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# Impact of Natural Disasters on Stock Exchange Markets –2023 Turkey Earthquake and Borsa Istanbul

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**ABSTRACT:** *Natural disasters such as severe earthquakes have a significant impact on the economy, and as a result, the financial markets and investors should take this into account. Turkey is one of the places where natural disasters like these occur frequently due to its geography and its economy is severely impacted by the earthquakes. On February 6th, 2023, at 04:17 and 13:24, two huge earthquakes with a magnitude of Mw 7.7 and Mw 7.6 occurred, the epicenters of which were Pazarcık and Elbistan (Kahramanmaraş), respectively. In this study, the effect of such a great disaster on the stock prices in Turkey on industry basis is investigated. In this context, the current study will evaluate the shock impact of the Kahramanmaraş centered twin earthquake disasters on the stock prices of stone&soil companies by the event study method. The study's findings may contribute to the existing literature by shedding light on the potential reactions of investors and stone&soil stocks to destructive disasters.*

**KEYWORDS -***Natural Disasters, Earthquake, Event study, Borsa İstanbul, Stone&Soil Index*

## I. INTRODUCTION

The world continuously struggled with many natural catastrophes, such as earthquakes, tsunamis and floods in the recent decades and the amount of researches on the monetary and economic impacts of these natural catastrophes has grown in parallel [1], [2]. The results of these disasters vary according to many factors, such as the magnitude and scope of the event [3].

Turkey is one of the places where natural disasters like these occur frequently due to its geography and its economy is severely impacted especially by the earthquakes [4]. On February 6th, 2023, at 04:17 and 13:24, two earthquakes with a magnitude of Mw 7.7 and Mw 7.6 occurred, the epicentres of which were Pazarcık and Elbistan (Kahramanmaraş), respectively [5].

The earthquakes were effective in an area of 108,812 km2, which includes 11 provinces in the Eastern and South-eastern Anatolia Region. The earthquakes, which were recorded as the most destructive earthquake storm in the history of the country, were felt very strongly in Hatay, Kahramanmaraş, Malatya, Adıyaman, Kilis, Gaziantep, Adana, Diyarbakır, Osmaniye, Elazığ, and Şanlıurfa causing a heavy damage [5].

**Figure 1. Kahramanmaraş Earthquake impact area [5]**

As a result of the natural disaster that killed about 50,000 people, a significant number of people were forced to move to alternative regions of the country [6]. Many buildings and neighbourhoods were collapsed or seriously damaged. Also, a lot of businesses had to stop their activities which led to job losses. People living in the earthquake zone were given temporary places to live. According to AFAD [5], businesses located in the earthquake zone were granted a deferment of credit repayments, and the credit guarantee fund surety limits, which were backed by the treasury, were increased.

Özdoğru [7] states that, according to preliminary studies based on the first data collected after the earthquake, the plan to rebuild the area will cost about $150 billion over five years and this will have a severe negative impact on Turkey's public finance and financial risk indicators. According to Özdoğru [7], in 2023, economic growth is expected to be 1.2 points lower than what the baseline scenario predicted before the

earthquake. The highest part of this cost is the reconstruction, reinforcement and repair costs of the superstructure and infrastructure caused by the demolition in the region. It is estimated that the cost of infrastructure and superstructure construction activities will be around $88 billion and half of the cost will be financed by the public [7].

The earthquake also had a detrimental impact for financial markets. The BIST100 index experienced a loss of approximately 10% on the first trading day following the earthquake. The Istanbul Stock Exchange, on the other hand, decided to temporarily halt trading after the earthquake for a period of one week [4].

It is crucial for investors and markets to understand the relationship between natural disasters and the financial markets. Because earthquakes are events that could not be known before, they offer new information to the markets. In this context, in accordance with the Efficient Markets Hypothesis, securities' prices are expected to quickly reflect the new information coming to the markets [8], [9].

Earthquakes have a great destructive impact on the building stock and the construction sector is generally affected positively by earthquakes as there will be a need for restructuring after the earthquake and significant returns are observed in the stocks of the companies in this sector [9].

