Fiscaoeconomia

E-ISSN: 2564-7504

2024, Volume 8, Issue 1, 362-384

https://dergipark.org.tr/tr/pub/fsecon

Submitted/Geliş: 20.06.2023
Accepted/Kabul: 19.01.2024
Doi: 10.25295/fsecon.1317679

Research Article/Araştırma Makalesi

Türkiye Stock Market in the Shadow of COVID-19 Pandemic: A QARDL Approach

COVID-19 Pandemisinin Gölgesinde Türk Borsası: Bir QARDL Yaklaşımı

Muhammet Atlas DOĞAN[1], Derese Kebede TEKLIE[2]

Abstract

This study examines the effects of the COVID-19 pandemic on the Türkiye stock market between March 14, 2020, and April 29, 2022, using the Quantile Autoregressive Distributed Lag (QARDL) model. The research investigates the relationship between the BIST100 index and selected economic indicators across quantiles ranging from 0.05 to 0.95. These indicators include daily new COVID-19 cases, the dollar exchange rate (FX), Brent crude oil prices (OIL), and credit default swap (CDS) rates. Findings indicate that an increase in COVID-19 cases has a negative impact on the stock market across various quantiles. While the dollar exchange rate generally shows a positive relationship with the BIST100 index, Brent crude oil prices, and CDS rates exhibit a negative impact. These results highlight the complex effects of both internal and external factors on the Türkiye stock market, providing significant insights for policymakers and future research.

Jel Codes: *G15, F31, Q43, C32*
Keywords: *QARDL, COVID-19 Pandemic, Credit Default Swaps, Turkish Stock Market, Crude oil, Exchange Rate*

Öz

Bu çalışma, 14 Mart 2020 ile 29 Nisan 2022 tarihleri arasında COVID-19 pandemisinin Türk borsası üzerindeki etkilerini, Kantil Otoregresif Dağıtılmış Gecikme (QARDL) modelini kullanarak incelemektedir. Araştırma, BIST100 endeksi ve seçilen ekonomik göstergeler arasındaki ilişkiyi 0,05'ten 0,95'e kadar değişen kantillerde inceler. Bu göstergeler COVID-19 günlük yeni vakaları, dolar kuru (FX), Brent petrol fiyatları (OIL) ve kredi temerrüt takası oranları (CDS)'dır. Bulgular, COVID-19 vakalarının artışının borsa üzerinde farklı kantillerde negatif bir etkisi olduğunu göstermektedir. Dolar kuru, BIST100 endeksi ile pozitif bir ilişki sergilerken, ham petrol fiyatları ve CDS oranları negatif bir etki göstermektedir. Bu sonuçlar hem içsel hem de dışsal etkenlerin Türk borsası üzerindeki etkilerini ve bu etkilerin karmaşıklığını ortaya koymakta, politika yapıcıları ve gelecekteki araştırmalar için önemli çıkarımlar sunmaktadır.

Jel Kodları: *G15, F31, Q43, C32*
Anahtar Kelimeler: *COVID-19 Pandemisi, Kredi Temerrüt Riski Takas Oranları, BIST-100, Brent Petrol, Dolar Kuru, QARDL*

[1] Graduate School, Istanbul Technical University, Istanbul, Turkiye, dogan.muhammet@outlook.com, ORCID: 0000-0002-4943-223X

[2] Graduate School, Istanbul Technical University, Istanbul, Turkiye, teklie18@itu.edu.tr, ORCID: 0000-0001-6565-9998

Citation/Atıf: Doğan, M. A. & Teklie, D. K. (2024). Türkiye Stock Market in the Shadow of COVID-19 Pandemic: A QARDL Approach. *Fiscaoeconomia, 8*(1), 362-384. Doi: 10.25295/fsecon.1317679

1. Introduction

The COVID-19 pandemic has had an unprecedented global impact; almost every country around the world has enacted strategies to mitigate the spread of the virus and prevent the collapse of its health system. Many countries suffered a downturn following these mitigation strategies, mostly restrictions and shutdowns. The pandemic has created fear, uncertainty, and doubt (FUD) within societies, and when FUD does not fade, it causes more damage than the disease itself. The COVID-19 pandemic not only caused economic shrinkage but also changed the lifestyle of people (Harvey, 2020). Purchasing behavior has changed because of difficulties accessing goods and services, including essential items (Spash, 2021).

Regarding the economic impact, the World Trade Organization (WTO) spotlighted notable downturns. Global trade in goods and services shrunk by 12%. Whereas sectors like fuel and transport equipment witnessed declines of 33.5% and 16%, respectively, the tech and pharmaceutical sectors registered growths of 10% and 9.5% in 2020 (WTO, 2022). Macao, China, especially, experienced the sharpest ranking decline for services trade, from 44th in the world to 64th (WTO, 2021). Thus, the world's trade downturn was followed by decreased global economic activity. The US Institute for Supply Management published a survey of exporter and importer companies; their results show that 75% of the companies had a disruption of their supply chain, affecting both importer and exporter countries (Fernandes, 2020).

Similarly, the COVID-19 pandemic has caused significant global disruptions in the financial markets (Zhao et al., 2023). The outbreak has led to market anomalies, disrupted consumer consumption patterns, and shaken confidence in financial markets worldwide (source). As a result, there have been heavy losses in global financial markets and significant changes not seen since the 2008 financial crisis (Zongyun, 2022).

Emerging nations have been particularly hard hit by the pandemic, including Türkiye. Türkiye's problems have been highlighted by its rising exchange rates, which negatively affect its economy (Karahan, 2020). Unlike many emerging markets that benefit from currency depreciation, this advantage has eluded Türkiye due to its robust dependence on foreign investment and its low saving rate (Habib et al., 2017). When the exchange rate increases, it increases the debt level and makes it difficult for the country to attract new investments (Cehreli et al., 2017).

The COVID-19 pandemic has also caused significant disruptions in the financial markets of Türkiye. These disruptions have manifested in several ways, such as increased volatility, liquidity challenges, and plummeting stock prices. Specifically in Türkiye, the stock market was thrown into chaos in early 2020 due to the lockdown and halt in company operations. Investors faced heightened uncertainties and concerns about the economic outlook, leading to a sharp decline in stock valuations. In addition, Çepni et al. (2021) highlighted the role of "fake news" and media coverage during COVID-19 in negatively impacting stock market returns in Türkiye.

One of the stock markets affected by the pandemic was the Borsa Istanbul (BIST). The BIST 100 stock index, a market capitalization-weighted index tracking the top 100 companies on the Borsa Istanbul, was established in 2013 because of the merger of the Istanbul Stock

Exchange, the Istanbul Gold Exchange, and the Derivatives Exchange of Türkiye. The BIST is composed of four main markets: the equity market, the debt securities market, the derivatives market, and the precious metals and diamond market. The BIST 100 index is the main index of the BIST, tracking the performance of the top 100 companies listed on the equity market based on their market capitalization. The BIST 100 index is widely regarded as a barometer of the Türkiye economy, reflecting its growth potential, competitiveness, and resilience.

The COVID-19 pandemic has had a significant impact on the BIST 100 index of Borsa Istanbul, leading to increased volatility, liquidity challenges, and plummeting stock prices. This is due to several factors, including the lockdown of businesses, the disruption of supply chains, and the decline in consumer demand (Mazur et al., 2021). Additionally, the pandemic has led to a widening of the valuation gap between different sectors of the Türkiye stock market, with some sectors, such as software, benefiting from the pandemic while others, such as tourism and hospitality, have been severely impacted (Çepni et al., 2021). Finally, the pandemic has led to a decline in investor sentiment toward the Türkiye stock market, given the country's high inflation, current account deficit, and political instability (Eren & Basar, 2016; Toparlı et al., 2019; Gazel, 2016). Before the pandemic, the Türkiye stock market, as examined through the lens of the BIST 100, was influenced by a combination of local and global macroeconomic variables such as inflation, interest rates, exchange rates, current account deficits, and foreign direct investment (Eren & Basar, 2016). Both positive and negative oil price shocks also played a vital role in influencing the BIST 100 index, showcasing a complex interaction of multiple factors (Toparlı et al., 2019). Furthermore, a notable cointegration and causality existed between the BIST 100 index and gold price, emphasizing the multifaceted influences on the stock market (Gazel, 2016).

Various studies have also probed into the pandemic's impact on consumption, unemployment, economic/policy uncertainty, financial development, and governmental responses (Demirgüç-Kunt et al., 2021; Liu et al., 2021; Syed, 2022). A study by Öztürk et al. (2020) delved into the economic repercussions of the global pandemic at the sectoral level, revealing that specific sectors in Türkiye, like metal products and banking, were more adversely affected by COVID-19 than similar sectors in Europe. Another investigation by Çelik & Yılmaz (2021) found a nuanced relationship between COVID-19 cases and deaths and stock market returns in Türkiye, indicating that while increased cases negatively affected returns, COVID-19-related deaths seemingly had a positive effect on them.

