 36, pp. 1–6, https://doi.org/10.1016/j.frl.2020.101528.

Reakcija tržišta dionica u nastajanju na politiku prevencije pandemije na primjeru diskontinuiteta regresije

Bora Aktan[1]

Sažetak

Svrha ove studije je otkriti istovremeno učinke trenutne pandemije na tržišta dionica u nastajanju i ispitati učinkovitost politike prevencije za smanjenje mogućih negativnih učinaka. U tom kontekstu, ispituje se Turska, kao tržište u nastajanju, primjenom dizajna diskontinuiteta regresije (RDD) koji predstavlja robustan ne-eksperimentalni pristup za procjenu uzročnih učinaka intervencija. Rezultati istraživanja otkrivaju da COVID-19 pandemija, nakon određenog razdoblja kada se prvi put pojavila u svijetu, utjecala na Istambulsku burzu. A pritom, politika prevencije, koja se vodi u zemlji, statistički je učinkovito smanjila negativan utjecaj pandemije.

Ključne riječi: *COVID-19, pandemija, tržišta kapitala u nastajanju, Turska, regresijski diskontinuitet*

JEL klasifikacija: *G10, G18*

[1] *Izvanredni profesor, Sveučilište u Bahreinu, College of Business Administration, P.O. Box: 32038, Kraljevina Bahrein. Znanstveni interes: financije, investicije, nova financijska tržišta. Tel.: +973 17438547. E-mail: gbora@uob.edu.bh.*