In this backdrop, this paper investigates the sectoral impact of such a catastrophic event on the Turkish financial markets. Using the event study approach, the current study will assess the impact of the twin earthquake catastrophes in Kahramanmaraş on the stock prices of BİST Stone&soil (XTAST) companies, since this industry is one of the main sources of the construction industry, which is expected to boost with the investments in the earthquake region as well as urban transformation in risky cities, especially in İstanbul.

In the study, XTAST companies' diary data between 16.01.2023 and 03.03.2023 is used. In the analysis, using an appropriate software, the event analysis (event study) method is applied and the event date is determined as February 6th, 2023, when the earthquake occurred.

The findings of this research can contribute to the body of literature in terms of revealing how investors and stone & soil stocks can react to destructive disasters like earthquakes.

This study starts with the introduction and literature review sections, where the purpose, significance, and impetus for the study are explained. The data set and methodology are broken down in depth in the third section. The research results are provided and discussed in the final section. The evaluation of the results in light of the existing literature and the provision of recommendations forms the final section of the study.

## II. LITERATURE SURVEY

The natural disasters that the world faces not only cause a lot of deaths, but they also cause huge economic losses for the countries [4]. According to Mahalingam et al. [10], the costliest natural disaster documented to date was Hurricane Katrina's landfall in Louisiana in 2005, with a cost of over 150 billion USD, while the S&P500 index experienced a 3% eight-day rally after the disaster. The Tohoku earthquake, which occurred in Japan in 2011, was followed by a massive tsunami and nuclear power plant meltdown, making it the second most expensive natural disaster in terms of reconstruction costs, at approximately $122 billion. The incidents initially produced market turmoil; the Tokyo Nikkei index fell 1.7% on the same day, but recovered later [10].

Unlike other natural catastrophes (such as droughts, floods and hurricanes), earthquakes happen relatively sudden, which can catch financial markets off guard [11]. Because of their low predictability, earthquakes are among the most destructive natural disasters that have a negative impact for economies in terms of both property damage and human lives lost and they have severe monetary, ecological, and societal consequences [11], [12].

In this section, important studies in the literature that primarily analyze the effects of the earthquakes on stocks as well as the connection between earthquake/other disasters and financial markets/sector stocks are summarized. A rising body of research has begun to examine the economic and larger socio-political implications of natural disasters but the studies on the effect of earthquakes on stock markets are limited.

According to Fama [13], a market is efficient when securities prices accurately reflect all relevant information. Fama [13], in his study in which he explains the efficient market hypothesis, classified three forms of market efficiency as weak form (past results are indicative of future prices), semi-strong form (prices of the stocks reflect all the information open to public) and strong form (investors have monopolistic access to non-public information that can affect market prices) efficiency. This classification has made it possible to test the efficient markets hypothesis according to different information sets.

According to the efficient markets hypothesis, no investor should be able to generate an above-normal return using the available information. All public information should already be reflected in prices in semi-strong form efficiency. However, there are studies showing that sometimes, contrary to this situation, some investors can obtain above-normal returns on the basis of certain criteria. In this framework, the situation in which abnormal returns are obtained in the market that cannot be explained by the efficient markets hypothesis is explained with the term "anomaly" in the finance literature [14].

Fama [15] stated that the clearest evidence of market efficiency could be obtained from event studies, particularly on daily returns. Besides he stated that event studies can give a clear picture of the rate at which prices adapt to information, and that the event study methodology can be used to test the market efficiency hypothesis in semi-strong form. Event Study methodology enables scholars of many disciplines such as accounting, economics and law as well as finance to analyze the effects of event [16]. MacKinlay [16] states that in an event study four consecutive steps is used: defining the event, defining the event window, evaluating the effects of the event, and evaluating the results by establishing and testing the model [16].

In this part of the study, similar event study researches on the effect of earthquakes over the stock markets are summarized. Shelor et al. [17] investigated the effects of the October 17, 1989 California earthquake on the values of real estate sector stocks. In their study, it was aimed to measure the price reaction of stocks to the event. The expected returns after the event were predicted by using the market performance before the event and compared the estimated returns with the realized returns. The findings show that the earthquake caused a negative change in the stock returns of the companies operating in the San Francisco region.