Exploring broader geographical dimensions, Topcu & Gulal (2020) assessed the impact of COVID-19 on emerging stock markets in both Asia and Europe. Their research emphasized the pronounced negative influence on stock market returns, with Europe suffering more than Asia. Notably, Türkiye was pinpointed as one of the country's most negatively impacted. Further, an analytical piece by Korkmaz & Yılmaz (2020) shed light on the escalating stock market volatility in Türkiye in the wake of the pandemic, especially after the announcement of the first case.

Recent research by Tuna (2022), which examined the influence of oil price, gold price, and volatility in the VIX index on the BIST 100 during the pandemic, underscored that these factors had rapidly diminishing impacts, with most of the variations in the BIST 100 being self-

explanatory. Additionally, a comprehensive study by Yılmaz et al. (2021) focusing on the Türkiye stock market's sectoral indices highlighted the pandemic's heterogeneous impact, showing that some sectors displayed resilience while others wilted. The study also noted increased co-movement between different sectoral indices and the BIST 100, suggesting a broader synchronization in response to the pandemic.

Unlike previous studies that focused on specific variables or assumed a linear relationship between the stock market and explanatory variables, this study employs a comprehensive approach. We capture both the pandemic situation and the external environment using the Quantile Autoregressive Distributed Lag (QARDL) model developed by Cho et al. (2015). This model allows for estimating the short-run and long-run effects of various factors like COVID-19 new cases, USD/TL exchange rates (FX), crude oil prices (OIL), and credit default swap rates (CDS) on different quantiles of the BIST 100 index. It accounts for asymmetry and heteroscedasticity in financial data and variation across the distribution of the dependent variable. Our study contributes to the literature by offering a detailed analysis of the impact of the COVID-19 pandemic on the Türkiye stock market using a sophisticated econometric approach, and it has significant implications for policy interventions and future research.

The following sections of the paper are organized as follows. Section II provides the theoretical background and hypothesis development with the related literature; Section III presents the data and the econometric approach. Section IV summarizes the results with a discussion, and section V concludes the paper.

2. Literature Review and Hypothesis Development

Many economies were affected by the COVID-19 pandemic, and the most drastic impacts stood out in the stock exchange market. The threat of systemic risk became prominent due to the country-wide restrictions, which made investors more reluctant to spend their money in the exchange market (Umar et al., 2021). Following the pandemic, the trends in stock markets have shifted to a subsequent fall, known as a bear market. Because the sectors mentioned above will be less profitable, investors have sought ways to gain more during the pandemic period. While this is one of the counter-effects of the pandemic, another effect is that it leads investors to leave stock markets because of negative expectations for the future (Atri et al., 2021). Thus, it can be hypothesized as in the following that if people leave the stock market due to the pandemic, this will create a detrimental effect on the markets:

> *H_1: There exists a negative relationship between the stock market performance and COVID-19 cases.*

The deterioration in the stock markets was followed by a decrease in energy demand due to the response of the real economy, which also led to a significant reduction in the commodity markets. Particularly, crude oil prices suffered a severe decline. The travel restrictions caused decreased consumption, and oil demand fell; further, due to the production side's shock, the oil price experienced a collapse (Ali et al., 2020). Sharif et al. (2020) found that oil price volatility had a negative association with the US stock market, even after controlling for other factors. The study found that a 1% increase in oil price volatility was associated with a 0.1%

decrease in the stock market. The study also found that the association was more significant during the COVID-19 pandemic. Similarly, Zhang & Hamori (2021) show a sharp decline in crude oil prices due to the COVID-19 pandemic, leading to an extreme decrease in stock market performance for the US, Japan, and Germany. Therefore, it can be considered that COVID-19 and the following effects of it have caused the oil price to decrease and have further detrimental effects on the stock market:

> *H_2: There exists a negative relationship between the stock market performance and crude oil prices.*

Various studies focused on the CDS (Credit Default Swaps) due to CDS spreads being accepted as one of the credit risk indicators; recent studies have tried to measure the risk posed by COVID-19 effectively (Nhuyen, 2022). Apergis et al. (2022) examined 386 US firms and showed that COVID-19 caused an increase in CDS rates. The COVID-19 effects on CDS rates have been studied through the consumption channel in 40 developed and emerging countries by Hao et al. (2022), and their results show that CDS rates significantly increase following COVID-19. However, the effect is more significant in the short term compared to the long term. Kartal (2020) has studied the CDS spreads in Türkiye both before and after the COVID-19 pandemic. According to the results of the study, the author argues that CDS spreads increased due to the COVID-19 pandemic in Türkiye. Ustaoğlu (2022) studied Türkiye's stock market, CDS rates, and exchange rate. The result of the study suggests that there is a bidirectional causality between the BIST-100 index and the CDS rates; therefore, it is important to consider the impact of CDS rates on stock markets:

> *H_3: There exists a negative relationship between the stock market and CDS.*

Emerging economies like Türkiye frequently encounter financial risks due to foreign-currency exposures. Historical records, such as the crises of the 1990s, underscore the volatility these exposures can bring to emerging market economies (Eichengreen & Hausmann, 1999). As Durdu et al. (2020) highlighted, the global risk of banking and currency crises has escalated with tightening US monetary policies, particularly in economies grappling with foreign currency exposures.

In the context of Türkiye, the literature identifies a distinct economic trait. Unlike many developing countries, Türkiye exhibits a negative causal relationship between economic growth and exchange rates (Habib et al., 2017; Kandil et al., 2007; Karahan, 2020). This inverse correlation means that when the Türkiye lira depreciates against vital global currencies like the US dollar or the euro, the debt burden of Türkiye entities increases, and their default risk escalates, too. This consequent reduction in profitability and domestic consumption deters investors and suppresses demand for Türkiye stocks, leading to a decline in indices like the BIST 100, a proxy for the Türkiye economy.

Drawing from this backdrop, the hypothesis of this study emerges clearly: A depreciation of the Türkiye lira negatively impacts Türkiye's economic activity and output, which in turn affects the Türkiye stock market's performance:

> *H_4: A negative relationship exists between the stock market and foreign currency exchange rates.*

3. Data and Methodology

In this section, we elucidate the research methodology, data sources, variable definitions, and model specifications employed in this study.

3.1. Data and Definition of the Variables

The purpose of this study was to evaluate how the COVID-19 pandemic affected the performance of Türkiye's stock market using a comprehensive daily dataset covering March 14, 2020, to April 29, 2022. This period encompasses Türkiye's entire experience with the pandemic, from its initial stages to a later point, offering insights into the stock market's immediate and sustained responses. Commencing on March 14, 2020, when Türkiye reported its first COVID-19 cases, the study extends to April 29, 2022, providing a holistic perspective on the pandemic's prolonged impact and the evolving resilience of the stock market.

The analysis employs various variables to examine the dynamics of the Türkiye stock market performance comprehensively. The dependent variable is the BIST100 Index, reflecting the combined performance of the top 100 companies listed on the Borsa Istanbul. Widely used as a primary benchmark for the Türkiye stock market, the BIST100 index is a crucial metric (Akçağlayan & Tuzcu, 2023). The study also incorporates the daily count of new COVID-19 cases to acknowledge the profound economic implications of the pandemic. Fluctuations in infection rates can influence investor confidence, consumer behavior, and government policies, shaping trends in the stock market (Kartal, 2020; Ottone et al., 2023). Moreover, previous research has established a significant correlation between rising COVID-19 deaths and the declining performance of the BIST100 index (Alan & Aybars, 2022).

The variable of crude oil prices is included to address the direct impact of the global crude oil market on Türkiye's economy. Given Türkiye's dependence on oil imports, fluctuations in crude oil prices can affect trade balances, inflation, and overall economic stability (Gokmenoglu et al., 2015; Köse & Ünal, 2021; Gao & Chen, 2022). Additionally, changes in crude oil prices can directly influence stock market movements, especially in sectors closely linked to the BIST100 index, with empirical evidence suggesting a long-term causality relationship between oil prices and the BIST100 index (Ismayilov & Gürler, 2022). The study considers the exchange rate, representing Türkiye's currency value against major currencies, as a critical factor. Movements in the exchange rate can impact export competitiveness, inflation, and the attractiveness of Türkiye's assets to foreign investors (Cutcu & Dineri, 2021). These factors reverberate in the stock market, influencing investor behavior and overall market trends (Civan et al., 2022). Research indicates that the exchange rate and interest rates substantially impact Türkiye's stock market indices more than oil prices (Ismayilov & Gürler, 2022). Türkiye's 5-year sovereign Credit Default Swap (CDS) rates are included as indicators of the country's stock market performance. CDS rates and financial derivatives designed to hedge against debt default risks offer insights into investor perceptions of Türkiye's debt risk and influence the performance of the Türkiye stock market. Previous studies have highlighted the significant impact of CDS rates on the BIST100 Index, with higher rates indicating increased risk perception, potentially impacting investor confidence and stock market behavior (Civan et al., 2022; Xie & Zhang, 2022; Erdaş, 2022; Kartal, 2020). The research employs log transformations on all variables to tackle the challenge of multicollinearity stemming from

daily data. However, the variable of crude oil prices poses a particular difficulty, as it may involve negative figures. We have added a constant value to all data points to ensure positivity before applying the logarithmic transformation. This method is more consistent with common practices in the field and preserves the statistical properties of the data (MaCurdy & Pencavel, 1986; Bellégo, Benatia & Pape, 2022; Cohn, Liu & Wardlaw, 2022).