Yamori and Kobayashi [18] used the event study method to look at how the Japanese stock market affected the values of local insurance companies after the 1995 Hanshin-Awaji earthquake. It was found that the earthquake had a negative effect on stock prices and the Japanese stock markets.

Bolak et al. [19] examined the effects of the 1999 Marmara earthquake on the stock prices of companies listed in BIST, whose business was dependent on stone&soil. Using an event study methodology, researchers were able to determine that the post-earthquake returns of the equities they analyzed were significantly higher than usual.

Worthington's [21] research examined at how natural disasters and other natural catastrophes that occurred in Australia between January 1, 1980 and June 30, 2003 affected the returns of the Australian stock market. In the study, the return series was modelled with a GARCH-Mean model, and natural disasters and events like storms, floods, cyclones, earthquakes, and forest fires were used as exogenous explanatory variables. The results show that natural disasters and events do not have a significant effect on returns.

Using the event research technique, Takao et al. [22] examined how the Great East Japan Earthquake of March 11, 2011, affected non-life insurance firms. The results led to the conclusion that insurance company stock prices were negatively impacted following the earthquake.

Scholtens and Voorhorst [23] analysed more than 100 earthquakes that took place in 21 countries between 1973 and 2011 using the event study method and reached the point where they had a significant and negative impact on their stock market value. In addition, it was emphasized that the said effects did not change according to the severity of the earthquake and the income status of the countries. According to Arndt et al. [24], it seems hard to figure out how a certain natural disaster affects people because the winners and losers might cancel each other out.

Yılmaz et al. [9] used the event study method to look at how the Ceyhan, Marmara, and Van earthquakes in Turkey affected the stock returns of companies in different industries that were listed on Borsa Istanbul. These three earthquakes happened at different times. According to the study's results, the Marmara earthquake had a negative effect on the banking, insurance, and real estate investment trust sectors, but a positive effect on the stone-soil sector. The Van earthquake had a positive effect on the stone-soil sector but had no effect on the other sectors. Also, it was said that the Ceyhan earthquake didn't cause any unusual returns in the sectors mentioned since the magnitude and the effect of the earthquake was low.

Using the GARCH-X model, Ferreira et al. [11] evaluated the effect of major earthquakes on the returns and volatility of stock market indices in 35 financial markets over the period of past two decades. Macroeconomic factors and characteristics of the earthquakes (per capita gross domestic product, magnitude of the earthquake, distance from the epicentre, and the amount of deaths) mediate the effect of earthquakes on the returns of stock markets, which results in a zero net effect. Yet, the impact of these factors differs per market, which indicates that global capital markets do not follow a consistent pattern. It is underlined that worldwide financial markets are robust to earthquake-induced shocks, albeit domestically, and that earthquakes outside of Japan have little effect on stock market volatility.

**Table 1. Literature review summary chart**

| Authors and Date of Study | Data | Methodology | Natural Disaster | Relationship |
|---|---|---|---|---|
| Shelor et al. (1990) | Real Estate Industry Stock Prices | Event Study | Earthquake | Negative |
| Yamori et al. (2002) | Japanese Stock Market – Insurance Industry Stock Prices | Event Study | Earthquake | Negative |
| Bolak et al. (2007) | BIST-Stone&Soil Industry Stock Prices | Event Study | Earthquake | Positive |
| Worthington et al. (2008) | Australian Stock Market | GARCH-Mean model | Various | None |
| Takao et al. | Japanese Stock Market – Insurance Industry Stock Prices | Event Study | Earthquake | Negative |
| Scholtens et al. (2013) | Domestic Financial markets | Event Study | Earthquake | Negative |
| Yılmaz et al. (2015) | BIST – Various Industry Indices | Evet Study | Earthquake | Negative/Positive/None (Depending on the Industry) |
| Ferreira et al. (2015) | 35 Financial markets | GARCH | Earthquake | None |
| Barragan (2018) | Latin America Stock Market Indices | Event Study | Earthquake | Negative |
| Hamurcu (2022) | BİST- Insurance Industry Stock Prices | Event Study | Earthquake | Negative |
| Say e al. (2023) | BIST-30 | Event Study | Earthquake | Positive |

Using an event study technique, Barragan [25] examined the effect that 83 earthquakes had on seven different stock market indices in Latin American countries between the years 1989 and 2018. As a consequence of this, it is claimed that earthquakes have a major and negative effect on stock markets on the day of the event itself and within the first five days after the earthquake. In addition, Barragan [25] indicates that earthquakes with a larger destructive power have a greater influence on stock markets than those with a lower intensity scale.