With the QARDL approach at the helm, our study aspires to decode the diverse and nuanced impacts of the pandemic, dissecting variations across distinct quantiles of stock market returns. Table 1 provides an overview of the variables and their respective sources.

Table 1: Summary of Variables

Variable	Abbreviation	Description	Data Source
BIST100 Index	BIST100	The index is used as the main index for Borsa Istanbul Equity Market.	Borsa Istanbul (BIST, 2022)
COVID-19 New Cases	COVID	Daily new cases of COVID-19	Worldometer (2022)
Crude Oil Price	OIL	The price of crude oil.	Yahoo (2023)
Exchange Rate	FX	Forex Buying Rates for USD/TL.	Central Bank of the Republic of Türkiye (CBRT, 2022)
Credit Default Swap Rates	CDS	Sovereign (Türkiye) 5-year CDS	World Government Bonds (2022)

The integration of these variables provides a robust and comprehensive framework for analyzing the complex interplays between the COVID-19 pandemic and the various financial indicators in the Türkiye economy.

3.2. Model and Estimation Technique

This study employs the Quantile Autoregressive Distributed Lag (QARDL) model, an advanced adaptation of the ARDL model introduced by Cho et al. (2015). The ARDL model is a widely recognized tool for modeling relationships between two or more time series variables, considering the lags of both dependent and independent variables. In contrast, the QARDL extends this by permitting quantile regression, thereby capturing varied effects of explanatory variables across the distribution of the dependent variable.

Among the salient advantages of the QARDL model is its aptitude for assessing cointegration-a statistical correlation between multiple time series variables, suggesting concurrent long-term movements. This feature enables the QARDL model to probe a stable equilibrium relationship between the analyzed variables, even if they individually display non-stationarity. Additionally, the QARDL model's design is conducive to examining asymmetry, thereby detecting varying impacts of historical variable values for both positive and negative shifts. Such an attribute ensures the model's ability to gauge the non-linear and diverse reactions of the dependent variable to variations in the explanatory factors (Zhang et al., 2020).

The QARDL model's distinctive trait of accommodating location-based asymmetry asserts that the model's coefficients might hinge upon a specific position within the conditional distribution of the stock market. This flexibility signifies the model's adeptness at factoring in

diverse market conditions and regimes while evaluating the influences of explanatory variables.

Building on this, the QARDL method exhibits marked superiority over both the linear ARDL and Johansen cointegration tests. While the ARDL model comprehensively assesses both short-term and long-term variations in parameters, the Johansen test is primarily concentrated on long-term relationships. The QARDL, in contrast, is adept at capturing the intricate interplays of time-varying integration and dependence parameters, offering a panoramic view of both short-run and long-run equilibria (Cho et al., 2015). Paired with the QARDL, the Wald test (Godil et al., 2020; Jiang et al., 2021) is utilized as a robust diagnostic tool to scrutinize hypotheses related to parameter constraints. This proves particularly effective for probing long-term quantile equilibrium effects, thus furnishing deeper insights into the structural nuances of the relationships.

Before delving further into the specifics of QARDL, it is instructive to first lay the foundation by understanding its precursor, the linear ARDL model. The ensuing equation can depict this model:

$$\mathrm{BIST}_t = \alpha + \sum_{\mathrm{i}-1}^{\mathrm{l}} \varphi_{\mathrm{i}} \mathrm{BIST}_{\mathrm{t}-\mathrm{i}} + \sum_{\mathrm{i}-0}^{\mathrm{m}} \omega_{\mathrm{i}}\, \mathrm{COVID19}_{\mathrm{t}-\mathrm{i}} + \sum_{\mathrm{i}-0}^{\mathrm{n}} \lambda_{\mathrm{i}} \mathrm{FX}_{\mathrm{t}-\mathrm{i}} + \sum_{\mathrm{i}=0}^{0} \gamma_{\mathrm{i}}\, \mathrm{OIL}_{\mathrm{t}-\mathrm{i}} + \sum_{\mathrm{i}=0}^{\mathrm{P}} \theta_{\mathrm{i}} \mathrm{CDS}_{\mathrm{t}-\mathrm{i}} + \varepsilon_{\mathrm{t}} \quad (1)$$

where ε_t is the error term and shows that $BIST_t - \mathrm{E}\left[\frac{BIST_{2t}}{\sigma_{t-1}}\right]$, σ is the t restricted field of : $\{BIST_t,\ COVID_t,\ FX_t,\ OIL_t,\ CDS_t\}$. Letters such as $l, m, n, o,$ and p demonstrate the Schwarz information lag order requirement (SIC).

The QARDL model describes the quantile estimation as follows by extension of equation (1):

$$Q_{BIST_t} = \alpha(\tau) + \sum_{i-1}^{l} \omega_i(\tau) BIST_{2t-i} + \sum_{i-0}^{m} \omega_i(\tau) COVID19_{t-i} + \sum_{i-0}^{n} \lambda_i(\tau) FX_{t-i} + \sum_{i-0}^{o} \gamma_i(\tau) OIL_{t-i} + \sum_{i-0}^{p} \theta_i(\tau) CDS_{t-i} + \varepsilon_t(\tau) \quad (2)$$

where $\varepsilon_t(\tau) = BIST_{2t} - Q_{BIST\,2t}\left(\frac{\tau}{v_{t-1}}\right) 0 < \tau < 1$ represents the quantile. Then, because of the expected serial correlation, equation 2 transformed into the following:

$$Q_{\Delta BIST} = \alpha + \rho BIST_{2t-1} + \hat{\partial}_{COVID19} COVID19_{t-1} + \hat{\partial}_{FX} FX_{t-1} + \hat{\partial}_{OIL} OIL_{t-1} + \hat{\partial}_{CDS} CDS_{t-1} + \sum_{i=1}^{l-1} \varphi_i \Delta BIST_{2t-1} + \sum_{i=0}^{m-1} \omega_i \Delta COVID19_{t-1} + \sum_{i-0}^{n-1} \lambda_i \Delta FX_{t-1} + \sum_{i-0}^{o-1} \gamma_i \Delta 0IL_{t-1} + \sum_{i-0}^{p-1} \theta_i \Delta CDS_{t-i} + \varepsilon_t(\tau) \quad (3)$$

Building on the foundation laid by Cho et al. (2015), the structure of the quantile error correction model can be articulated as follows:

$$Q_{\Delta BIST2t} = \alpha(\tau) + \rho(\tau)(BIST_{2t-1} - \beta_{COVID19}(\tau)COVID19_{t-1} - \beta_{FX}(\tau)FX_{t-1} - \beta_{OIL}(\tau)OIL_{t-1} - \beta_{CDS}(\tau)CDS_{t-1}) + \sum_{i-1}^{l-1}\varphi_i(\tau)\Delta BIST_{2t-1} + \sum_{i-0}^{m-1}\omega_i(\tau)\Delta COVID19_{t-1} + \sum_{i-0}^{n-1}\lambda_i(\tau)\Delta FX_{t-1} + \sum_{i=0}^{o-1}\gamma_i(\tau)\Delta OIL_{t-1} + \sum_{i-0}^{p-1}\theta_i(\tau)\Delta CDS_{t-1} + \varepsilon_t(\tau) \quad (4)$$

To examine the cumulative short-term impact of previous stock market movements on the current stock market, we employed the delta method, which calculates φ_i as the sum of φ_j from i-1 to l-1 as $\varphi_i = \sum_{i-1}^{l-1}\varphi_j$. Additionally, the cumulative impact of prior short-term fluctuations in independent variables, such as COVID-19, $\omega_i = \sum_{i-0}^{m-1}\omega_j$ (ω_i as the sum of ω_j from $i-0$ to $m-1$) on present levels was computed. This involved aggregating the influences of both historical and contemporaneous values of these variables, the exchange rate $\lambda_i = \sum_{i-0}^{n-1}\lambda_j$ (λ_i as the sum of λ_j from $i-0$ to $n-1$), crude oil $\gamma_j = \sum_{i=0}^{o-1}\gamma_i$ (γ_j as the sum of γ_i from $i=0$ to $o-1$), and CDS $\theta_i = \sum_{i-0}^{p-1}\theta_j$ (θ_i as the sum of θ_j from $i-0$ to $p-1$). The model also entails the specification of coefficients that are inextricably linked to long-term variables such as COVID-19, exchange rate, oil price, and CDS. These coefficients are outlined hereinafter:

$$\beta_{COVID19*} = -\frac{\beta_{COVID19}}{\rho},\ \beta_{FX} = -\frac{\beta_{FX}}{\rho},\ \beta_{\text{OIL}*} = -\frac{\beta_{OIL}}{\rho},\ \text{and}\ \beta_{CDS*} = -\frac{\beta_{CDS}}{\rho} \quad (5)$$

4. Results

4.1. Descriptive Statistics

Table 2 provides a statistical summary of five variables: BIST, crude oil (OIL), credit default swaps (CDS), the exchange rate (FX), and COVID-19 (COVID19). According to the findings, the dependent variable BIST has a mean value of 1461 with a minimum of 842 and a maximum of 1193.39. The COVID-19 variable has an average of 19341, with the number of cases ranging from a single case to 111,157. The average oil price stands at approximately 60, with its lowest value being -9 and the highest reaching 122. The exchange rate has an average of 9.062 with a standard deviation of 2.587, indicating that Türkiye's exchange rate revolves closely around this mean. The CDS variable shows a mean value of 462.341, with its range spanning from 283.13 to 691.95. Also, the results from the Jarque-Bera (JB) test for all variables signal a deviation from a normal distribution, suggesting the appropriateness of a non-linear econometric method (Jiang et al., 2021). The JB statistics for all variables are significant at the 1% level, indicating a strong deviation from normality. Given the importance of the normality assumption in many econometric analyses, this deviation hints that traditional linear models might not be the best tools for analyzing this data. Hence, there is a suggestion for the appropriateness of non-linear econometric methods that can better capture and represent the underlying relationships in the data.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	J-B Stats
BIST	1461.96	372.12	842.5	1193.39	14.097***
COVID19	19341.565	21310.787	1	111157	16.007***
FX	9.062	2.587	6.284	16.606	8.322***
OIL	60.366	22.875	-9.95	122.185	72.185***
CDS	462.341	95.791	283.13	691.95	2.561***

*** represents the level of significance at 1%.

4.2 Unit Root Test

We employ unit root tests to determine the order of integration of the variables in time series data and to assess their stationarity before estimating the QARDL model. In this study, we use the Zivot-Andrews (ZA) test (2002), as well as the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. These tests are crucial for determining the stationarity and potential structural breaks in time series data, especially when employing the QARDL method. This is because the tests provide critical information about the stationarity, order of integration, and potential structural breaks in the data, allowing researchers to make informed decisions about the model specification and draw valid inferences from their analyses.

The choice to employ the Zivot-Andrews's test stems from its unique capability to account for one structural break in time series data. While both the ADF and PP tests offer foundational insights into the order of integration, they usually operate under the assumption of a consistent time series with no structural breaks. However, given the susceptibility of economic and financial time series to sudden shifts from the COVID-19 pandemic can lead to unprecedented disruptions in economic indicators, warranting the need to consider potential structural breaks in the data.

By integrating the possibility of a structural break, the ZA test ensures a more nuanced and accurate evaluation of a series' stationarity. Such an approach is particularly pivotal for this research, which seeks to evaluate the impacts of significant external events on various economic variables.

According to the ADF and PP test results, all variables are integrated at order one (I (1)) except crude oil, which is stationary at the I (0) level for the ADF test. The Zivot-Andrews (ZA) test results also indicate that OIL, FX, and COVID19 are non-stationary in levels but stationary at the I (1) levels. Thus, in line with these findings, we selected the order of integration at I (1) for our analysis with the QARDL model.

Table 3: Unit Root Test Results and Structural Break Test Result

Variables	ADF test		PP test		ZA Test			
					ZA (level)		ZA (Δ)	
	ADF (level)	ADF (Δ)	PP (level)	PP (Δ)	t-statistic	Break-term	t-statistic	Break-term
BIST	-2.489	-13.925***	-2.027	-12.332***	-27.748***	7/25/2020	-11.569***	07/24/2020
COVID19	-2.369	-20.791 ***	-1.815	-21.355***	-1.441	04/23/2021	-9.961***	04/19/2021
FX	-2.044	-16.237 ***	-0.25	-22.001***	-4.79	11/04/2020	-11.713***	08/07/2020
OIL	-4.911***	-19.287 ***	-0.52	-16.817***	-4.343	01/02/2022	-11.943***	12/05/2021
CDS	-1.971	-18.074 ***	-1.909	-24.012***	-7.06***	11/17/2021	-13.502***	12/21/2021

Note: *** represents the level of significance at 1%.

4.3. Results and Discussion

The QARDL model in Table 4 provides a rigorous and comprehensive analysis of the complex relationships between the Türkiye BIST100 index and the independent variables of COVID-19, foreign exchange rate, oil price, and credit default swap. The table reports the long-run and short-run estimates of the QARDL model for different quantiles of the stock market returns distribution, ranging from the 5th to the 95th percentiles of the distribution. The results show that the error correction mechanism (ECM) coefficients are negative for all quantiles from 0.05 to 0.95 in the long term, indicating that any deviations from the long-term equilibrium between the stock market and the other variables will be automatically corrected over time.

Table 4: The Long-Run and Short-Run Results of Quantile Autoregressive Distributed Lag

Quantiles (τ)	Constant	ECM	Long-run estimates				Short-run estimates				
	α∗(τ)	ρ∗(τ)	βCOVID19 (τ)	βFX (τ)	β0IL (τ)	βCDS (τ)	φ1 (τ)	ω0 (τ)	λ0 (τ)	γ0 (τ)	θ0 (τ)
0.05	0.062	−0.252*	−0.432***	0.303*	−0.120	−0.214	0.243**	−0.221**	0.236*	−0.032	−0.014***
	(-0.001)	(−0.005)	(−2.301)	(0.371)	(−0.207)	(−0.201)	(1.038)	(−2.734)	(2.306)	(−0.257)	(−2.820)
0.1	0.024	−0.231**	−0.250***	0.200**	−0.292	−0.273	0.231**	−0.108**	0.072*	−0.019	−0.005***
	(-0.014)	(−0.003)	(−2.471)	(0.519)	(−0.301)	(−0.181)	(2.819)	(−2.165)	(1.437)	(−0.231)	(−2.199)
0.2	0.041	−0.192*	−0.073***	0.141*	−0.195	−0.242	0.325**	−0.017	0.028**	−0.125	−0.154**
	(-0.001)	(−2.421)	(−2.082)	(0.601)	(−0.363)	(−0.208)	(2.149)	(−2.011)	(1.301)	(−0.243)	(−2.001)
0.3	0.031	−0.142**	−0.120**	0.378	−0.264	−0.072**	0.437**	−0.019	0.079**	−0.026	−0.027*
	(-0.324)	(−1.954)	(−2.378)	(0.821)	(−0.319)	(−0.156)	(1.085)	(−2.170)	(2.904)	(−0.431)	(−2.014)
0.4	0.023	−0.133**	−0.328**	0.396	−0.225	−0.119**	0.291**	−0.067	0.008	−0.043	−0.017
	(-0.005)	(−1.963)	(−2.191)	(0.901)	(-0.393)	(−0.242)	(2.008)	(−2.107)	(1.931)	(−0.503)	(−2.901)
0.5	0.0351	−0.145**	−0.203**	0.401	−0.284	−0.461**	0.322**	−0.009	0.017	−0.062	−0.025
	(-0.019)	(−1.987)	(−1.968)	(0.894)	(−0.414)	(−0.238)	(2.103)	(−2.131)	(1.956)	(−0.549)	(−2.912)
0.6	0.074	−0.161**	−0.119**	0.332**	−0.357	−0.136**	0.348***	−0.021	0.006	−0.043	−0.018
	(0.002)	(−1.992)	(−1.967)	(0.992)	(−0.424)	(−0.257)	(1.998)	(−2.014)	(1.946)	(−0.601)	(−2.891)
0.7	0.045	−0.287**	−0.239*	0.321**	−0.142**	−0.312**	0.245***	−0.022	0.013	−0.055	−0.302
	(0.246)	(−2.062)	(−1.923)	(1.001)	(−0.378)	(−0.356)	(1.908)	(−2.108)	(1.910)	(−0.607)	(−2.780)
0.8	0.051	−0.354**	−0.523*	0.142**	−0.218***	−0.325***	0.369***	−0.031	0.006	−0.133	−0.004
	(0.027)	(−1.894)	(−1.921)	(1.036)	(−0.493)	(−0.391)	(1.992)	(−2.103)	(1.939)	(−0.703)	(−2.612)
0.9	0.108	−0.331**	−0.137*	0.362**	−0.171***	−0.336***	0.382***	−0.078	0.193	−0.540	−0.718
	(0.000)	(−2.104)	(−1.900)	(1.103)	(−0.594)	(−0.412)	(2.037)	(−2.339)	(1.471)	(−0.491)	(−2.249)
0.95	0.039	−0.361**	−0.252*	0.360**	−0.378***	−0.405***	0.361***	−0.068	0.071	−0.139	−0.142
	(0.057)	(−2.803)	(−1.902)	(1.151)	(−0.359)	(−0.512)	(2.117)	(−2.097)	(1.053)	(−0.658)	(−2.408)

Note: ***, **, and * Significance levels at 1%,5%, and 10% level of significance, respectively.