Hamurcu [3] evaluated the impact of the İzmir earthquake, which occurred on 2020, on the BIST TUM index-listed stocks of insurance-related industries. The data were analyzed using the event study methodology. The results demonstrated that the earthquake had a negative impact on the cumulative returns of insurance sector stocks over 15, 30, 45, and 60 days.

Say et al. [8] examined the influence of the Kahramanmaraş earthquake on stock returns using the event study approach in a recent study. A positive abnormal return on the day of the event and the first day after the event was examined as a result of the analysis. On the other hand, a negative abnormal return was observed two days after the event. In addition, after the third day of the earthquake, no statistically significant average abnormal return was seen. Additionally, positive cumulative abnormal returns were observed before the event, on the event day, and on all following days.

The literature survey shows that, the effect of the natural disasters on the stock prices differ according to the macroeconomic variables of the countries, magnitude of the event and type of industry. This study will evaluate the shock impact of the Kahramanmaraş centred twin earthquake disasters on the stock prices of stone&soil industry companies by the event study method.

## III. DATA AND METHODOLOGY

The event study method has been used a lot in the financial literature to measure how stock prices respond to news about the economy or a company, as well as to unexpected events like terrorist attacks. The event study method is an analysis method developed by Fama, Fisher and Jensen [26] in order to measure the effects of actions and events on securities' prices [11].

According to MacKinlay [16], in order to conduct an event study, initially the "the event day" $T_0$, the "estimation window" [$T_0$-$T_1$] interval in which the parameter estimations will be made, the "event window" [$T_1$-$T_2$] interval in which the effects of the event will be examined, and a "post-event window" [$T_2$-$T_3$] especially in studies with long-term effects are needed to be defined.

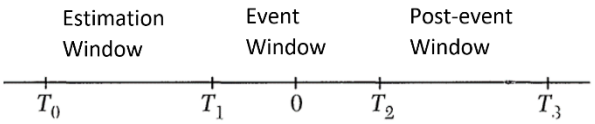


**Figure 2: Event study timeline [16].**

Unlike "announced events", for suddenly developing events such as earthquakes or terrorist attacks where the markets cannot create an expectation, it is more often used that the estimation window starts from the event day. In the studies conducted by Shelor et al. [17], Yamori and Kobayashi [18], Bolak and Süer [20] and Takao et al. [22], the event windows cover the day after the event day. So, in this study the event window is selected starting from the first trading day after the event day and post event window is excluded since long term data is not valid yet. The event study timeline is revised for this study as shown in Fig.3.

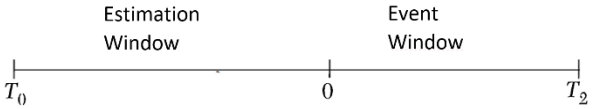


**Figure 3. Applied event study timeline**

There is no unity of practice in terms of the estimation and event windows used in the event study method in the literature and the length varies even in the same type of event studies in literature [27], [28], while according to Mackinlay [16] the estimation window should be more than 120 days. In this study, the dates for the analysis are defined as 8 months before and 1 month after the earthquake, which took place on February 6$^{th}$, 2024. The estimation window is '-1,-210' (covering 210 days) and the event windows of '0-30' is used. The closure prices of the XTAST companies and BIST 100 index for the selected window are obtained from İşyatırım website.