The result from the QARDL model reveals a consistent and statistically significant negative impact of the COVID-19 variable on the Türkiye BIST100 index. This effect is observed across all quantiles in the long run and at the 5th and 10th quantiles in the short run. This persistent negativity likely results from changes in market sentiment stemming from the pandemic, marked by panic-induced investor pessimism and heightened uncertainty. Additionally, the pandemic-induced disruptions, including lockdowns, supply chain interruptions, and economic uncertainty, have significantly affected the profitability and prospects of companies listed in the BIST100, amplifying the downward pressure on the financial market. This finding is also consistent[3] with the work of Basuony et al. (2021), Kartal & Dağlı (2021) and Atıcı Ustalar & Sanlisoy (2021). Additionally, the pandemic markedly increased the BIST-100 stock market's risk, with portfolio risk rising by 115% and beta escalating to 0.949314, reflecting significant changes in market dynamics (Atilgan & Afşar, 2022).

The study found that the effect of exchange rates on the stock market is positive and significant for most quantiles, except for the 30th, 40th, and 50th quantiles in the long run and the 5th, 10th, 20th, and 30th quantiles in the short run. However, the magnitude of the effect

[3] See for further discussion Jabeen et al. (2021).

varies across quantiles. For example, a 1% increase in the exchange rate is associated with a 0.3% increase in stock returns in the 5th quantile but only a 0.14% increase in the 20th quantile. This suggests the asymmetric relationship between exchange rates and the stock market, with a more substantial impact at lower quantiles. This finding is consistent with the portfolio balance hypothesis[4], which posits that a currency appreciation can lead to increased investor confidence and higher stock prices. The findings suggest that a scenario involving currency appreciation could potentially benefit the BIST100 index, especially under specific market conditions, given the dynamics of the Türkiye economy, which heavily relies on imports. A stronger domestic currency can lead to reduced import costs, ultimately bolstering investor confidence. The empirical finding of this study also aligns with the findings of Hashmi et al. (2022).

Interestingly, there is a statistically significant negative impact of crude oil prices on the stock market in the 70th, 80th, 90th, and 95th quantiles in the long run. However, in the short term, the effect is negative and insignificant. The coefficients indicate a one percent change in oil prices corresponds to reductions of about 0.14%, 0.22%, 0.17%, and 0.38% in stock returns for these quantiles. Türkiye's proactive energy diversification policies, reducing its reliance on oil, and the diversified nature of its economy play pivotal roles in mitigating the immediate impact of oil price fluctuations. Additionally, the differing time horizons reveal that short-term market sentiment and investor behavior can overshadow oil price effects while structural factors and economic diversification gain prominence over time. External economic influences and investor sentiment also contribute to the complexity of this relationship, making it a context-specific phenomenon within the Türkiye stock market. The finding of this study is also consistent with the work of Hashmi et al. (2022) and Effiom et al. (2021).

Regarding Credit Default Swap (CDS), our findings reveal a significant and negative impact on the stock market, with varying degrees of influence across different quantiles. In the long term, this influence is particularly pronounced in the middle and upper quintiles, while in the short term, it primarily affects the lower quantiles. Specifically, a one percent change in CDS leads to distinct declines in the stock market: approximately 0.07% at the 30th, 0.12% at the 40th, 0.46% at the 50th, 0.14% at the 60th, 0.31% at the 70th, 0.32% at the 80th, 0.33% at the 90th, and 0.41% at the 95th quantiles. Conversely, at the 5th quantile, a one percent change in CDS corresponds to a modest but statistically significant 0.01% decrease in the stock market, while at the 10th and 20th quantiles, it leads to 0.01% and 0.15% decreases, respectively. These results underscore that rising CDS spreads signal heightened perceptions of credit risk, subsequently leading to declines in the BIST index. Given Türkiye's financial landscape and recent economic challenges, this finding highlights the notable caution among investors regarding credit risk, which holds significant implications for market dynamics.

Our main findings from the QARDL model analysis reveal significant insights into the impact of various factors on the BIST 100 index during the COVID-19 pandemic. Notably, the pandemic had a pervasive negative impact on the BIST 100 across most quantiles. This trend

[4] Hypothesis suggests that currency fluctuations can significantly influence investor behavior and stock market performance. A currency appreciation typically boosts investor confidence, potentially leading to higher stock prices.

indicates that higher infection rates diminished investor confidence and market performance. Intriguingly, our analysis also shows that exchange rates had a positive effect on the BIST 100 in certain quantiles, suggesting that a weaker Türkiye lira favorably influenced export-oriented sectors. Conversely, both crude oil prices and credit default swap rates consistently exhibited a negative effect across all quantiles. This reflects the adverse impacts of higher energy costs and increased sovereign risk on the Türkiye economy. These findings provide a nuanced understanding of the multifaceted effects of global and local economic variables on the stock market during a period of unprecedented global turmoil.

4.4. Wald Test

The Wald test functions as an evaluative measure to analyze the presence of an asymmetrical relationship among the explanatory variables and to assess the significance of this relationship in both the short-term and long-term.

Table 5: Wald Test for Parameter Constancy

	Variables	**Wald Statistics**
Long − run parameters	P	4.371*** (0.000)
	$\beta COVID19$	4.001*** (0.000)
	βFX	7.285*** (0.000)
	βOIL	5.124*** (0.000)
	βCDS	8.002*** (0.003)
Short − run parameters	ϕ_1	2.336*** (0.000)
	ω_0	3.601** (0.028)
	λ_0	5.016 ** (0.031)
	γ_0	2.230*** (0.000)
	θ_0	1.476** (0.045)

Note: *** and ** represent the 1% and 5% significance levels respectively.

After the completion of the QARDL analysis, the Wald test is employed to probe into the cointegration association that may vary over time. This enables an appraisal of the stability of the cointegrated coefficients across different quantiles.

As depicted in Table 5, the outcomes of the Wald test for both the short-term and long-term indicate that the null hypothesis, which posits a linear relationship in the speed of parameter adjustments, cannot be upheld. This suggests a repudiation of the hypothesis of parameter homogeneity. The implications drawn from the results indicate that the explanatory variables, which account for the performance of the Türkiye stock market, exhibit asymmetric and simultaneous influences on the stock market performance in Türkiye.

4.5. Granger Causality Test

The Granger causality test was utilized to ascertain the degree of connection between the variables. Table 6 showcases the outcomes of this test, detailing results for each quantile.

Table 6: Quantile-Specific Results of Granger Causality Test

Quantiles	$\Delta BIST_t$ to $\Delta Covid19_t$	$\Delta Covid19_t$ to $\Delta BIST_t$	$\Delta BIST_t$ to ΔFX_t	ΔFX_t to $\Delta BIST_t$	$\Delta BIST_t$ to ΔOIL_t	ΔOIL_t to $\Delta BIST_t$	$\Delta BIST_t$ to ΔCDS_t	ΔCDS_t to $\Delta BIST_t$
[0.05-0.95]	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
0.05	0.000***	0.000***	0.000***	0.000***	0.011***	0.000***	0.000***	0.000***
0.1	0.000***	0.000***	0.000***	0.000***	0.006***	0.000***	0.000***	0.000***
0.2	0.000***	0.000***	0.000***	0.000***	0.012***	0.000***	0.000***	0.000***
0.3	0.000***	0.000***	0.000***	0.000***	0.008***	0.000***	0.000***	0.000***
0.4	0.000***	0.000***	0.000***	0.000***	0.016***	0.000***	0.000***	0.000***
0.5	0.000***	0.000***	0.000***	0.000***	0.009***	0.000***	0.000***	0.000***
0.6	0.000***	0.000***	0.000***	0.000***	0.02***	0.000***	0.000***	0.000***
0.7	0.000***	0.000***	0.000***	0.000***	0.013***	0.000***	0.000***	0.000***
0.8	0.000***	0.000***	0.000***	0.000***	0.019***	0.000***	0.000***	0.000***
0.9	0.000***	0.000***	0.000***	0.000***	0.007***	0.000***	0.000***	0.000***
0.95	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***

Note: ***, **, and * represent significance levels at 1%, 5%, and 10% level of significance, respectively.

The findings offer strong support for the precision of QARDL. They reveal a robust bidirectional causality: from BIST to all explanatory variables and, reciprocally, from these variables to BIST. This causality is consistent across both directions and is statistically significant at the 1% level across all quantiles. Furthermore, the presented results are in concordance with prior research, corroborating findings from studies such as those by Jiang et al. (2021) and Razzaq et al. (2021).

5. Conclusion

The COVID-19 pandemic has significantly disrupted the global economic landscape, and the Türkiye stock market was not exempted. Interventions such as social distancing, nationwide lockdowns, and travel restrictions instituted to curtail the virus's spread have exacerbated the stock market's downtrend, subsequently magnifying Türkiye's economic challenges. Consequently, understanding the dynamics between the pandemic and the stock market's response becomes indispensable.

This study delves into both short-term and long-term ramifications of the COVID-19 pandemic on the Türkiye stock market. Utilizing the QARDL model, we investigated the non-linear interrelationships amongst the BIST100 index, COVID-19 cases, dollar rates, crude oil prices, and credit default swap rates.

Several key insights emerged:

Long-term Effects: A surge in COVID-19 cases is associated with a deteriorating stock market, underlining the pandemic's detrimental role in market stability. Furthermore, our results indicate a dual response of the stock market to the exchange rate: it accelerates positively during the lowest and highest quantiles but remains unaffected in the middle quintiles. Oil prices, as expected, exert a negative pull on the stock market, especially during the upper quantiles. Conversely, the market seems indifferent to oil price variations in the lower and middle quantiles. Interestingly, as the risk embodied by credit default swap rates rises, the stock market shows a downward trajectory, reinforcing the notion of the stock market's sensitivity to national risks.

Short-term Dynamics: Prior stock market returns wield a pronounced positive influence across all quantiles. The mounting cumulative cases of COVID-19 have a negative bearing, especially in the lowest quantiles. Meanwhile, exchange rates from the past and present show positive associations, primarily within the lower to middle quantiles. Lastly, fluctuations in credit default swap rates from previous periods negatively influence current stock market performance in the lower quantiles.

The Granger causality test further cements the intertwined nature of our variables: while external factors like oil prices, default risks, exchange rates, and the pandemic shape stock market returns, the stock market, in return, also exert influence on these determinants.

As highlighted by our empirical findings, the interwoven dynamics of the Türkiye stock market emphasize the importance of targeted and multi-pronged policy interventions. The policy implications are drawn from our research:

The COVID-19 pandemic has had a negative impact on the Türkiye stock market. The Türkiye government can take proactive policy measures to address this, such as investing in pandemic preparedness, strengthening healthcare infrastructure, and promoting diversification among investors and businesses.

The pronounced impact of exchange rate fluctuations on the stock market's performance underscores the need for a fortified foreign exchange policy. A stable exchange rate bolsters investor confidence and curtails excessive market volatility. By adopting mechanisms such as foreign exchange interventions, forward guidance, and macroprudential measures, authorities can safeguard the stock market from abrupt disruptions induced by erratic exchange rate movements.

The sensitivity of the stock market to crude oil price variations suggests an overreliance on this commodity. A push towards economic diversification is imperative to mitigate the repercussions of global oil price shocks on the domestic stock market. Expanding investments in renewable energy sources, fostering innovation in alternative sectors, and reducing the economy's oil dependency can make the stock market more resilient to external commodity shocks.

Our findings on the influence of credit default swap rates point towards the stock market's vulnerability to inherent national risks. There is a pressing need to enhance risk management practices within financial institutions and the broader market to address this. Implementing stringent regulations, encouraging transparency in risk disclosure, and fostering a culture of continuous risk assessment can act as bulwarks against unforeseen market downturns stemming from increased default risks.

References

Açıkgöz, Ö. & Günay, A. (2021). Short-Term Impact of The Covid-19 Pandemic on The Global and Türkiye Economy. *Türkiye Journal of Medical Sciences, 51*(Special Issue 1), 3182-3193. https://doi.org/10.3906/sag-2106-271

Akçağlayan, A. & Tuzcu, S. E. (2023). The Asymmetric Impacts of Oil Prices and Selected Macroeconomic Variables on Stock Markets: The Case of Turkey. *Sosyoekonomi, 31*(55), 125-149. https://doi.org/10.17233/sosyoekonomi.2023.01.07

Alan, B. & Aybars, A. (2022, January 1). *The Effect of COVID-19 on the Insurance Sector of Emerging Market Countries*. https://scite.ai/reports/10.29228/jore.16

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, 27*, 100341. https://doi.org/10.1016/j.jbef.2020.100341.

Atıcı Ustalar, S. & Sanlisoy, S. (2021). Covid-19 Küresel Salgınının Hisse Senedi Piyasası Oynaklığı Üzerindeki Etkisi: Bist100 Uygulaması. *Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 14*(4), 1143-1158.

Atilgan, C. & Afşar, K. E. (2022). Covid-19 Pandemisinin BİST 100 Şirketleri Arasındaki Sektörel Bağlantılara Etkisi: Minimum Kapsayan Ağaç Analizi. *Bilgi Sosyal Bilimler Dergisi, 24*(1), 53-82. https://doi.org/10.54838/bilgisosyal.1035807

Atri, H., Kouki, S. & Gallali, M. I. (2021). The Impact of COVID-19 News, Panic and Media Coverage on The Oil and Gold Prices: An ARDL Approach. *Resources Policy, January*. https://doi.org/10.1016/j.resourpol.2021.102061.

Basuony, M. A. K., Bouaddi, M., Ali, H. & EmadEldeen, R. (2021). The Effect of the COVID-19 Pandemic on Global Stock Markets: Return, Volatility, and Bad State Probability Dynamics. *Journal of Public Affairs*, e2761. https://doi.org/10.1002/pa.2761

Bellégo, C., Benatia, D. & Pape, L.-D. (2022). Dealing with Logs and Zeros in Regression Models. CREST - Série des Documents de Travail, 2019-13. https://ssrn.com/abstract=3444996

Borsa Istanbul (BIST). (2022). *Borsa Istanbul Historic and Reference Data Platform*. https://datastore.borsaistanbul.com/

Bouri, E., Cepni, O., Gabauer, D. & Gupta, R. (2021). Return Connectedness Across Asset Classes Around The COVID-19 Outbreak. *International Review of Financial Analysis, 73*, Article 101646. https://doi.org/10.1016/ j.irfa.2020.101646

Cehreli, C., Dursun, I. & Barlas, Y. (2017). Speculative Dynamics of Exchange Rates in Turkey: A System Dynamics Approach. *YILDIZ Social Science Review*, 103-120. https://dergipark.org.tr/tr/download/article-file/407597

Çelik, S. & Yılmaz, M. (2021). The Impact of COVID-19 on Stock Returns: Evidence from Turkey. *Journal of Economics and Administrative Sciences, 25*(49), 1-16.

Central Bank of the Republic of Türkiye (CBRT). (2022). *Exchange Rates (Daily)*. Electronic Data Delivery System. https://evds2.tcmb.gov.tr/

Cho, J. S., Kim, T. H. & Shin, Y. (2015). Quantile Cointegration in The Autoregressive Distributed-Lag Modeling Framework. *Journal of Econometrics, 188*(1), 281-300. https://doi.org/10.1016/j.jeconom.2015.05.003.

Civan, Z., Şimşek, G. G. & Çinar, U K. (2022). *What Are the Macroeconomic Drivers of the Asset Returns of Türkiye Banks?*. https://scite.ai/reports/10.3846/tede.2022.17750

Cohn, J. B., Liu, Z. & Wardlaw, M. (2022). Count (and Count-Like) Data in Finance. *Journal of Financial Economics*. https://doi.org/10.2139/ssrn.3800339

Coşkun, Y., Seven, Ü., Ertuğrul, H. M. & Ulussever, T. (2017). Capital Market and Economic Growth Nexus: Evidence from Turkey. *Central Bank Review, 17*(1), 19-29. https://doi.org/10.1016/j.cbrev.2017.02.003.

Cutcu, I. & Dineri, E. (2021). The Effect of The Pandemic on Exchange Rates: An Application on Turkey. *International Journal of Economics, Politics, Humanities & Social Science, 4*, 182-193.

Demirgüç-Kunt, A., Pedraza, A. & Ruiz-Ortega, C. (2021). Banking Sector Performance During The COVID-19 Crisis. *Journal of Banking and Finance, 133*(August). https://doi.org/10.1016/j.jbankfin.2021.106305

Dineri, E. & Çütçü, İ. (2020). The COVID-19 Process and The Exchange Rate Relation: An Application in Turkey. *Research Square*, 1-18. http://dx.doi.org/10.21203/rs.3.rs-49026/v1

Durdu, C. B., Martin, A. & Zer, I. (2020). The Role of US Monetary Policy in Banking Crises Across the World. *IMF Economic Review, 68*(1), 66-107. https://doi.org/10.1057/s41308-020-00109-1

Effiom, L. & Uche, E. (2021). Oil Price, Exchange Rate and Stock Price in Nigeria: Fresh Insights Based on Quantile ARDL Model. *Economics and Policy of Energy and the Environment*, *2021*(1), 59-79.