**Table 2: BIST Stone & Soil Companies [29]**

| No. | Code | Name of the company |
|---|---|---|
| 1 | AFYON | AFYON ÇİMENTO SANAYİ T.A.Ş. |
| 2 | AKCNS | AKÇANSA ÇİMENTO SANAYİ VE TİCARET A.Ş. |
| 3 | BASCM | BAŞTAŞ BAŞKENT ÇİMENTO SANAYİ VE TİCARET A.Ş. |
| 4 | BTCIM | BATIÇİM BATI ANADOLU ÇİMENTO SANAYİİ A.Ş. |
| 5 | BSOKE | BATISÖKE SÖKE ÇİMENTO SANAYİİ T.A.Ş. |
| 6 | BOBET | BOĞAZİÇİ BETON SANAYİ VE TİCARET A.Ş. |
| 7 | BUCIM | BURSA ÇİMENTO FABRİKASI A.Ş. |
| 8 | CMBTN | ÇİMBETON H.BETON VE PREF. YAPI EL. SAN. VE TİC. A.Ş. |
| 9 | CMENT | ÇİMENTAŞ İZMİR ÇİMENTO FABRİKASI T.A.Ş. |
| 10 | CIMSA | ÇİMSA ÇİMENTO SANAYİ VE TİCARET A.Ş. |
| 11 | DOGUB | DOĞUSAN BORU SANAYİİ VE TİCARET A.Ş. |
| 12 | EGSER | EGE SERAMİK SANAYİ VE TİCARET A.Ş. |
| 13 | GOLTS | GÖLTAŞ GÖLLER BÖLGESİ ÇİMENTO SAN. VE TİCARET A.Ş. |
| 14 | KLKIM | KALEKİM KİMYEVİ MADDELER SANAYİ VE TİCARET A.Ş. |
| 15 | KONYA | KONYA ÇİMENTO SANAYİİ A.Ş. |
| 16 | KUTPO | KÜTAHYA PORSELEN SANAYİ A.Ş. |
| 17 | NIBAS | NİĞBAŞ NİĞDE BETON SANAYİ VE TİCARET A.Ş. |
| 18 | NUHCM | NUH ÇİMENTO SANAYİ A.Ş. |
| 19 | OYAKC | OYAK ÇİMENTO FABRİKALARI A.Ş. |
| 20 | QUAGR | QUA GRANITE HAYAL YAPI VE ÜRÜNLERİ SAN. TİC. A.Ş. |
| 21 | USAK | UŞAK SERAMİK SANAYİ A.Ş. |
| 22 | YBTAS | YİBİTAŞ YOZGAT İŞÇİ BİRLİĞİ İNŞ. MALZ. TİC.VE SAN. A.Ş. |

In order to conduct event study, the daily closing prices of each XTAST company and BIST 100 index were used. The actual return of each stock and BIST 100 was calculated with the formula below [16], [30], [8]:

(1) $$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}}$$

$R_{it}$ represents the actual rate of return that the stock (i) has generated as of the related day (t), whereas Pit and Pit-1 stand for the stock price at closure on days t and t-1.

When estimating the market model, the rate of return on each stock during the estimation window is used [3], [30], [8].

(2) $$E(R_{it}) = \alpha_i + \beta_i R_{mt}$$

In this formula, the expected return on the stock (i) and the BIST100 index at day t are denoted by the notations $E(R_{it})$ and $R_{mt}$ respectively.

The market model was used to make an estimate of the expected rate of returns for a 31-day event window, which included 30 days after the earthquake. Calculations of abnormal returns, ($AR_{it}$), are performed on each of the 31 trading days for each stock using the following formula [16], [3], [30], [8]:

(3) $$AR_{it} = R_{it} - [E(R]_{it})$$

In addition, the formula for determining the average daily abnormal returns (AARt) for each day that falls inside the event window is as follows [16], [30], [8]:

(4) $$AAR_t = \sum_{i=1}^{n} \frac{AR_{it}}{n}$$

The cumulative average abnormal returns, or $CAAR_j$, are determined by the following formula [16], [3], [30], [8]:

(5) $$CAAR_j = \sum_{j=1}^{J} AAR_{i,t}$$

The statistical significance of the $AAR_t$ and $CAAR_t$ is evaluated using a parametric test - the t-test. The event provides significant abnormal return, if the average abnormal return or the cumulative abnormal rate of return is significantly different from zero.