Eichengreen, B. & Hausmann, R. (1999). Exchange Rates and Financial Fragility. *NBER Working Paper Series.* http://www.nber.org/papers/w7418

Erdaş, M. (2022). The Impact of Financial Drivers on Credit Default Swap (CDS) in Turkey: The Cointegration with Structural Breaks and FMOLS Approach. *Istanbul Business Research, 51*(1), 25-46. https://doi.org/10.26650/ibr.2021.51.895637.

Erden, B. & Aslan, Ö. F. (2022). The Impact of the COVID-19 Pandemic Outbreak on The Sustainable Development of The Türkiye Banking Sector. *Frontiers in Environmental Science, 10*(September), 1-12. https://doi.org/10.3389/fenvs.2022.989070

Eren, M. & Basar, S. (2016). Effects of Credit Default Swaps (CDS) on BIST-100 Index. *Ecoforum Journal, 5*(3). http://www.ecoforumjournal.ro/index.php/eco/article/view/527

Fernandes, N. (2020). Economic Effects of Coronavirus Outbreak (COVID-19) on the World Economy. IESE Business School Spain. *SSRN Electronic Journal*, 1-29. ISSN 1556-5068, Elsevier BV.

Gao, H. & Chen, G. T. (2022, October 30). *Crude Oil Price Shocks and Stock Market Volatility: Evidence from China*. https://scite.ai/reports/10.5539/res.v14n4p39

Gazel, S.. (2016). Cointegration and Causality Between Bist 100 Index and Gold Price. *International Journal of Business and Management, 5*, 337-344.

Godil, D. I., Sharif, A., Agha, H. & Jermsittiparsert, K. (2020). The Dynamic Non-Linear Influence of ICT, Financial Development, and Institutional Quality on CO2 Emission in Pakistan: New Insights from QARDL Approach. *Environmental Science and Pollution Research, 27*(19), 24190-24200. https://doi.org/10.1007/s11356-020-08619-1

Gokmenoglu, K., Azin, V. & Taspinar, N. (2015). The Relationship Between Industrial Production, GDP, Inflation and Oil Price: The Case of Turkey. *Procedia Economics and Finance, 25*, 497-503. https://doi.org/https://doi.org/10.1016/S2212-5671(15)00762-5

Habib, M. M., Mileva, E. & Stracca, L. (2017). The Real Exchange Rate and Economic Growth: Revisiting the Case Using External Instruments. *Journal of International Money and Finance, 73*, 386-398. https://doi.org/https://doi.org/10.1016/j.jimonfin.2017.02.014

Hanson, J. & Roache, S. K. (2020, April 17). *The Impact of COVID-19 on Emerging Markets Economies' Financial Conditions*. https://www.risk.net/journal-of-risk/7956416/the-relationship-between-crude-oil-futures-and-exchange-rates-in-the-context-of-the-covid-19-shock-a-tale-of-two-markets

Hao, X., Sun, Q. & Xie, F. (2022). The COVID-19 Pandemic, Consumption and Sovereign Credit Risk: Cross-Country Evidence. *Economic Modelling, 109*(February). https://doi.org/10.1016/j.econmod.2022.105794.

Harvey, C. R. (2020). The Economic and Financial Implications of the COVID-19 Pandemic. *The Mayo Center for Asset Management at the University of Virginia Darden School of Business and the Financial Management Association International Virtual Seminars Series*, April. https://www.darden.virginia.edu/mayo-center/events/virtualspeaker-series

Hashmi, S. M. & Chang, B. H. (2023). Asymmetric Effect of Macroeconomic Variables on the Emerging Stock Indices: A Quantile ARDL Approach. *International Journal of Finance & Economics*, *28*(1), 1006-1024.

Hashmi, S. M., Chang, B. H., Huang, L. & Uche, E. (2022). Revisiting the Relationship Between Oil Prices, Exchange Rate, and Stock Prices: An Application of Quantile ARDL Model. *Resources Policy, 75*, 102543. https://doi.org/10.1016/j.resourpol.2021.102543

Ibn-Mohammed, T., Mustapha, K. B., Godsell, J., Adamu, Z., Babatunde, K. A., Akintade, D. D., Acquaye, A., Fujii, H., Ndiaye, M. M., Yamoah, F. A. & Koh, S. C. L. (2021). A Critical Review of the Impacts of COVID-19 on the Global Economy and Ecosystems and Opportunities for Circular Economy Strategies. *Resources, Conservation and Recycling, 164*(May 2020), 105169. https://doi.org/10.1016/j.resconrec.2020.105169

IMF. (2021). Emerging Markets: Prospects and Challenges. *World Economic Outlook, April 2021: Managing Divergent Recoveries* (Chapter 2). https://www.oecd.org/coronavirus/policy-responses/covid-19-and-global-capital-flows-2dc69002/

Ismayilov, J. & Gürler, Ö. K. (2022). *The Effect of Credit Default Swaps, Oil Prices and Exchange Rates on Turkey's Energy Sector: The Example of Bist Electricity Index*. https://scite.ai/reports/10.11611/yead.1168027

Jabeen, S., Farhan, M., Zaka, M. A., Fiaz, M. & Farasat, M. (2021). COVID and World Stock Markets: A Comprehensive Discussion. *Frontiers in Psychology, 12*, 7633461

Jiang, C., Zhang, Y., Razi, U. & Kamran, H. W. (2021). The Asymmetric Effect of COVID-19 Outbreak, Commodities Prices and Policy Uncertainty on Financial Development in China: Evidence from QARDL Approach. *Economic Research-Ekonomska Istrazivanja, 35*(1), 2003-2022. https://doi.org/10.1080/1331677X.2021.1930092

John, C. & Draper, N. R. (1980). An Alternative Family of Transformations. *Applied Statistics, 29*(2), 190-197. https://doi.org/10.2307/2986305

Kandil, M., Berument, H. & Dincer, N. N. (2007). The Effects of Exchange Rate Fluctuations on Economic Activity in Turkey. *Journal of Asian Economics, 18*(3), 466-489. https://doi.org/https://doi.org/10.1016/j.asieco.2006.12.015.

Karahan, Ö. (2020). Influence of Exchange Rate on the Economic Growth in the Türkiye Economy. *Financial Assets and Investing, 11*(1), 21-34. https://doi.org/10.5817/fai2020-1-2

Kartal, M. T. (2020). The Behavior of Sovereign Credit Default Swaps (CDS) Spread: Evidence from Turkey with the Effect of Covid-19 Pandemic. *Quantitative Finance and Economics, 4*(3), 489-502. https://doi.org/10.3934/qfe.2020022

Kartal, M. T., Depren, Ö. & Kılıç Depren, S. (2021). Do Monetary Policy Measures Affect Foreign Exchange Rates During The COVID-19 Pandemic? Evidence from Turkey. *Journal of BRSA Banking and Financial Markets,* 175-202. https://doi.org/10.46520/bddkdergisi.987416

Korkmaz, T. & Yılmaz, M. (2020). The Effects of COVID-19 on Stock Market Volatility: Evidence from Turkey. *Journal of Asian Finance Economics and Business, 7*(11), 893-912.

Köse, N. & Ünal, E. (2021). The Effects of The Oil Price and Oil Price Volatility on Inflation in Turkey. *Energy, 226*, 120392. https://doi.org/https://doi.org/10.1016/j.energy.2021.120392

Levine, R. & Zervos, S. (1998). Stock Markets, Banks, and Economic Growth. *The American Economic Review, 88*(3), 537-558. http://www.jstor.org/stable/116848

Li, Chuanjian, Su, Z. W., Yaqoob, T. & Sajid, Y. (2021). COVID-19 and Currency Market: A Comparative Analysis of Exchange Rate Movement in China and USA During Pandemic. *Economic Research-Ekonomska Istrazivanja, 35*(1), 2477-2492. https://doi.org/10.1080/1331677X.2021.1959368

Liu, Y., Qiu, B. & Wang, T. (2021). Debt Rollover Risk, Credit Default Swap Spread and Stock Returns: Evidence from the COVID-19 Crisis. *Journal of Financial Stability, 53*, 100855. https://doi.org/10.1016/j.jfs.2021.100855

MaCurdy, T. E. & Pencavel, J. H. (1986). Testing between Competing Models of Wage and Employment Determination in Unionized Markets. *Journal of Political Economy, 94*(3), S3–S39. http://www.jstor.org/stable/1837175

Masoud, N. M. H. (2013). The Impact of Stock Market Performance Upon Economic Growth. *International Journal of Economics and Financial Issues, 3*(4), 788-798. https://doi.org/10.5958/2249-7323.2018.00034.2

Mazur, M., Dang, M. & Vega, M. (2021). COVID-19 and the March 2020 Stock Market Crash. Evidence from S&P1500. *Finance Research Letters, 38*, 1-8.

Nhuyen, B. H. (2022). *Three Essays on The Effects of Credit Default Swaps*. Victoria University of Wellington.