As a result, whether the cumulative abnormal returns of the stone&soil industry stocks in BIST are different from "0" is tested with the following hypotheses.

$H_0$: The stock market is in semi-strong form and Kahramanmaraş based Earthquakes had no significant effect on the stone&soil industry stocks in the event period.
$H_1$: A significant positive cumulative abnormal return for the stone&soil industry stocks is obtained in the event period.

## The Study and the Results

In this study, the effect of on February 6th, 2024 dated and Kahramanmaraş based earthquakes on the stone&soil industry stocks is examined with event study methodology. Based on the closure prices of the 22 companies' stocks, Average Abnormal Return (AAR) and Cumulative Average Abnormal Return (CAAR) for the stone&soil industry stocks 30 days after the earthquake (0, 30) are calculated.

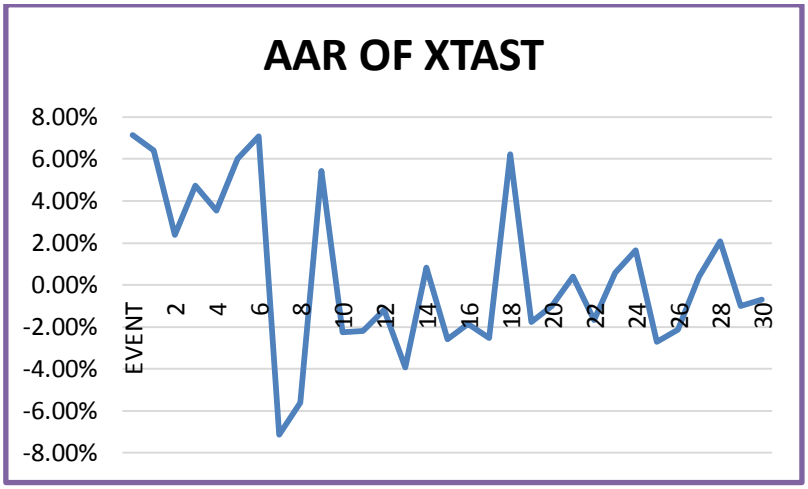


**Figure 4. Average Abnormal Return of XTAST stocks**

Average abnormal returns for companies in the stone and soil industry are shown in Fig. 4. The findings show that, there is a positive average abnormal return on the day of the event and up to the 6th day after the event. On the other hand, there is a negative abnormal return on the 7th day after the event and abnormal returns follow a fluctuating course in the subsequent period.

Fig. 5 shows the cumulative average abnormal returns for stone and soil sector firms. CAAR values were obtained non-zero on all days in the event window of the companies in the stone&soil industry. Cumulative abnormal returns take positive values during the 30 transaction days after the earthquake. At this point, one sample test statistics is conducted to determine whether these positive returns are significant.

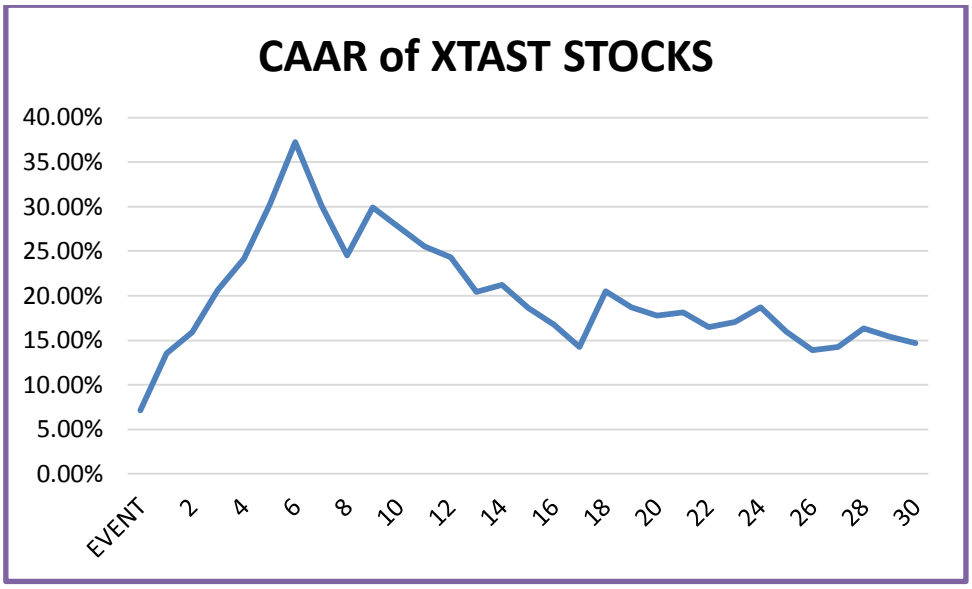


**Figure 5. Cumulative Average Abnormal Return of XTAST stocks**

The average abnormal and cumulative average abnormal returns calculated for the study are shown in Table 3. Throughout a 31-day event period, the significance of the 22 companies' daily average abnormal returns and cumulative average abnormal returns was assessed. The findings demonstrate that the earthquake had a significant positive effect on stone and soil stocks.

**Table 3: Abnormal Returns on Stone&soil Companies**

| DAY | DATE | AAR | AAR T-TEST | AAR P VALUE | CAAR | CAAR T-TEST | CAAR P VALUE |
|---|---|---|---|---|---|---|---|
| 0 | 06-02-2023 | 7,14% | **6,1154** | **0,0000** | 7,14% | | |
| 1 | 07-02-2023 | 6,42% | **3,2839** | **0,0035** | 13,56% | **4,8163** | **0,0001** |
| 2 | 15-02-2023 | 2,37% | **4,3248** | **0,0003** | 15,93% | **5,6324** | **0,0000** |
| 3 | 16-02-2023 | 4,72% | **3,8115** | **0,0010** | 20,65% | **5,2796** | **0,0000** |
| 4 | 17-02-2023 | 3,54% | **3,1163** | **0,0052** | 24,19% | **5,0359** | **0,0001** |
| 5 | 20-02-2023 | 6,00% | **7,9016** | **0,0000** | 30,19% | **6,2211** | **0,0000** |
| 6 | 21-02-2023 | 7,07% | **6,1923** | **0,0000** | 37,26% | **6,9302** | **0,0000** |
| 7 | 22-02-2023 | -7,14% | **-8,4138** | **0,0000** | 30,12% | **5,684** | **0,0000** |
| 8 | 23-02-2023 | -5,60% | **-5,0939** | **0,0000** | 24,52% | **5,2727** | **0,0000** |
| 9 | 24-02-2023 | 5,43% | **7,5210** | **0,0000** | 29,95% | **5,9122** | **0,0000** |
| 10 | 27-02-2023 | -2,24% | -1,8978 | 0,0718 | 27,71% | **5,0167** | **0,0001** |
| 11 | 28-02-2023 | -2,20% | **-2,8442** | **0,0097** | 25,51% | **4,5386** | **0,0002** |
| 12 | 01-03-2023 | -1,18% | -1,7149 | 0,1015 | 24,32% | **4,3531** | **0,0003** |
| 13 | 02-03-2023 | -3,93% | **-7,0458** | **0,0000** | 20,40% | **3,9095** | **0,0008** |
| 14 | 03-03-2023 | 0,84% | 1,3512 | 0,1891 | 21,23% | **3,8688** | **0,0009** |
| 15 | 06-03-2023 | -2,59% | **-4,3127** | **0,0003** | 18,64% | **3,5636** | **0,0018** |
| 16 | 07-03-2023 | -1,86% | **-3,1281** | **0,0051** | 16,78% | **3,3196** | **0,0033** |
| 17 | 08-03-2023 | -2,51% | **-5,7714** | **0,0000** | 14,27% | **2,9781** | **0,0072** |
| 18 | 09-03-2023 | 6,22% | **7,4716** | **0,0000** | 20,49% | **3,8073** | **0,0010** |
| 19 | 10-03-2023 | -1,76% | **-3,9364** | **0,0007** | 18,74% | **3,4917** | **0,0022** |
| 20 | 13-03-2023 | -0,99% | **-2,0741** | **0,0501** | 17,75% | **3,2695** | **0,0037** |
| 21 | 14-03-2023 | 0,40% | 0,7995 | 0,4333 | 18,15% | **3,2086** | **0,0042** |
| 22 | 15-03-2023 | -1,67% | **-3,6348** | **0,0015** | 16,48% | **2,9917** | **0,0070** |
| 23 | 16-03-2023 | 0,57% | 1,1288 | 0,2673 | 17,06% | **3,1862** | **0,0044** |
| 24 | 17-03-2023 | 1,66% | **3,8348** | **0,0010** | 18,72% | **3,4121** | **0,0026** |
| 25 | 20-03-2023 | -2,71% | **-5,4692** | **0,0000** | 16,00% | **2,7948** | **0,0109** |
| 26 | 21-03-2023 | -2,14% | **-4,6621** | **0,0001** | 13,87% | **2,4435** | **0,0235** |
| 27 | 22-03-2023 | 0,40% | 0,8989 | 0,3762 | 14,27% | **2,4583** | **0,0227** |
| 28 | 23-03-2023 | 2,09% | **5,1025** | **0,0000** | 16,35% | **2,7524** | **0,0119** |
| 29 | 24-03-2023 | -0,99% | **-2,5839** | **0,0172** | 15,36% | **2,5601** | **0,0182** |
| 30 | 27-03-2023 | -0,70% | -0,9447 | 0,3554 | 14,66% | **2,4356** | **0,0239** |