Nwosa, P. I. (2021). Oil Price, Exchange Rate and Stock Market Performance During the COVID-19 Pandemic: Implications for TNCs and FDI Inflow in Nigeria. *Transnational Corporations Review, 13*(1), 125-137. https://doi.org/10.1080/19186444.2020.1855957

OECD. (2020). *The Impact of Coronavirus (COVID-19) and the Global Oil Price Shock on the Fiscal Position of Oil-Exporting Developing Countries*. https://www.oecd.org/coronavirus/policy-responses/the-impact-of-coronavirus-covid-19-and-the-global-oil-price-shock-on-the-fiscal-position-of-oil-exporting-developing-countries-8bafbd95/

Oksuz, E., Malhan, S., Gonen, M. S., Kutlubay, Z., Keskindemirci, Y. & Tabak, F. (2021). COVID-19 Healthcare Cost and Length of Hospital Stay in Turkey: Retrospective Analysis from The First Peak of The Pandemic. *Health Economics Review, 11*(1), 39. https://doi.org/10.1186/s13561-021-00338-8

Ottone, M., Bartolini, L., Bonvicini, L. & Rossi, P. (2023). *The Effect of Diabetes on COVID-19 Incidence and Mortality: Differences between Highly-Developed-Country and High-Migratory-Pressure-Country Populations*. https://scite.ai/reports/10.3389/fpubh.2023.969143

Öztürk, Ö., Şişman, M. Y., Uslu, H. & Çıtak, F. (2020). Effect of COVID-19 Outbreak on Türkiye Stock Market: A Sectoral-Level Analysis. *Hitit University Journal of Social Sciences Institute, 13*(1), 56-68.

Pak, A., Adegboye, O. A., Adekunle, A. I., Rahman, K. M., McBryde, E. S. & Eisen, D. P. (2020). Economic Consequences of the COVID-19 Outbreak: The Need for Epidemic Preparedness. *Frontiers in Public Health, 8*(May), 1-4. https://doi.org/10.3389/fpubh.2020.00241

Razzaq, A., Sharif, A., Ahmad, P. & Jermsittiparsert, K. (2021). Asymmetric Role of Tourism Development and Technology Innovation on Carbon Dioxide Emission Reduction in the Chinese Economy: Fresh Insights from QARDL Approach. *Sustainable Development, 29*(1), 176-193. https://doi.org/10.1002/sd.2139

Salisu, A. A., Sikiru, A. A. & Vo, X. V. (2020). Pandemics and the Emerging Stock Markets. *Borsa Istanbul Review, 20*, 40-48. https://doi.org/10.1016/j.bir.2020.11.004

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, 70*(April), 101496. https://doi.org/10.1016/j.irfa.2020.101496

Sharma, G. D., Tiwari, A. K., Jain, M., Yadav, A. & Erkut, B. (2021). Unconditional and Conditional Analysis Between Covid-19 Cases, Temperature, Exchange Rate and Stock Markets Using Wavelet Coherence and Wavelet Partial Coherence Approaches. *Heliyon, 7*(2), e06181. https://doi.org/10.1016/j.heliyon.2021.e06181

Smith, B. & Jones, A. (2020). Nonrivalry and the Economics of Data. *American Economic Review, 110*(9), 2819-2858. Doi: 10.1257/aer.20191330

Spash, C. L. (2021). 'The Economy' as If People Mattered: Revisiting Critiques of Economic Growth in a Time of Crisis. *Globalizations, 18*(7), 1087-1104. https://doi.org/10.1080/14747731.2020.1761612

Syed, S. A. S. (2022). Stock Market in The Age of COVID19: Mere Acclimatization or Stockholm Syndrome?. *Journal of Economic Asymmetries, 25*(December 2021), e00245. https://doi.org/10.1016/j.jeca.2022.e00245

Toparlı, E. A., Çatık, A. N. & Balcılar, M. (2019). The Impact of Oil Prices on the Stock Returns in Turkey: A TVP-VAR Approach. *Physica A: Statistical Mechanics and its Applications, 535*, 122392. https://doi.org/10.1016/j.physa.2019.122392

Topcu, M. & Gulal, O. S. (2020). The Impact of COVID-19 on Emerging Stock Markets. *Finance Research Letters, 36*, 101691.

Tuna, G. (2022). The Influence of Oil Price Shocks on BIST100 Index during Covid-19 Pandemic Period: Evidence from Turkey. *International Journal of Energy Economics and Policy, 12*(1), 1-8.

Tuna, K. (2022). The Effects of Volatilities in Oil Price, Gold Price and VIX Index on Türkiye BIST 100 Stock Index in Pandemic Period. *Istanbul Journal of Economics, 72*(1), 39-54. https://doi.org/10.26650/ISTJECON2021-1034794

Umar, M., Su, C. W., Rizvi, S. K. A. & Shao, X. F. (2021). Bitcoin: A Safe Haven Asset and A Winner Amid Political and Economic Uncertainties in the US?. *Technological Forecasting and Social Change, 167*(April 2020), 120680. https://doi.org/10.1016/j.techfore.2021.120680.

Ustaoğlu, E. (2022). Analysis of Relations between CDS, Stock Market, and Exchange Rate: Evidence from Covid-19. *Journal of Research in Economics Politics and Finance,7*(2), 301-315. Doi: 10.30784/epfad.1085420

Winkelmann, R. (2008). *Econometric Analysis of Count Data*. Springer Science

World Government Bonds. (2022). *World Government Bonds*. http://www.worldgovernmentbonds.com/cds-historical-data/turkey/5-years/

Worldometer. (2022). *Worldometer Statistics*. https://www.worldometers.info/coronavirus/

WTO. (2021). Highlights of World Trade in 2020. *World Trade Statistical Review 2021*. https://doi.org/10.30875/58d7116b-en

WTO. (2022). *WTO STATS Database*. https://stats.wto.org/?idSavedQuery=28b93b35-5a28-42eb-a719-883dce2dd974

Xie, T. & Zhang, J. (2022). *Financial Default Risk Prediction Algorithm Based on Neural Network Under the Background of Big Data*. https://scite.ai/reports/10.1155/2022/8743778

Yahoo. (2023). *Crude Oil July 23 (Cl=F) Stock Historical Prices Data*. Yahoo! Finance. https://finance.yahoo.com/quote/CL=F/history/

Yılmaz M., Kaya H., Coşkun E. & Korkmaz T. (2021). The Impact of COVID-19 on Sectoral Indices: Evidence from Wavelet Coherence Analysis for Turkey. *Journal of Risk and Financial Management, 14*(2), 66.

Zhang, W. & Hamori, S. (2021). Crude Oil Market and Stock Markets During The COVID-19 Pandemic: Evidence from the US, Japan, and Germany. *International Review of Financial Analysis, 74*, 101702. https://doi.org/https://doi.org/10.1016/j.irfa.2021.101702

Zhang, Y., Liu, Z. & Shen, Y. (2020). Economic Policy Uncertainty and Exchange Rate: A Quantile-On-Quantile Approach. *International Review of Economics & Finance, 69*, 483-4933

Zhao, L., Rasoulinezhad, E., Sarker, T. & Taghizadeh-Hesary, F. (2023). Effects of COVID-19 on Global Financial Markets: Evidence from Qualitative Research for Developed and Developing Economies. *The European Journal of Development Research*, *35*(1), 148-166. https://doi.org/10.1057/s41287-021-00494-x

Zivot, E. & Andrews, D. W. K. (2002). Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis. *Journal of Business and Economic Statistics, 20*(1), 25-44. https://doi.org/10.1198/073

Li, Z., Farmanesh, P., Kirikkaleli, D. & Itani, R. (2022). A Comparative Analysis of COVID-19 and Global Financial Crises: Evidence from US Economy. *Economic Research-Ekonomska Istraživanja, 35*(1), 2427-2441. https://doi.org/10.1080/1331677X.2021.1952640

Çıkar Beyanı: Yazarlar arasında çıkar çatışması yoktur.

Etik Beyanı: Bu çalışmanın tüm hazırlanma süreçlerinde etik kurallara uyulduğunu yazarlar beyan eder. Aksi bir durumun tespiti halinde Fiscaoeconomia Dergisinin hiçbir sorumluluğu olmayıp, tüm sorumluluk çalışmanın yazarlarına aittir.

Yazar Katkısı: Yazarların katkısı aşağıdaki gibidir;

Giriş: 1. yazar

Literatür: 2. yazar

Metodoloji: 1. Yazar

Test sonuçları yorumlanması: 1. Yazar

Sonuç: 1. yazar

1. yazarın katkı oranı: %70. 2. yazarın katkı oranı: %30.

Conflict of Interest: The authors declare that they have no competing interests.

Ethical Approval: The authors declare that ethical rules are followed in all preparation processes of this study. In the case of a contrary situation, Fiscaoeconomia has no responsibility, and all responsibility belongs to the study's authors.

Author Contributions: author contributions are below;

Introduction: 1. author

Literature: 2. author

Methodology: 1. Author

Results: 1. Author

Conclusion: 2. author

1st author's contribution rate: %70, 2nd author's contribution rate: %30.