Although the analysis results are determined during the 30 days after the event, as mentioned by Shelor et al. [17], especially the first few days of processing time after the earthquake is more decisive in determining whether the earthquake creates a new information input.

According to the results, average abnormal returns for XTAST firms increased in the first 6 days after the event day. The CAAR for the event day and the day after the event are %7,14 and %13,56 respectively. At the 6th day, CAAR reaches the highest rate (%37,26), and then for 31 days event window (0,30), the CAAR is calculated as %14,66. It has been determined that the positive impact that the earthquake had on the stone&soil stocks is valid of the subsequent 30-day period. This outcome can be understood as the effect of the earthquake continued for a certain time and CAAR reached its max. on the 6th day, but then CAARs started to tend to decrease although ended up with a positive CAAR in '0,30' event window. There is a significant positive effect of the earthquake on the stone&soil industry stock prices therefore H1 hypothesis is valid for '0,30' event window. In this respect, it supports the findings of the studies of Yılmaz et al. [9] and Bolak et al. [19].

According to the efficient markets hypothesis, in order to be effective in a semi-strong form for a market, the disclosure of information about the companies or the market should be reflected instantly on the share prices of the companies and should not affect the share returns [14].

To put it another way, investors should not be able to make significant abnormal returns as a result of any event in an efficient market. Therefore, it can be concluded that the H0 hypothesis, which states that the market is efficient in a semi-strong form, cannot be supported for this event study. Besides, H1 hypothesis, which states that there is a significant positive cumulative abnormal return for the stone&soil industry stocks in the event period, is supported with the results of this study.

## IV. CONCLUSION AND FUTURE IMPLICATIONS

This research, where the event study technique is utilized in order to investigate how the Kahramanmaraş based earthquake that occurred on February 06th, 2024 affected the stocks of the stone and soil industry stocks in short term, has some limitations.

Firstly, the study deals with the effects of earthquake only on the financial market and the stone and soil industry is selected because of the expected high demand for the materials produced by this industry after the earthquake so the findings are related with the stock prices of one industry companies. Results may differ for companies of different sizes or industries.

Additionally, the study's event window was restricted to 30 days following the earthquake, and longer periods were not included in the analysis. It has been proposed that considering these limitations, utilizing this method to study the effects of multiple disasters, and measuring behavioral finance trends that are expected to influence investor behavior can all add to the body of literature.

In this manner, for future studies, research can be enlarged in terms of multiple events (other earthquakes and disasters) or the impacts of different disasters for different sectors or other markets such as goods or services, as well as for different countries can be investigated.

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